March 2024

Organisation of Eastern Caribbean States

OHCP GRADE 3 SCIENCE

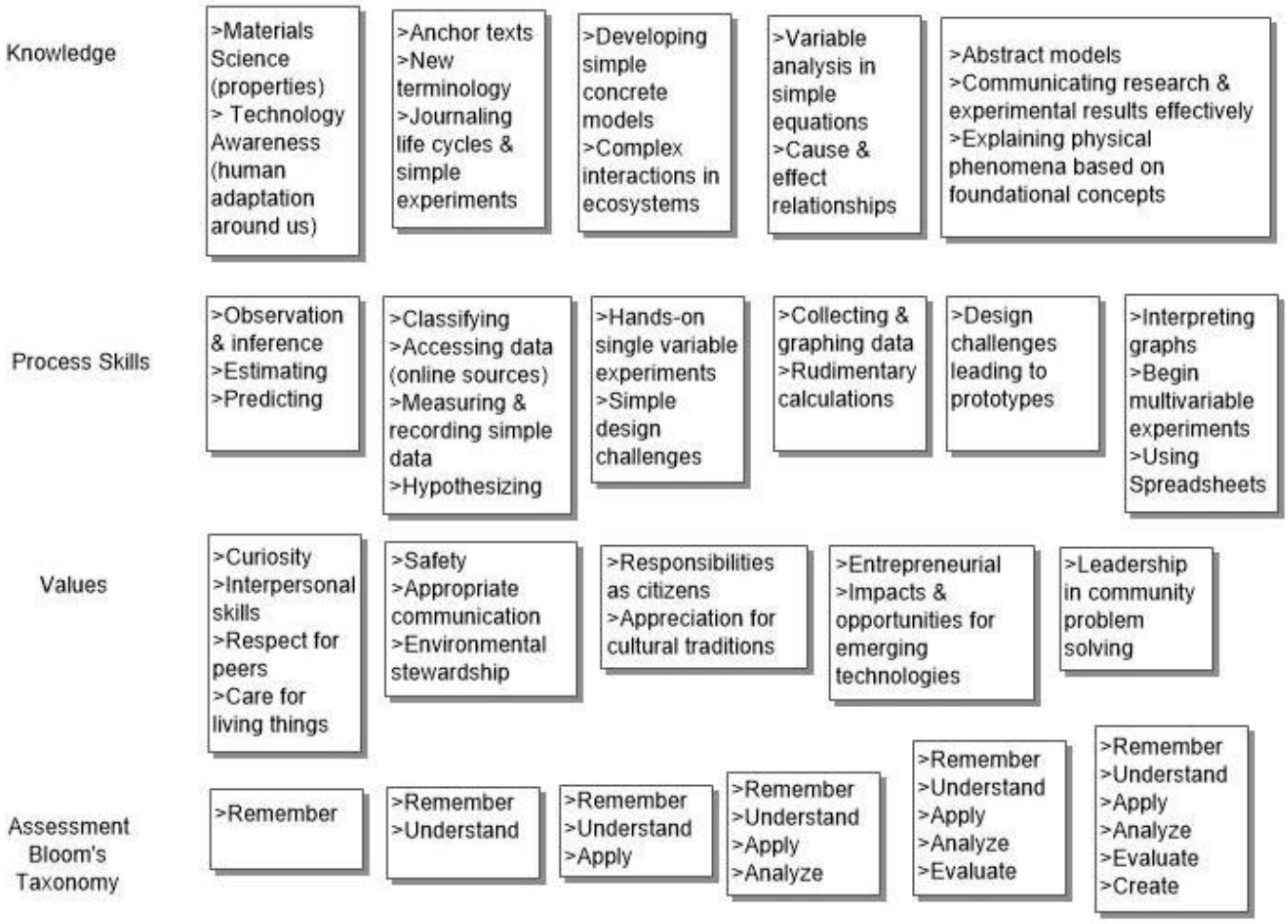
Science Grade 3

Introduction

Growth Area	No Implementation	Beginning Implementation	Moderate Implementation	Strong Implementation
Constructivist Pedagogy	Teacher-centered delivery of lessons	Evidence of hands-on activities	Evidence of teacher-scaffolded investigations that involve teacher-student & student-student discussions. Minds-on learning.	Active lessons that begin with questions about the world (and inherent discussions) that are socially relevant & invoke cultural perspectives.
Building Process Skills	Lessons that rely solely on the recall of knowledge	Students are involved in experiments	The processes of science & 21st century skills are highlighted in student-centered activities. (e.g., observing, inferring, hypothesizing, measuring, graphing etc. & researching, critical thinking, communicating)	Evidence that the lesson, within active authentic learning contexts (real world questions) involves tracking & evaluating student growth in the processes of science & 21st century skills.
Integrating Subjects	Attention to subject focused topics rather than student outcomes	Reading about science topics & collecting/tabulating data.	Emphasizing **literacy** (Reading anchor texts, researching, listening, writing & communicating). Emphasizing science studies that invoke **social** concern & discussion. Emphasizing the collection, interpretation & communication of **numbers** as an account of science investigation	Science Investigations that begin with socially relevant questions that require numerical analysis &, in communication of results, invoke quality discussions that develop literacy skills.
Empowering learning with Instructional Technology	No technology tools evident. Teacher-led instruction accessing traditional resources; primarily textbook-based instruction	Use of simple technologies to motivate learners. These may or may not activate new ways of learning.	Use of technologies to access enhanced types of learning that place the student at the center of constructing knowledge. (e.g. student-led simulation activities, use of computer probes to collect data, logic exercises with coding)	Use of digital pictures, video, simulations & probes to pose authentic real world questions as a basis for discussions & developing process skills.
Integrating Technology as "a way of adapting"	No evidence of problem solving in any context	Simple activities that challenge students to think about the problem solving that has led to human adaptation in the world. This necessarily involves developing an awareness of technology around us	Activities that emphasize design challenges that rely on careful planning, prototyping & testing.	Lessons that invoke problem solving to design solutions in response to community problems.

Grade 3 Science

Progression of Students' Knowledge Skills & Values P-6



**Skills and Attitudes Captured Verbatim from the OECS Performance Standards for Grade 3

SKILLS: Summary of Skills to be developed by Grade 3 pupils

In the development of inquiry, problem identification, design and solution pupils will demonstrate the following:

Observing	Identify differences and similarities between objects and events.
Measuring	Use simple measuring models of measuring instruments.
Manipulating	Manipulate simple equipment and gadgets.
Recording	Fill out correctly tables to report findings from investigations.
Classifying	Group objects according to several different criteria.
Communicating	Talk freely about their activities and ideas they have, using a variety of methods of reporting.
Inferring	Discern patterns and relationships in simple measurements and events.
Interpreting Data	Compare their findings with their predictions.
Experimenting	Suggest a set of ideas about how they could find out answers to questions.
Predicting	Attempt to use evidence to make a series of predictions.
Hypothesising	Suggest how an event may have happened.
Problem Solving	Suggest at least two (2) solutions to a simple problem.
Designing	Select appropriate material to make models and gadgets, giving reasons for choice.

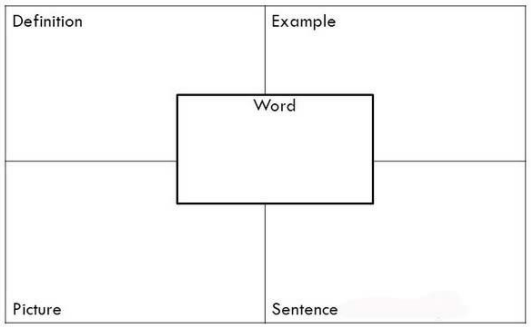
ATTITUDES - Summary of Attitudes to be developed by Grade 3 pupils

In the activities throughout the Grade 3, pupils are encouraged to develop attitudes required for positively interacting with scientific and technological ideas and concepts. At the end of the Grade these are some of the attitudes that should be evident:

Curiosity	Ask questions about objects, events and matters not necessarily part of the class activity.
Inventiveness	Suggest new ways to do old investigations.
Respect for Evidence	Support their explanations and conclusions using evidence.
Persistence	Complete activities in spite of challenges.
Respect for living things	Appreciate that all living things deserve respect and protection.
Cooperation	Share and work together with others.
Concern for Safety	Realize that safety instructions should be heeded.

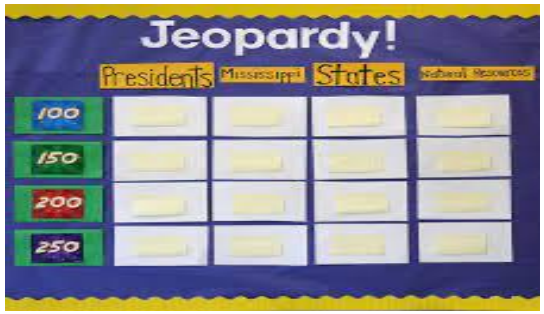
Science Grade 3

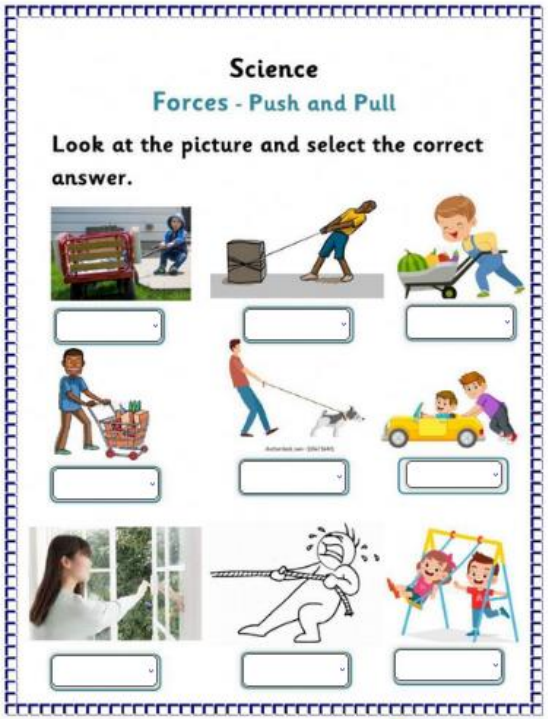
Introduction to the Subject: The study of science encompasses knowledge, processes, and values. Scientifically literate persons will foster an attitude of caring not only for themselves but as responsible citizens, for the world around them. Their decision-making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Forces and Interactions Force and motion are important parts of everyday life. As students study this unit, they will learn how these physical factors impact their lives and work. The lessons and activities will help students become aware of factors like friction, gravity, and magnetic force.
Essential Learning Outcomes: ELO-1 **Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

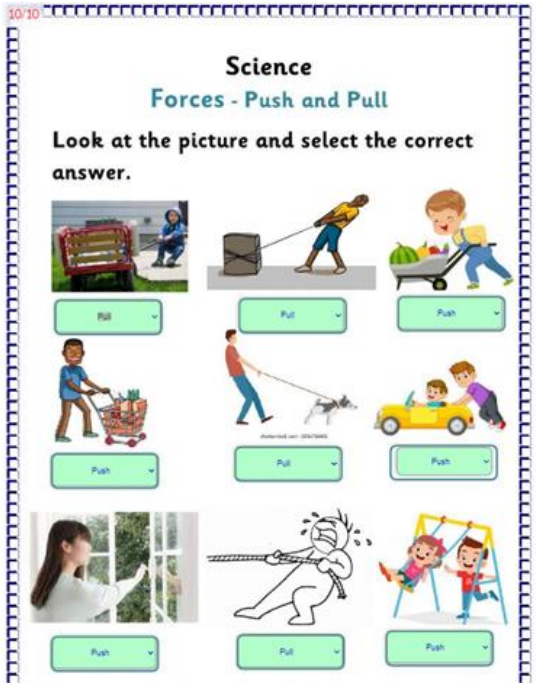
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Learners are expected to: **<u>Knowledge</u>** • Define the terms: ○ pull ○ push ○ force ○ speed ○ velocity ○ frictional force ○ mass ○ balanced force ○ unbalanced force ○ gravity force ○ magnetic force	**Literacy Development** Teachers may use a Frayer Four Square to monitor students' understanding of key terminology developed in the lesson. Frayer Model (Four Square) Reinforcing Vocabulary 	**Understanding Force as a Push or Pull**  *Source: Retrieved from* WR2871509

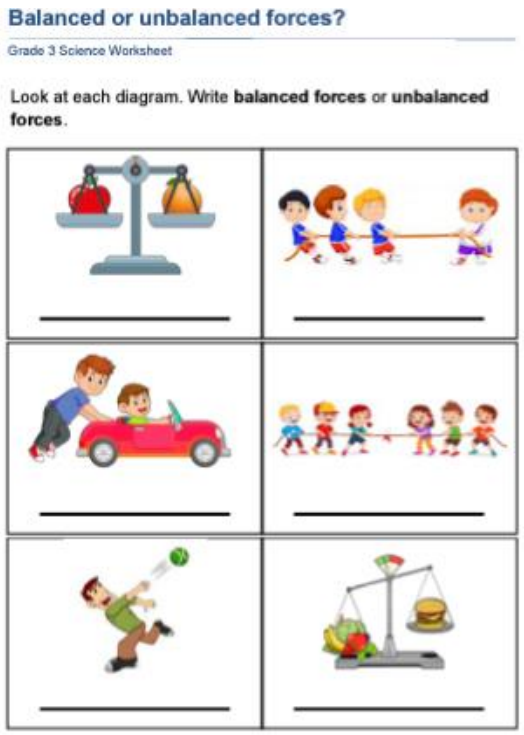
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Identify forces as pushes or pulls. • Identify forces used to create movement or change in given situations. • Give examples of balanced and unbalanced forces. • Describe the effects of balanced and unbalanced forces acting on a variety of everyday objects. • Identify force as a push or pull by one body on another. • Identify, demonstrate and give examples of push and pulls (ST 1 PS FMS 1). • Describe and demonstrate the forces of push and pull. (ST 3 PS FMS 1). • Identify, with examples, forces at work in everyday situations in the home and community. (ST 3 PS FMS 2). • Describe the visible effects of push and pull on a variety of everyday objects. (ST 4 PS FMS 4). **<u>Skills</u>** • Compare balanced and unbalanced forces using a Venn Diagram. • Demonstrate ways in which unbalanced forces can cause change in motion (start movement, increase speed, reduce speed, change direction).	**Practicing Terminology- Jeopardy** Students will engage in a game of jeopardy to assess students' knowledge on defining the terms. Students can work individually or in groups. Write a list of the words in an area where all can view. (pull, push, force, friction, mass, balanced force, unbalanced force, gravity). On an empty wall, create a grid with 16 papers (letter size) (4x4). Each grid will have points ranging from 100 to 400. Under each grid will be 8 definitions and 8 scenarios. Under the paper the teacher will write the definitions as written below. Meanings: 1. Push: the act of moving an object away from oneself. 2. Pull: the act of moving an object towards oneself. 3. Force: is any push or pull on an object. 4. Friction is a force that acts between two objects that are in contact with one another. 5. Mass is the measurement of how much matter is contained in an object. 6. Balanced Force is the acting on an object which does not change the state of rest or uniform motion of it. 7. Unbalanced Force is when the force applied in one direction is greater	 *Source Retrieved From:* [father-with-daughter-on-playground-swing-gm1311824561-400811887] Look at these two pictures. What do they show? (*Girls on swings with their dads*) Have you ever been on a swing? (*Yes/No*) Do you like being on a swing? (*Yes/No*) How does the swing work? What is being pushed? (*The swing./ The person on the swing.*) What happens when the swing is pushed? (*The girl moves forward*) What is being pulled?(*The swing./ The person on the swing*) What happens when the swing is pulled? (*The girl goes backward*)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Demonstrate the effect of balanced forces on objects. • Conduct an Investigation on the ways in which different forces (e.g. magnetism, static electricity, muscular force, gravitational force) can change the speed and direction of a moving object. **<u>Attitudes/Values</u>** • Appreciation of the visible effects of push and pull on a variety of everyday objects. • Appreciate that forces are all around us and they can sometimes help us do work and also can cause us problems. • Appreciate that humans are great problem solvers who have tried diligently to overcome forces of friction and gravity to make life easier. • Work collaboratively in groups to complete assigned tasks that require the use of balanced and unbalanced forces. • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges.	than the force applied in the opposite direction. 8. Gravity: the force that attracts a body towards the centre of the earth, or towards any other physical body having mass. Scenarios: 1. I am turning up the volume on my cell phone. Which word describes the force that I used? (what is push?) 2. I am trying to take my book from my teacher. What word best describes the force that is used? (what is pull?) 3. I placed my pencil on the table but it rolled off. (what is an unbalanced force?) 4. I throw my ball up towards the ceiling but it always seems to fall back down. What word best describes the force that pulls the ball down? (What is gravity) 5. I placed my apple on my stack of textbooks and it's not moving. What word best describes this force? (what is a balanced force?) 6. I am pushing my dresser across my bedroom. What am I creating between the floor and the dresser? (what is friction) 7. I can choose to push or pull my grocery cart. What do I use to move the cart? (what is force) 8. I can be heavy or light (what is mass)	 *Source: Retrieved from: https://www.alamy.com/stock-photo/children-on-swings.html?sortBy=relevant* In this picture, who was pushed? Who was pulled? How did you know?(*pushed: boy in white shirt, orange shirt - forward movement pulled: girl in blue, boys in red - backward movement*) In order to play on a swing, forces must be used. Have you ever heard the word force? What is a force? (*Write down the students suggestions*) A **force** is any push or pull on an object. A force that changes the direction of an object towards you, would be a pull. On the other hand, if it moves away, it is a push. Just like we observed with the girl on the swing. When a pushing force was applied, she moved forward and when a pulling force was applied, she moved backward. Formative Assessment: Imagine you were sitting in a chair with your eyes closed and someone pushed it. Explain in your own words, what you would feel as you moved? How would that feeling be different if they pulled the chair. Can you use the word force in a sentence that helps you describe that feeling?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Participate actively in classroom discussions.	 The teacher will decide on the arrangement on the grid with the top row being 100 points, 2nd row being 200 points, third row being 300 points, and bottom row being 400 points. When the student is ready to play they will select the points they want added to their total score. If they get the answer or respond correctly the points will be added to their total. If they did not respond correctly the teacher will give the next student or team a chance to respond and if they get it correct, they get the score. Now if no one gets it, then the teacher will reveal the answer and the sheet is placed on the side.	Let us listen and watch the video carefully to learn more about forces. As you watch, think about answering these questions: *1)* What does it mean to put something in motion? (*get it moving)* 2) What is needed to create motion? (*apply a force*) 3) How is a push different from a pull? (*push – the object is away from you/ your body; pull – the object is towards you/your body*) Click on the link: https://www.youtube.com/watch?v=-lOyW3pEUl0 (2.50 mins) **Review on board** A **push force** is the force that is responsible for an object moving from the state of rest away from the person or thing applying the force. Some examples of push forces are: • Pushing the trolley. • Pushing the car when it breaks down. • Pushing the table from one place to another. Can you think of other examples of push forces? (*students share their experiences with push forces. Add good examples to the list of push forces*) Let us discuss pull forces. A **pull force** is the force that is responsible for an object moving from the state of rest but towards the person or thing applying the force.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Push Pull Worksheet  Retrieved from: https://www.liveworksheets.com/w/en/science/1726952 Teacher will access the document and print copies for her students. Or students can complete the worksheet on devices if possible. Students will say what they see in each picture and the teacher will clarify if necessary.	Some examples of pull forces are: ● Pulling the curtain. ● Dragging the box. ● Opening of the door. Can you think of other examples of pull forces? (*students share their experiences with pull forces. Add good examples to the list of pull forces*) Look at the exercise below. Complete it using the knowledge acquired from the above information. Look at each picture carefully, place a tick next to the correct answer. Have Fun!!

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Answer Sheet  Students will complete the following worksheets Retrieved from: https://www.k5learning.com/worksheets/science/grade-3-balanced-forces-d.pdf Look at each diagram. Write balanced forces or unbalanced forces.	 Retrieved from: https://www.kidsacademy.mobi/printables/push-or-pull-1/ Look at the pictures below. They are all examples of activities we engage in using either a push or a pull.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Teacher will make copies of the first worksheet and distribute them to her students. Or Students can use devices to complete the activity  Balanced or unbalanced forces? Grade 3 Science Worksheet Look at each diagram. Write **balanced forces** or **unbalanced forces**.	Can you think of other activities, games or scenarios where we can either push or pull for it to function? Share them with the class.  **Forces and Motion** You have probably heard the word "force" before in conversations. Here are a few examples: "the rocket had a lot of force to blast off" or "the force of the storm blew

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Answers  	the roof off the building." What is force**? Force** is defined as a push or pull on an object.  Retrieved from: https://dribbble.com/shots/3822584-Going-for-a Ride/attachments/10039979?mode=media When you ride a bike, your foot pushes against the pedal. The push makes the wheels of the bike move. Forces affect how objects move. They may cause motion; they may also slow, stop, or change the direction of motion of an object that is already moving. Since force causes changes in the **speed** or direction of an object, we can say that forces cause changes in **velocity**. **Avoid Confusing Speed and Velocity** Students, sometimes people confuse speed and velocity. They are not the same. Speed is simply how fast you are going. Velocity is not only how fast you are going but, in what direction that you are traveling. Example: Sarah was traveling 10 kms per hour on the street in front of her house. Philp was riding his scooter 15 kms per hour west ward on the same street.

<table>
<tr><th>Specific Curriculum Outcomes</th><th>Inclusive Assessment Strategies</th><th>Inclusive Learning Strategies</th></tr>
<tr>
<td></td>
<td>Worksheet on balanced and unbalanced forces:
Retrieved from:

https://www.k5learning.com/worksheets/science/grade-3-balanced-forces-b.pdf

 
</td>
<td>We say that Sarah was travelling with a speed of 10 kms per hour whereas Philip was traveling at a velocity of 15 kms per hour west.

Impacts of Force
Today we will work in pairs. I want each pair to get a ball and show ways you can:
(a) start the ball moving or set it in motion
(b) change its direction
(c) slow down or speed it up (increase speed)
(d) stop it from moving.

Now let us discuss the various ways forces can cause change in motion.
Now with your partner you are going to choose another object example toy car, pencil.

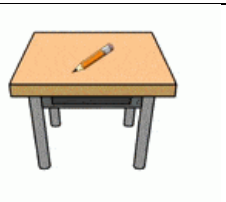
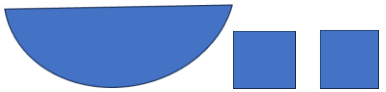
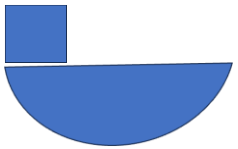
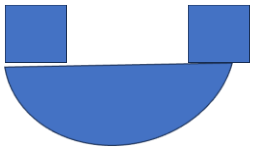
I also want you to complete the table below while doing this activity.

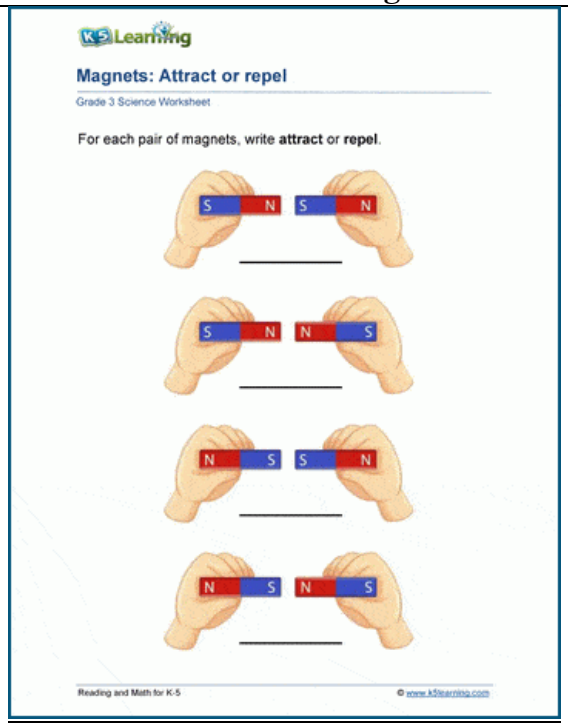
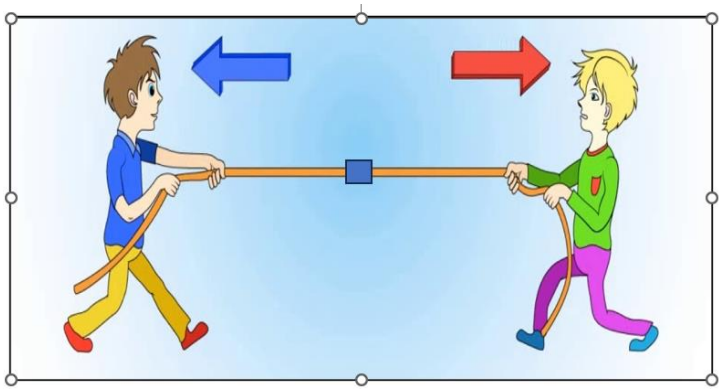
We chose to use a: _____

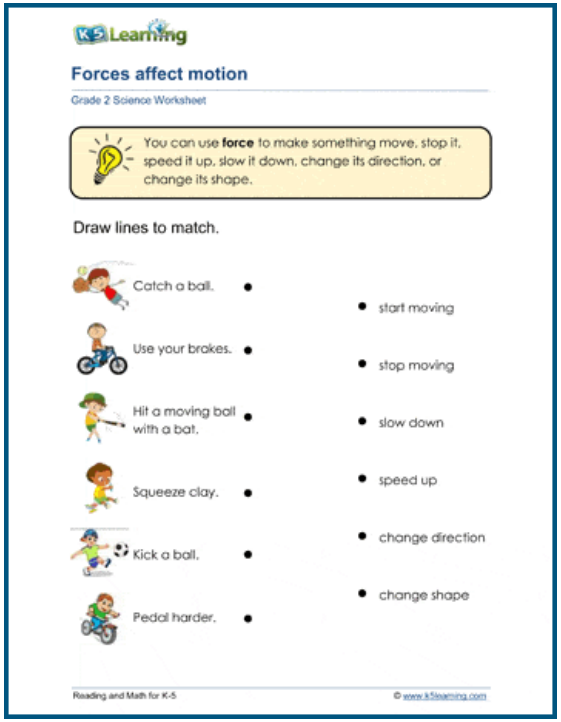
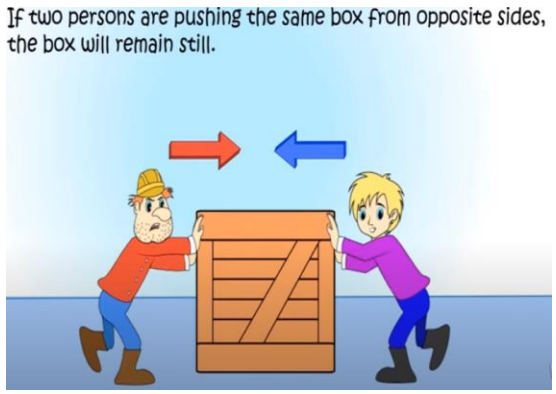
<table>
<tr><td>Change in motion</td><td>What we did</td></tr>
<tr><td>start moving</td><td></td></tr>
<tr><td>make it move faster</td><td></td></tr>
<tr><td>make it move slower</td><td></td></tr>
<tr><td>make it change direction</td><td></td></tr>
<tr><td>make it stop</td><td></td></tr>
</table>

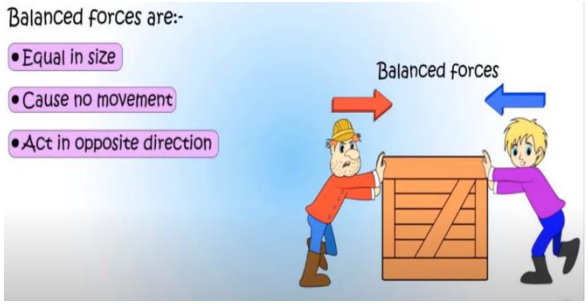
Table and activity retrieved from: Caribbean Primary Science Level 2</td>
</tr>
</table>

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Answers Draw one example of balanced forces and one example of unbalanced forces. *Answers will vary.* Do all forces cause objects to move or change shape? Explain. *If forces are balanced, objects will not change their shape or motion. Unbalanced forces will cause objects to change their motion or shape.* Assessment: Worksheets on Forces and Motion: Retrieved from: https://www.k5learning.com/science-worksheets/third-grade-3/forces-motion In this worksheet, Students will conduct an investigation and record what they see. Investigation #1: Put a pencil on a table. Questions: Does the pencil move? Explain why you think this happened.	Therefore, it can be interpreted that a push or pull force can do the following actions itself: ● A push or pull force may make an object move from rest. ● A push or pull force may change the speed of a moving object. ● A push or pull force may change the direction of a moving object. ● A push or pull force on an object or body may change the shape of an object. Examples of everyday activities which require either a push or a pull. With it, life would surely be difficult. 1. Thumb Pins 2. Opening and Closing a Door 3. Pushing a Car 4. Pulling a Cart 5. Inserting and Removing a Plug 6. Water Dispensers 7. Pulling Curtains and Blinds 8. Pushing Furniture 9. Typing 10. Walking 11. Playing Football 12. Dragging a Suitcase Let us now create a toy truck. Can you guess which force can be used to move it?

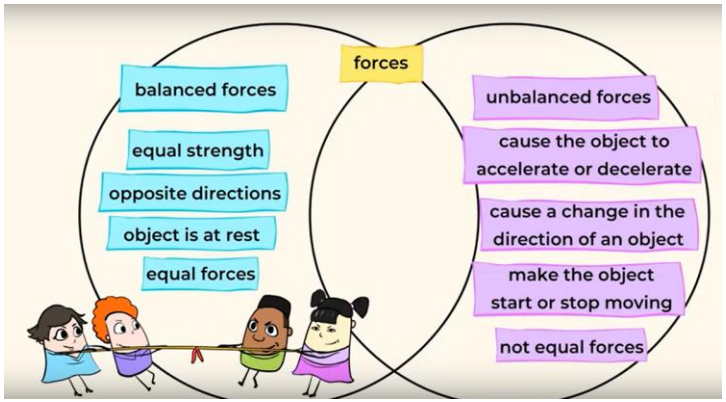
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	 Investigation #2: Gently push the pencil off the edge of the table. Questions: What happens? Explain why you think this happened.  Retrieved from: https://www.k5learning.com/science-worksheets/third-grade-3/electricity-magnetism	*https://www.youtube.com/watch?v=X-h9YS-mAI0 Link to video - How to make RC Tipper Truck from cardboard // very simple// the crafts crew.* **<u>Balanced and Unbalanced Forces</u>** You will be given the following block shapes:  Place one square block on the left side of your semicircle (moon shaped) block.  What did you observe happen to the blocks when the square was placed on one side of the semicircle? (*the half moon tipped t one side)* Why do you think this happened? (*Heavier side*) Now place both blocks on either side of the semicircle, what do we observe? (*the half moon block levels out)* 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	 The teacher will encourage students to bring a pair of magnets to school and engage. They will complete each as demonstrated on the worksheet and on the line they will record their answer **Retrieved from:** https://www.k5learning.com/worksheets/science/grade-2-forces-motion-a.pdf	What do you observe when both square blocks are placed on either side of your moon shaped block? Why do you think this is so?  Picture from video: https://youtu.be/-Rjid6hQuww?si=55uV0vxDtZEij5w9 What game are these two boys playing? (*tug of war)* Have you ever played this game before? (*yes/no*) Who wins in a tug of war game? (*team/person that is pulled towards the other or falls over*) Does the tug of war require a push or a pull force in order to play? (pull) Who is winning the game in the picture? (no one) Why? (*Both boys are the same distances from the blue box and are both standing upright.*)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	How force affect motion Students will read each scenario then draw a line to match.  **Retrieved from:** *https://www.k5learning.com/worksheets/science/grade-2-forces-motion-b.pdf*	Who applied more force in playing the game? (*same amount of force was applied by both boys*) The forces applied by these two boys are balanced. **Balanced force** is when two forces are pulling in the opposite direction are equal just like the picture of the two boys playing tug of war. There is no movement when forces are balanced.  Retrieved from: https://www.youtube.com/watch?app=desktop&v=-Rjid6hQuww In groups now you will demonstrate the effect of a balanced force by engaging in another activity where you and your partner will push a desk or box from the opposite side. Each person on the opposite side. Why didn't the desk move? (*with an equal amount of force, then neither of the team will move and it will be a tie*)

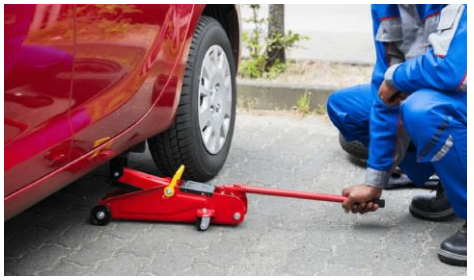
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	<u>Draw and write to show how you can use force to affect motion in each way</u> 1. *Make something start moving* 2. *Make something stop moving* 3. *Make something slow down* 4. *Make something speed up* 5. *Make something change direction* 6. *Make something change shape.* Worksheet on Magnetism Retrieved from: *https://www.k5learning.com/worksheets/science/grade-3-magnetism-d.pdf* Worksheet on Friction Retrieved from: grade-3-gravity-friction-d.pdf	What type of force prevented the desk from moving - balanced or unbalanced? (*Unbalanced*) What causes forces to remain balanced?  Retrieved from: https://www.youtube.com/watch?app=desktop&v=-Rjid6hQuww To conclude this activity we now will listen and view the book entitled : Balancing Act by Ellen Walsh I want you to listen carefully so you can answer the following questions: 1) What is a teeter totter? (*a board over a center that can move up & down)* 2) How did the mice balance the teeter totter? (*one mouse on each side)* 3) If they stand in exactly the same place on each side, what do we know must be true for the teeter totter to balance? (*each mouse must weigh the same*) 4) Will the tetter totter balance if the mice are at different distances from the center of the teeter totter? (*no, the closer one will push upward)*

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		5) Why does the addition of a salamander on one side cause an unbalanced tetter totter? (*more weight on one side pushes down*) Video reading here: *https://www.youtube.com/watch?v=H22Gv85lS_Q (4:32 min)* Let us now play our own tug of war game. There will be two teams. I will need eight students to assist, three students on team A and five students on Team B. (*Materials: rope, chalk, ruler*). [*Mathematics: measurement link in preparing for the tug of war activity*] There is an 'X" and two lines on the floor/ground. Each team stands behind a line. The team that wins the game pulls the other team over the 'X' that is on the ground.  Retrieved from https://ssimphal.nic.in/images/3012.jpg Who won our tug of war game? (*Team A/B*) Why did this team win? (*They pulled harder*) Did they apply the same amount of force? (*The team that won applied more force*).

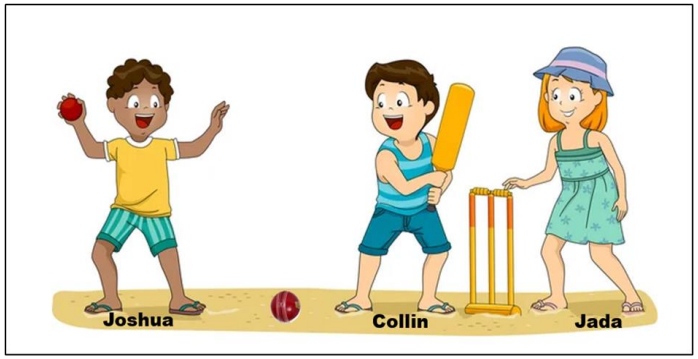
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		In our tug of war game both teams applied forces in opposite directions but the same amount of force was not applied. This is an example of unbalanced forces. **Unbalanced forces** means that the force applied in one direction is greater than the force applied in the opposite direction. When unbalanced forces are acting on an object, there is a change in speed and/or direction. Let's see if we can spot **at least two** everyday examples of balanced and unbalanced forces in the video that you are about to watch. *(tug of war and arm wrestling)* Retrieved from: https://www.youtube.com/watch?v=_-yzCNniwuw (5:53 mins) **Comparing the Balanced and Unbalanced Forces** As a review, the teacher can explain the following Venn diagram comparison.  Retrieved from: https://www.youtube.com/watch?v=_-yzCNniwuw

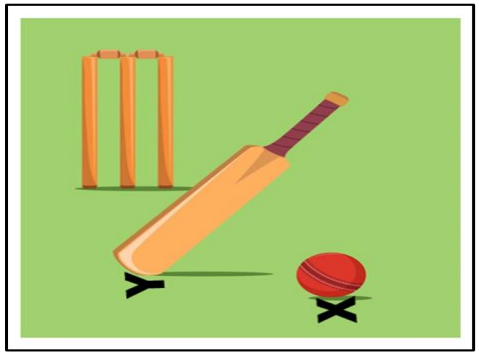
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Describing Forces Activity [Students will be placed in 5/6 groups for this activity] In your groups you have been given a card. Each card has a picture that shows the actions of a force on an object. Using the questions provided on the worksheet attached, discuss within your group what is happening in your picture ***with regard to forces.*** You will then present your findings to the rest of the class (The group will select a representative who will write the information and draw pictures where necessary, on a Bristol board sheet. All members will brainstorm what is happening in the picture. The selected representative will read out the information to the class) Group 1 – Picture of a mango hanging from a tree branch / a book lying on a desk.   Retrieved from: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQo6dky73fTXb0lmzjbOG8TIqeht0GuSFA92w&usqp=CAU Retrieved from: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcSWRB1BvOY1qgDa5-Z0ocTdQGLQD18XrXk0IQ&usqp=CAU

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Group 2 – Two boys arm wrestling.  Retrieved from: https://media.istockphoto.com/id/155279846/photo/scholarly-competition.jpg?s=612x612&w=0&k=20&c=eaC-Bhey3f1SeIBiJezvcW9UD8bUkRqP54gen-Rh6Ps= Group 3 - A boat on the water  Retrieved from: https://images.fineartamerica.com/images-medium-large-5/boat-in-clear-water-david-van-hulst.jpg Group 4 – Tug of war 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Retrieved from: www.ravenox.com/cdn/shop/articles/tugofwar.jpg?v=1654138980 Group 5 – Jacking up a car to change the tire  Retrieved from: https://carorbis.com/wp-content/uploads/2023/04/02Carorbis-Blog_How-to-Jack-Up-a-Car-step-by-step.png Group 6 – Pushing a door open/A rocking chair 

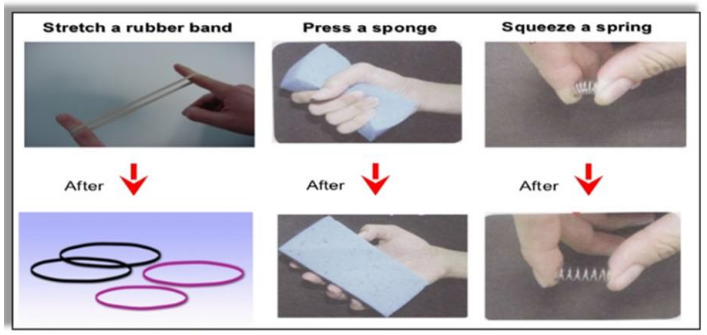
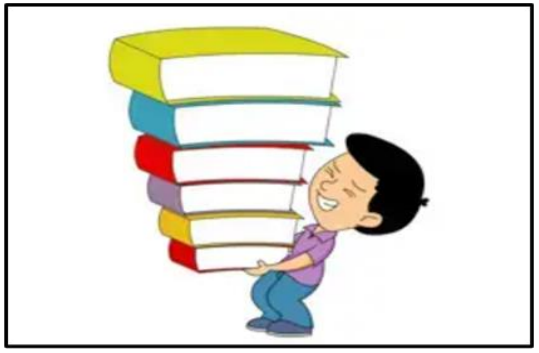
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Retrieved from: https://image1.masterfile.com/getImage/NjQ5LTA4NTYzMzMzZW4uMDAwMDAwMDA=AFmnor/649-08563333en_Masterfile.jpg  Retrieved from: https://maryannscloset.org/cdn/shop/products/Mother_Baby_Rocking_Chair_530x@2x.jpeg?v=1549225582 Each group will be probed about their picture: 1. What is happening in the picture? 2. Is the object stationary or in motion? 3. Was the direction of the object changed? 4. What type of force is acting on the object? Balance or Unbalanced? Why? 5. Use arrows to show the direction of the forces acting in your picture.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Let us remember the following things about forces: ● Forces act in pairs. ● Forces act in a particular direction. ● Forces usually cannot be seen, but their effects can. Things can move when more force is applied in one direction than another. Movement is caused by unbalanced forces. Forces can make objects move in different ways. **We want to answer the question: How do forces change motion?** **An Example from Cricket** Let us consider three friends playing with a ball and a cricket bat.  Picture retrieved from: https://depositphotos.com/photos/sport-of-cricket.html and modified. Joshua thinks that forces act on the cricket ball you see on the ground only when Collin hits the ball. Jada thinks that

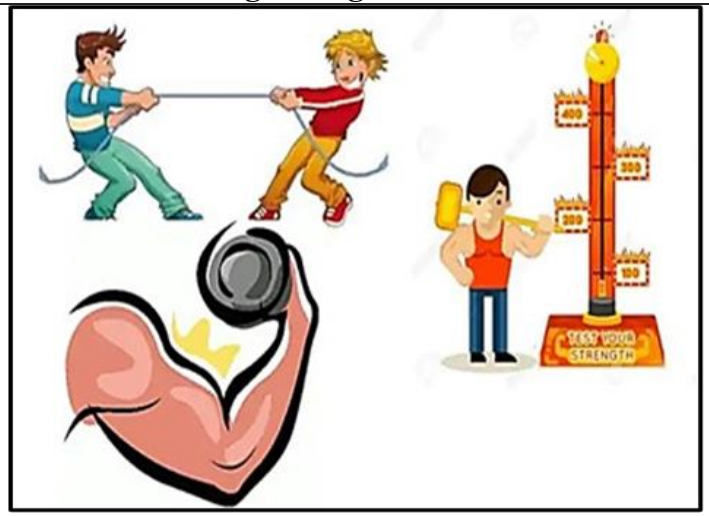
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		there are forces acting on the ball as it lays still on the ground as well as when Collin hits it with the cricket bat. Who do you think has the best idea about the forces acting on the ball? (*Joshua/Jada*) Explain why you think this person has the best idea? Students write down their predictions in complete sentences. Share your ideas with your classmates on your table/in your group. Who does your group think has the best idea and why? Let us share with the entire class. When Collin hits the ball with a bat, he is applying a force, a hard push against the ball, the ball may move along the ground, or it can fly upwards. Let us try hitting a ball with a bat to see if we can get the ball to change its motion. We will hit the ball first on the pavement/concrete and then on the grass/ carpet. We will record what we did in our groups and how the ball moved. (*Materials: balls, bat, grass/carpet, recording table or chart*). 

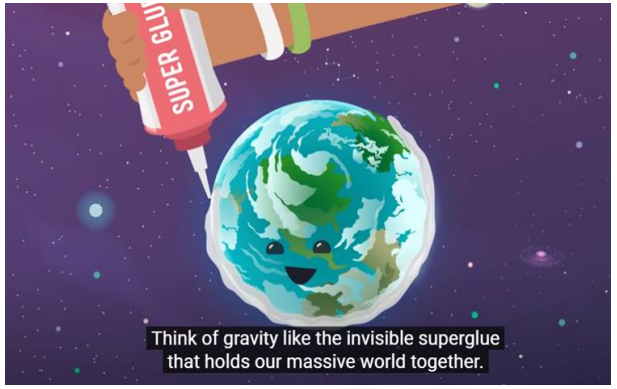
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Retrieved from: https://www.freepik.com/premium-vector/bat-ball_9033832.htm You must place an X on the pavement/concrete and grass/carpet with chalk so that the ball rests in the same place every time you use the bat. Also place a 'Y' so that you hit the ball from the same distance every time. **Surface** / **How did I use the bat?** / **What happened to the ball?**  Pavement/Road Hit the ball softly and then very hard. Hit the ball in different directions  Grass/Carpet Hit the ball softly and then very hard. Hit the ball in different directions *Assign students different roles in performing this investigation. Be caring towards those with physical and other learning challenges so they are included and given a role.* [*The students will realize that the harder you hit the ball, the further it may go and depending on where you hit the ball, it may go across the ground or go up in the sky. The rougher the surface, the harder the ball moves.*]

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		[The activity can be used and modified with any sport that has a bat] How did force affect the movement of our ball? When you hit the ball with the bat, how did it move? How did the way you hit the ball affect its movement (*The ball moved faster, it also changed direction*) Forces cause objects to change speed and direction. The harder you hit the ball, the more force applied, the faster it moves. There were some other forces working on the ball too. When the bat hits the ball, it squashes inward a little bit as it is made from light material. The force from hitting the ball causes it to change shape slightly. Because the ball is made from a stretchy material, it rapidly expands again, returning to its original shape and it flies into the air. This is also a force. When the ball hits the ground, it squashes slightly again then returns to its original shape. Forces can cause changes in shape! **Other Types of Forces That Change Shapes** When a force acts on an object, the object may change shape by bending, stretching, or compressing - or a combination of all three shape changes. Squeezing your juice or water bottle changes its shape, pulling on a rubber band or even when you flatten a piece of playdough.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		 Force can change the shape of an object You are also exerting muscular force when you use your arms to move the bat to hit the ball. Muscular force is the force exerted by the muscles of the body. When you lift a book, you are exerting muscular force. 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		When you walk you exert muscular force onto the ground.  [Muscular force is the force used by the muscles, which involves legs as well as arms. It is the type of force that occurs due to the body muscles' action and makes them contact the surfaces. Some examples of muscular force are pulling a toy truck, playing tug of war, jumping, or weightlifting. Bouncing a fall is another example of muscular force.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		  It is the type of force, which is exerted when something is touched, and then force is applied to it. In other words, muscular force is related to the movement within the body.] Retrieved from: https://www.openacessjournal.com/blog/what-is-muscular-force-and-example/

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		What other forces acted on our balls? Let's find out! When the ball is at rest on the road or pavement, its **weight is a force pushing downward,** there is also the force of the pavement pushing upwards. Gravity is also acting on the ball keeping it on the ground. **Gravity is a force** that is always pulling objects down. The upward and downward forces are the same, so the ball does not move. There is balanced force as the same amount of force is acting in opposite directions, that is, no net force. Do you think gravity acts on the ball when you hit it and it moves upwards into the air? (*Yes, because it came back down to the ground*). 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		 Let's learn more about gravity from a video: As you watch this video, think about answers to these questions: a. Which scientist discovered Gravity? (*Sir Issac Newton*) b. Where was he and what happened to him that caused him to have an Aha! Moment? (*Sitting under a tree when an apple fell and hit him on his head*) c. Does gravity affect only light objects? (*No heavy and light objects all fall to the ground due to gravity*). Retrieved from: https://youtu.be/ljRlB6TuMOU?si=c0fRfXilEtpxzvQx (3:11 mins) No matter where you hit or throw a ball gravity gets it back to the ground. Gravity is a force that can affect an object from a distance (without touching it).

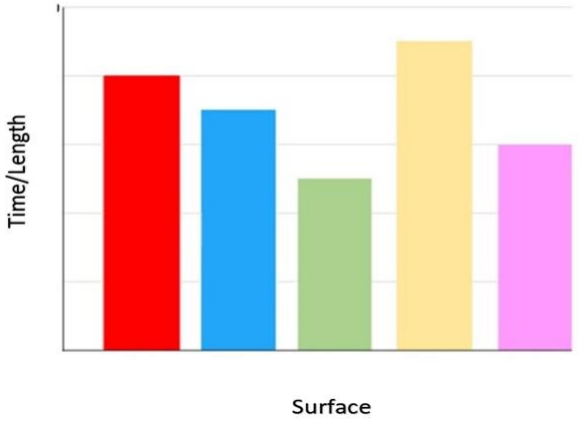
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Frictional Forces How is the speed of the ball affected by the change from pavement/road to grass/carpet? (*Slows down*) Why do you think the ball slowed down? (*Grass/carpet is rougher*) Does the type of surface affect the speed or motion of an object? As the ball rolls across the surface, it scrapes against the grass or concrete and gradually stops. This is because of the **force of friction. Friction** is the force which opposes motion of one object over another. It is a contact force. Friction steals the energy of the ball because the ball is in contact with the pavement/grass bringing it to rest. (*Materials: meter rule, chalk, carpet, grass, timer, recording sheets/chat*) (*This activity can be used to integrate Mathematics standards on time and measurement*) Let us **pull** a chair across the classroom 3 meters. Now let us pull the same chair across the carpet/grass 3 meters as well. We will time how long it takes us to pull the chair from one point to the next on each surface? (Time can be measurement using a timer or counting out loud) Alternatively – put thirty seconds on the timer and have the same student move the chair across the tiles/ pavement and then carpet/ grass, then measure how much distance was covered using a string and a ruler or a meter stick).

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		First, you will write down your prediction. Next, we take careful measurements. Each team/group will take each measurement twice. We record our measurements in the table/chart. (*Bar charts can be created to display the data – Mathematics link*)

Surface	How far do I think the chair will move? (Prediction)	How far did the chair move? (Measurement)	
 Pavement/Road		Trial 1	Trial 2
 Grass/Carpet		Trial 1	Trial 2

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

Surface	How long will it take the chair to move the distance? (Prediction)	How long did it take? (Measurement)	
 Pavement/Road		Trial 1	Trial 2
 Grass/Carpet		Trial 1	Trial 2



Let us discuss our results!

Which surface took the longest for the chair to move from one point to another? (Grass/carpet)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Why? (*The amount of friction generated depends on the surface. A rougher surface will cause more friction than something smooth*.) Extend the discussion on friction. Dry friction (sometimes called **surface resistance**) occurs when two solid objects touch each other. If they are motionless, it's called **static friction**. If there is motion, it's known as kinetic or sliding friction. Put your hands together so the two palms touch each other. This is an example of dry/surface friction. **Is friction always good? How do we solve problems of friction?** **Rub your hands together. Let's keep doing it for about a minute.** How do your palms feel now? Touch your neighbour's palms, how do they feel? (*Hot*) When friction occurs, it causes an object to slow down and lose its energy. But energy doesn't just disappear, instead, it changes. The moving energy (or kinetic energy) changes into heat energy. This is why your palms were warm! [In lots of different sports, we *don't* want friction. This is because it slows us down. Like a cyclist in a race, the friction we know as air resistance between the cyclist and the air can affect their speed. But there are ways to reduce this, like crouching low on the bike and wearing special streamlined clothing. More about what that means down below.

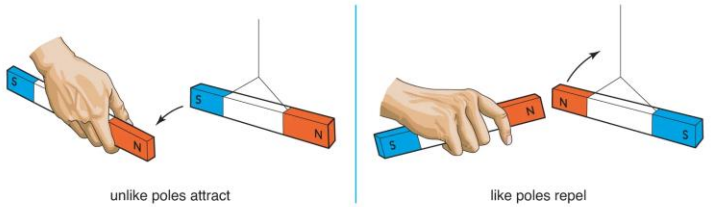
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Let us complete the following worksheet and talk about some surfaces that increase or reduce friction. grade-3-gravity-friction-c.pdf *Circle one:* • *You will slide faster if there is more / less friction on a playground slide.*  • *Which material would make more friction if you rubbed your hand on it? tile / carpet* • *To slow down a speeding bike, brakes create a little / a lot of friction against the tires.*  • *If you tried to walk on ice you might slip because there is too much / too little friction.*  • *It is easier to pedal a bike on a dirt trail / a smooth road because there is more / less friction.* Friction is also unhelpful on a bike if the chain has not been oiled because this creates friction between the

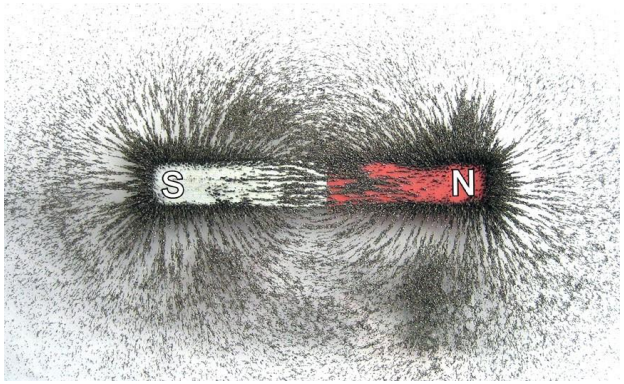
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		moving parts of the bike. This makes pedaling more difficult. The reason why putting oil on the chain of the bike reduces friction is because it creates a much smoother surface between the chain and the other moving parts, and that means less friction.] https://www.twinkl.co.uk/teaching-wiki/friction Let us learn more about friction: https://www.youtube.com/watch?v=IkmAnLmXENo (3:58 minutes) [In machines and engines, friction is usually quite unhelpful. The constant rubbing of one part against the other wears out even very hard and durable metals like stainless steel. That's why engineers use lubrication: by squirting liquids and gels between moving parts, we can help them slide past one another with less friction, reducing wear-and-tear, cutting maintenance costs, and reducing energy losses.] https://www.explainthatstuff.com/motion.html (*For the advanced student*) **Magnetic Forces**  Retrieved from: https://www.amazon.com.au/Magnetic-Refrigerator-Whiteboard-Fridge-Magnets/dp/B07GV8F2DT?th=1

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Do you see the notes that have been placed on the fridge? Have your parents ever placed notes on the fridge door for the family to see? (*Yes/no*) What other things are placed on the fridge door at home? (*pictures, report card etc.*) What do you use to stick a note on the fridge door? (*magnet*) Why does the note or picture you stick on the fridge not fall? (A *Magnet is attracted to the fridge door, there is a force exerted between the magnet and the fridge that is able to hold up the note or picture*). Let us view a video that explains what magnets are and how they work. Video link: https://youtu.be/7HHs98PBgk0?si=k3jgBO1bhiMeICHv (5:44 mins) Stop at 1:05 seconds. What are magnets? (***Magnets*** *are pieces of metal or rock with an invisible force to attract special kinds of metal.*) This force is called magnetism. A magnetic field is the area around a magnet that has magnetic force. All magnets have a magnetic field, no matter how big they are. Things that are attracted to magnets are called magnetic objects. Let us see if we can find items around the school that are attracted to magnets. We are going to go on a scavenger hunt.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		 Retrieved from: https://www.nypl.org/events/programs/2023/09/09/scavenger-hunt [Give out a magnet to each of your students/ group of students and have them wander around the school (both inside and outside) to see how many magnetic objects they can locate. Let them write down all the objects that they found that attracted their magnet. You'll be surprised about how many things are magnetic: doors, door frames, metal poles, doorknobs, fences…]. After the students return to their seats in the classroom, discuss the scavenger hunt and what they found. Ask each group to tell the class the various items they found that were attracted to the magnets by asking: What objects were attracted to your magnet? Use a table on the chalkboard/whiteboard to create a class list of items that were attracted to the magnet and those that were not

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		What type of items were attracted to the magnets? What material are they made from? (*metals*) How did you know the object was attracted to the metal? (*felt the pull of the magnet to the object*) Which items were not attracted to the metal? What materials were they made from? (*Plastic, glass, wood*) Do all metals attract magnets? Provide students with samples of aluminium, silver, copper, iron filings, steel, nickel and allow them to test these pieces of metal with a magnet. Were all the metals attracted to the magnets? (*No*) Which metals were not attracted to the magnet? (*Aluminium, silver, copper*) Which metals were attracted to the magnet? (*iron, steel, nickel*) All magnetic objects are made of metal, but not all metals are magnetic. Provide the students with two magnets to play with. They will notice that some ends of the two magnets attract each other and the other two repel.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		 Retrieved from: https://www.britannica.com/science/magnetic-pole How many ends does a magnet have? (*A magnet has two ends.*) One end is called the north pole and the other end is called the south pole.) What happens when the north and south poles of a magnet are close to each other? (attract) There is a magnetic field around each pole. A magnet is a material that has a magnetic field. A **magnetic field** is an invisible force that draws objects to a magnet. Magnets pull things made of steel or iron toward them. A magnet has two ends. One end is called the north pole and the other end is called the south pole. There is a magnetic field around each pole. Let us use our magnet on the iron filings to see our magnetic field. We can also observe how the magnetic force moves our iron filings. Instructions found on this video:

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Retrieved from: https://youtu.be/j8XNHlV6Qxg?si=emobNOyqTa6ZQG5y  Is magnetic force acting on the iron filings balanced or unbalanced force? Why? (*Unbalanced, iron filings moved around*) Let us make our own magnetic slime and then test to see if it attracts other objects. Materials: magnets/magnetic slime, record/observation sheet **Magnetic slime recipe** https://www.survivingateacherssalary.com/how-to-make-magnetic-slime-recipe-stem-activity/

Additional Resources and Materials

https://www.k5learning.com/worksheets/science/grade-3-force-motion-a.pdf

(Additional material and resources that are not included in the Inclusive Learning and/or Inclusive Assessment Strategies that may be useful for lesson planning)
https://www.youtube.com/watch?app=desktop&v=-Rjid6hQuww (5:17 mins)

Caribbean Primary Science Level 2 pages 116-118

Friction Simulations: https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html

Videos on Friction – extend the discussion on friction and its importance in everyday life.

- https://www.youtube.com/watch?v=n2gQs1mcZHA (2:16 mins)
- https://youtu.be/V2P6CuHVWvI?si=KTPLzQpUM8HGGho**a (2:26 mins)**

Simulations on Forces and Motion

- https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html
- https://phet.colorado.edu/en/simulations/forces-and-motion-basics

Simulation on balanced and unbalanced forces: https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html

Video with more everyday examples of balanced and unbalanced forces explained: https://youtu.be/-Rjid6hQuww?si=_0oZuIlIj--fNuxn (5:17 mins)

Additional Useful Content Knowledge for the Teacher: (*any additional knowledge that the writers believe would be helpful for the teacher such as reading material at a lower or higher grade level, links to curriculum documents for other grades)*

Pushing and pulling are forces that move objects/things.

This movement is called motion.

Pushes and pulls are forces.

A push force usually moves an object away from you.

A pull force moves an object towards you.

Push and pull forces can be used to cause objects/things to move, stop moving, slow down, increase speed, change direction, change shape.
A push usually moves an object away from the body, while a pull moves an object towards the body. (N.B. the human body is used as the reference point.)

You cannot see forces but you can see the effect they have on objects.
Forces:

- can start an object in motion.
- can also stop an object.
- can also bring about a change in shape

Forces may be balanced or unbalanced. Balanced forces act on an object but do not cause it to change in motion. The forces are equal and act in opposite directions.

Unbalanced forces cause objects to change in motion.

All objects pull on other objects around them with a force called gravity. Very large objects like the earth have very strong gravity and their pull affects the motion of other objects.

All objects on Earth experience the earth's gravity which pulls them vertically towards the centre of the Earth.

Gravity, like magnetism, is a force that can affect an object from a distance (without touching it).

Opportunities for Subject Integration: *(Additional ideas about how the inclusive learning strategies might be adapted and/or applied to include other subjects in the curriculum)*

Math Integration - Measurement
Using objects to determine balanced and unbalanced

Using hangers, strings and two cups, students will use this method as a creative way to create unbalance and balance using weight in Math.

Have them bring the items to school and build their 'scale' in class or you may choose to have them do so at home.
Once this has been done, have them use things around the classroom such as cubes, paper clips, crayons, sharpeners, pebbles and drop them in each cup.

They will notice that one side will become lower than the other. Why is the hanger now leaning on one side? (because that side is heavy)
Would you say the hanger is balanced or unbalanced? (unbalanced)

Language Arts: Reading and Comprehension: using passages about various topics and comprehension questions: Example: https://www.k12reader.com/worksheet/push-and-pull/view/

Writing short paragraph about various scenarios

- ***Life without Gravity***
- ***How gravity works***
- ***Benefits of gravity on life***

Writing to explain the difference between a pulling force and a pushing force

Art and Craft:
Creating posters to depict examples of push and pull forces/ balanced and unbalanced forces.

Strategies that Support the Curriculum and Assessment Framework
Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework. It will be used to guide the writing but will not appear in the curriculum guides.

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have::	**Where might this competency be promoted/developed in this learning outcome and associated lessons?**
Developed Citizenship Competencies	Students will appreciate the importance of forces in their everyday lives.
Developed Critical Thinking and Ethical Communication Competencies	In planning, designing and conducting investigations students will need to be critical thinkers to best utilise the resources available to them. They will also need to work cooperatively in groups to complete assigned tasks.
Developed Well-being Competencies	Students' knowledge of forces will help them understand forces and will help them solve problems in their everyday lives.

Developed Knowledge and Entrepreneurial Competencies	Students can have a tug of war competition and sell refreshments to raise funds. A board game can be designed for the Jeopardy game which can be marketed and sold to schools.

Elements that are integrated across subjects: developed critical thinking and ethical communication: students through investigations are able to draw conclusions about forces and their interactions with objects through collaborative learning. They have to communicate with their peers and show concern for persons with challenges so that they can accomplish the tasks assigned.

Elements from Local Culture, Technology, TVET, Environment that are integrated:

- Playing popular sports such as cricket, tug of war or playing on the swing in their playgrounds
- Toys and games from the regions such as sliding on a cart, sling shots, pop guns
- Popular Religious Song "The Holy Ghost Power".
  Lyrics
  The Holy Ghost power is moving just like a magnet (x2) Moving here, moving there, Moving just like the day of Pentecost
  The Holy Ghost power is moving just like a magnet.

Items of Inspiration (teaching tips, inspirational passages, connections to educational research): Conducting research to find the best surfaces that can reduce friction.

Science Grade 3

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it.
Strand (Topic): Forces and Interactions Force and motion are important parts of everyday life. As students study this unit, they will learn how these physical factors impact their lives and work. The lessons and activities will help students become aware of factors like friction, gravity, and magnetic force.
Essential Learning Outcomes: ELO-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a seesaw.] [Assessment Boundary: Assessment does not include technical terms such as period and frequency.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

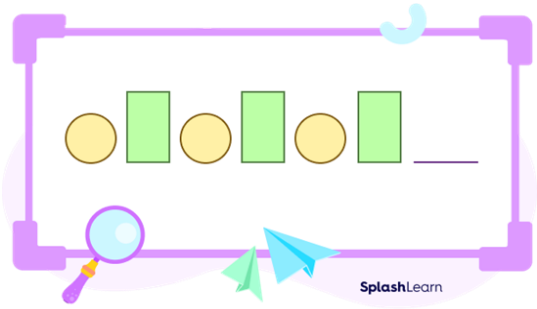
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies

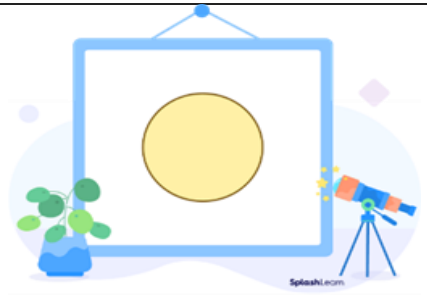
Learners are expected to:
 	
<u>Knowledge</u>
 	
• Define the terms:
  ○ Arc
  ○ Motion
  ○ Force
  ○ Force of gravity
  ○ Magnetic force
  ○ Pattern
  ○ Predict
	After discussing pictures in class students will engage in the assessment below.
	
	<u>Straight Line Motion</u>
	
	<u>Assessment One</u>
	
	Students will brainstorm examples of objects that move in a straight motion. Examples can include: An athlete running on a track, a
		Introduction
		
		Students, I want you to think about a swing on the playground or in a local park or someone's' backyard. Imagine you give one big push to the friend. Describe in your own words what you expect to happen. (*the person will move forward until they lose energy and then return , almost to the starting point*). Draw a line that shows the path of the person on the swing. Its not a straight line is it? We call that line an **arc** which is something we will talk more about in mathematics. We would call that arc path their **motion** and it resulted from you applying a **force**. Forces are pushes and pulls. For the swing we both push and

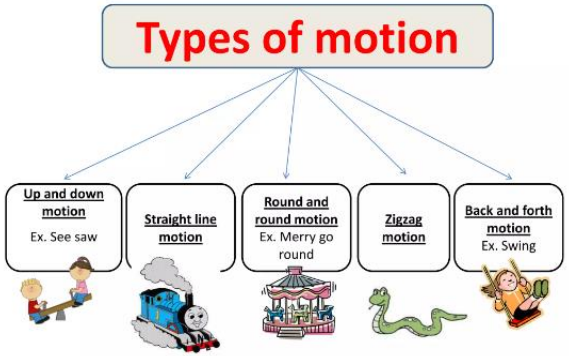
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
• Identify the different types of motion (ways objects move). • Describe patterns in the environment (natural and human). • Describe the movement of various objects. • Demonstrate they understand that objects can move in various ways. • Compare the different ways objects can move (straight line, zig zag, back and forth, circular). • Explain the various ways objects can move in the environment. • Identify the conditions needed for objects to move in a given situation. (ST 2 PS EN 1) • Identify with examples forces at work in everyday situations in the home and community. (ST 3 PS FMS 2)	bead moving on a fixed rod, a train moving on a straight track, a car travelling on a straight road, a bowling ball, an object falling straight down, someone pushing an object like a box. I would like you to draw one example of an object or an activity that shows an object moving in a straight line. ***Assessment Two*** • ***Worksheet One*** Put an X on the pictures where the objects move in a straight line.  Retrieved from: https://www.prolinebowstrings.com/blog/archery-equipment/archery-for-beginners/	pull on the swing to make our friend go higher! What other forces cause things to move? What about the **force of gravity;** it pulls objects to the earth's surface. We have seen that magnets can also pull some metal objects along. Did you know we can put magnets in a motor and make it turn when we apply electricity? That is an amazing invention that relies on the pull of the **magnet force**. Back to our swing example…we apply a force and we start the motion of the swing. How did you know the person will return to the starting point? (*I have used swings many times and they always go out so far and then return*) What does their path depend on? (*the length of the rope holding the swing).* The path of the swing "forward and back" is predictable from our experience; we would say there is a definite **pattern** to that motion. You probably know the distance you walk to the store in your neighborhood. It is very likely that it takes almost the same amount of walking time each visit you make to the store. Because you probably walk the same speed most times, we would say there is a pattern and we can **predict** how long it will take you to get there. Today we are going to look at patterns in motion all around us everyday. You have already shown me that you are clever students. You can predict patterns! ***Let us review then:*** ***What is motion?***

Grade 3 Science

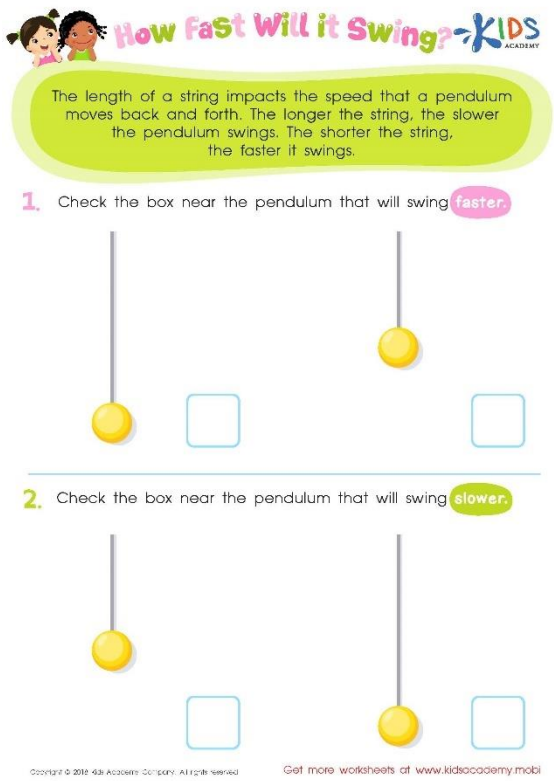
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
Skills • Observe objects in motion. • Infer that patterns can be repeated by engaging in scientific investigations. • Classify the motion of objects. • Communicate ideas on patterns and motions with their peers. • Predict what should come next in patterns. • Construct a pendulum and a spiral marble track to observe motion. • Illustrate or draw the various ways objects can move in the environment. • Distinguish between a motion and a pattern. • Demonstrate ways in which motion can be changed. (ST 2 PS FMS 1).	 Retrieved from https://www.sportsplayinc.com/choose_merrygorounds.php  Retrieved from https://thetoyinsider.com/alex-toys-active-play-super-go-pogo-stick-review/ 	**Definition** Motion is the process of an object moving or being moved. Motion that repeats is said to occur in a pattern. We can observe patterns of motion to make predictions about how things will move in the future. The force that slows down moving objects is called friction. ***What is a pattern?*** **Definition** A pattern is something that happens or appears in a regular and repeated way. Patterns exist in various forms. They can be found in **mathematics**, the **arts**, **science**, **language**, and **social science**. A pattern can appear as a visible design, such as a spiral or set of stripes. Patterns can also appear as repeated events, such as in the weather or in the behaviors of living things. **Describe patterns in the environment (natural and human).** Patterns help children make predictions because they begin to understand what comes next. They also help children learn how to make logical connections and use reasoning skills. Patterns can be found everywhere in our daily lives and should be pointed out to small children. ❖ The sun came up and went down and then the moon came up and went down. ❖ The frog hopped up and down - sunrise and sunset.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
• Describe and demonstrate the forces of push and pull (ST 3 PS FMS 1). • Classify different kinds of motion according to what causes the motion (e.g. gravity, magnets) (ST 4 PS FMS 2). • Describe the visible effects of push and pull on a variety of everyday objects. (ST 4 PS FMS 4). • Infer that the position of the sun changes at different times of the day. (ST 2 ESS SS 3). • Outline the relationship between earth, moon and sun, especially how the relationship affects humans. (ST 3 ESS SS 1). **Attitudes/Values** • Develop an appreciation for the various ways objects move in their environment. • Display interest and curiosity in carrying out investigations. • Inquiry. • Show respect for scientific evidence by using their	Retrieved from https://www.science.org/content/article/physicists-unlock-secret-childs-swing  Retrieved from https://studiousguy.com/linear-motion-examples/ • ***Worksheet Two*** Students will check all the pictures that show straight line motion.	❖ The water cycle – rain falls down to earth as precipitation and goes back up in the sky to form clouds - evaporation and condensation. ❖ The way a caterpillar moves. ❖ A jackhammer. ❖ A seesaw. **Predict what should come next in patterns.** In math, a pattern is defined as a sequence of repeating objects, shapes or numbers. We can relate a pattern to any type of event or object. A pattern has a rule that tells us which objects belong to the pattern and which objects do not belong to the pattern. Let's look at some examples of patterns:  Retrieved from: https://www.splashlearn.com/math-vocabulary/wp-content/uploads/2022/08/pattern-image-1.png In the above image, the rule that is followed is that the circle is in the odd places and the rectangle is in the even places. So, the next figure in the pattern will be:

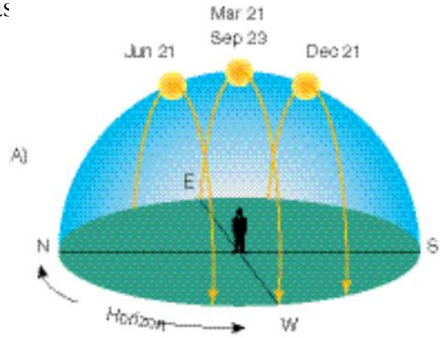
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
observations to make predictions or to complete a task. • Work safely when participating in various activities. • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges. • Participate actively in classroom discussions. • Work collaboratively in groups.	 Retrieved from: https://www.kidsacademy.mobi/printables/grade-2/science/physical-science/grade-2-position-and-motion-worksheet.pdf **Zig Zag Motion Assessment** Read the following statements. Predict which object will move in a zigzag pattern. Write the letter Z in front of the statement that you believe will show zigzag motion.	 Retrieved from: https://www.splashlearn.com/math-vocabulary/wp-content/uploads/2022/08/pasted-image-0-8-1.png **Create an AB pattern** A pattern is a sequence. A repeated arrangement of numbers, letters, shapes, colors etc. AB patterns are patterns that involve two varieties of objects or colors or numbers. AB pattern worksheets provide a sense of order in understanding and identifying recurring patterns and help develop critical thinking in kids. **Types of Motion** The types of motion are straight line, zigzag, up and down and back and forth.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
	_____ 1. A car driving down a winding road. _____2. An athlete dribbling a basketball. _____3. A cricketer hitting 6 runs during a game of cricket. _____4. A snake slithering through the grass. _____5. Riding the escalator at the shopping mall. _____6. Lightning striking during a hurricane. _____7. Using pinking shears (scissors) to cut a pattern from cloth. ***Circular Motion Assessment*** Students can engage in the following activities in pairs or in groups. The teacher can use a rubric to assess students. Build a paper plate spiral marble track. Materials needed: paper plates, clear tape, and hot glue, toilet paper roll. Cut a circle in the center of each plate. 	 Retrieved from: http://pt.slideshare.net/safa-medaney/what-is-motion-and-its-types **Straight Line Motion** Moving things follow different paths. Some things move in a straight line. Other things move in circles. Straight line motion is a change in position from one point to another in a straight line (in one dimension). A pattern of motion is the repeated process of an object moving. Patterns of motion can be used to make predictions. Today we will engage in activities and discuss one way that objects move. **Activity One:** In this activity you will choose a ball. You will roll the ball at varying distances. Now you will describe the motion or how the ball moved.

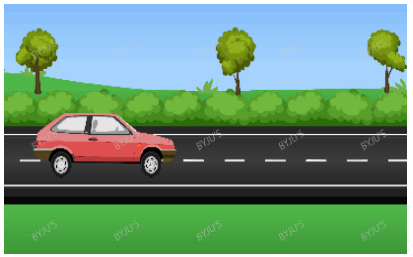
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
	Cut a straight line to the center of the plate Connect each plate to each other by the cut made earlier with tape and also to the paper roll with glue gun.  Students can be encouraged to use the spiral track to race cars (hotwheels). Ask them to describe the motion. ***Assessment*** ***Back and Forth Worksheet***	Example of guided questions for class discussion 1. Did the ball move fast or slow? 2. In what pattern did the ball move? (*The ball moves in a straight line*). 3. Did the pattern change at any time? (*No the ball always rolled in a straight line*). You will now roll the ball to different targets, for example a wall, a desk at varying distances (short, medium, long). How did you get the ball to roll to the various targets? (*More force or a harder push makes the ball roll faster and further in a straight line).* Now we will engage in a competition. The person who throws or rolls the ball the furthest (distance) will be declared the winner. **<u>Activity Two</u>** Let us look at some pictures that show some objects in our everyday lives that travel in a straight line. (Teacher will then provide various pictures of objects that move in a straight line for discussion). Teacher will question students about the activity in each picture. Example:

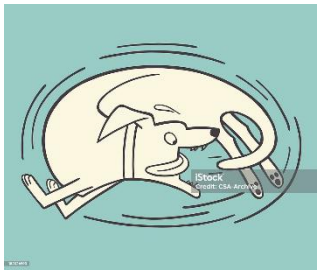
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
	 Retrieved from: https://www.kidsacademy.mobi/printables/grade-3/science/physical-science/grade-3-pendulum-experiment-worksheet-for-3rd-grade.pdf ***Overall Assessment:***	***How will the arrow travel when the girl lets it go?*** *(When she lets go, the arrow goes in a straight line and then when it loses energy, it begins to make an arc until it falls to the ground).*  Retrieved from: https://www.acaedu.net/cms/lib3/TX01001550/Centricity/Domain/441/Stemscopepediamovement.pdf ***Will the bowling ball continue travelling in a straight line?***  A rolling ball is one of the prime examples of linear motion in everyday life. When a muscular force is applied to a bowling ball, it rolls along the lane in a straight line.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
	Project Ask students to bring in pictures of things in the environment that move, and say the kind of motion they exhibit. ***Fieldtrip*** Identifying and naming objects in their environment that are examples of the different forms of motion. Creating a scrapbook with the information gathered. (Teacher will decide on the number of objects to be included in scrapbook) Teacher will award marks for correctly identifying and naming the objects. **Rubric**: Organization of scrapbook 3 pts Quality of pictures 3 pts Correctness of motion labels 4 pts **Important Patterns of Motion** Students: The sun rises each morning and tracks across the sky and then sets before darkness (absence of light) arrives. If the weather is	Retrieved from: https://studiousguy.com/linear-motion-examples/ ***Do fruits fall in a zig zag or straight line from a tree?***  A coconut falling from a tree will be an example of straight-line motion because it will fall vertically downwards in the gravity following a straight line. **Retrieved from:** **https://nikobens.wordpress.com/2014/05/14/coconut-tree/** **Zig Zag Motion** Another way objects can move is in a zigzag motion. **Activity One** Use your pencil to draw a line and connect the dots on your worksheet. Follow the number sequence. What

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
	clear, we can see it moving in a very predictable pattern. 1) Describe the pattern as the sun seems to rise and set each day. What does it look like? 2) Do some research and investigate how the following people may find the pattern useful: a. A fisher b. A traveller or explorer on the ocean c. A hiker in the rainforest Teacher can assign one of these to each group to research and report back to the clas  Retrieved from: https://www.meted.ucar.edu/ams/wim_2014/3b.html	pattern did you make by connecting the numbers in sequence? (*a zig zag pattern)* Exercise 1 1 3 5 7 9 2 4 6 8 10 Exercise 2 1 2 3 4 5 6 7 8 9 10

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		To move in zigzag motion is to move in a line, frequently making sharp turns to one side and then to the other side, just as you did when connecting the numbers in sequence. Zigzag motion and patterns can be fun. Can you think of examples of Zigzag patterns around us? **<u>Activity Two</u>** Let's look at the following pictures. 1. Which of the pictures show something moving in a zig zag like pattern? (*the athlete running the obstacle course, the snake, the traffic sign)* 2. Which ones do not? (*the car, the swing and the dog chasing its tail)* 3. Give an explanation for your answer to each picture.  Retrieved from: https://www.verywellfit.com/build-sports-endurance-with-shuttle-runs-3120584 

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		Retrieved from: https://www.freepik.com/premium-vector/line-art-vector-contour-illustration-yellow-cute-snake-funny-reptile-minimalistic-simple-style-linear-zigzag-serpent-cub-isolated-white-background_25349321.htm  Retrieved from: https://byjus.com/question-answer/a-car-moving-straight-on-a-straight-road-is-an-example-of/  Retrieved from: https://www.istockphoto.com/vector/cute-boy-playing-on-swing-gm615489960-106769299 

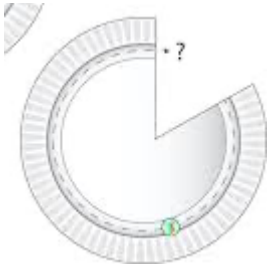
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		Retrieved from: **pinking-shears-for-sewing-tailoring-and-quilting-blades-can-be-re-positioned-167100572.html**  Retrieved from: https://www.istockphoto.com/vector/dog-chasing-its-tail-gm182026993-27569592  Retrieved from: https://en.wikipedia.org/wiki/Zigzag#/media/File:NO_road_sign_102.1.svg **Activity Three** We will now play a game called 'Stay on the Path.'

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		 Retrieved from: https://www.twinkl.com/resource/my-community-maps-resource-za-ss-79 **Instructions for game:** You have in front of you a map of Dan's Neighbourhood. Today Dan decides to do something different and take a zig zag path to get to the park. If Dan starts at his house, we can trace the route that Dan would have to take in order to get to the park? Use your pencil to map out Dan's journey. *(Make a left onto Bishop Lane, then right onto Cooper street, left onto Lark Avenue then right onto Rose Street.)* **Circular Motion** Circular motion is described as a movement of an object while rotating along a circular path.

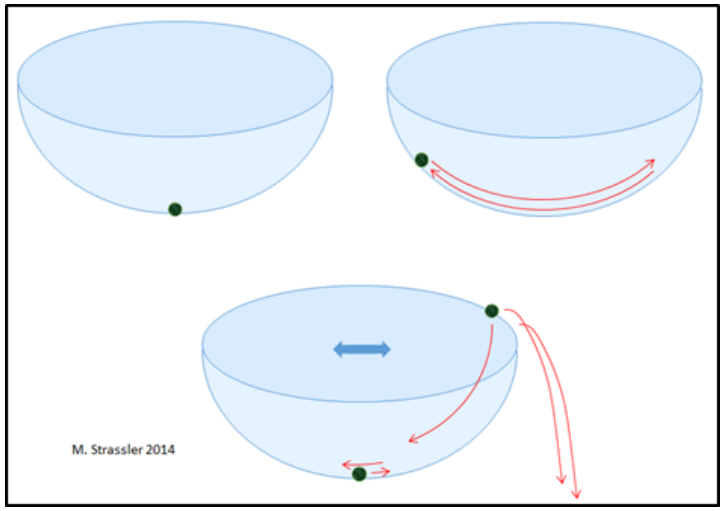
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		We will now be looking at another way objects move. Students will now look at objects that move in a circular motion. <u>Activity One:</u> Show students a variety of pictures and then name them together.   **a ceiling fan** **a standing fan**   **a car wheel** **wheel on the fridge**

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		  **ferris wheel** **merry go round** **After observing the pictures, ask students:** **Have you ever seen or used one of these items? (***yes/no)* **Are they in motion in the pictures? (***no***)** **If they were in motion, how would the pattern move? (***in a circle/circular)* Have them brainstorm other things that move in a circular motion. (*fan on planes, propellers on boats, planets moving around the sun, an analog clock*) Option: students can be taken on a field trip or nature walk as they search for things around them that move in a circular motion. **Activity Two:** We will conduct a simple experiment in this lesson. I would like you to collect these materials from the table at the front of the classroom. (They will be given one

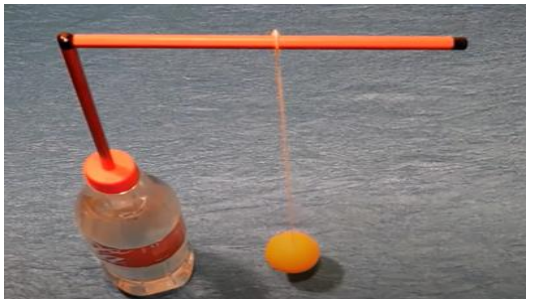
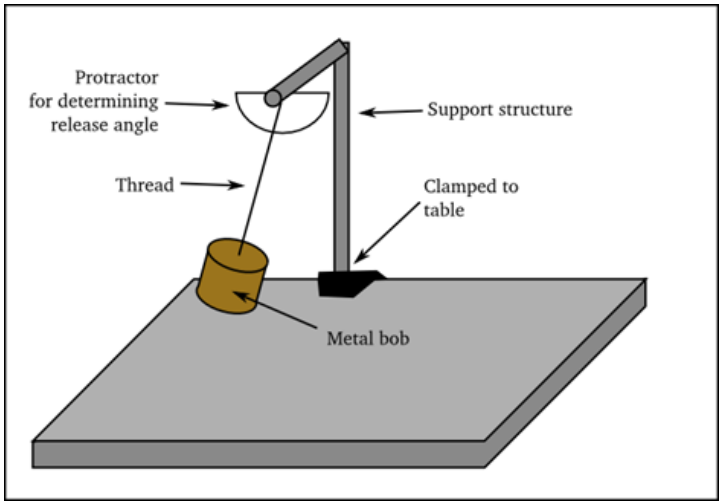
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		uncut plate and a marble as well as a triangle cut plate and marble.) Gently push the marble along the rim of the plate and carefully observe the force making the marble go in a circle is the normal force of the plate rim on the marble.  **Questions:** What was the force that caused the marble to move? (*a push)* After pushing the marble on the plate, what motion did it move? (*circular-then spiral*) What allowed the marble to move in a circular motion? (*the rim of the plate)* They will repeat the experiment with the triangular cut plate. When the marble reaches that section it no longer travels in a circle but goes off in a straight line.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		 Before beginning the experiment, What is different with this plate compared to the first? (we cut a triangle from the plate) Do you think the marble will move in a circular motion like the first plate? (no) Explain why? (*this is because the plate is missing a piece that will be needed to guide it around*) What do you think will happen to the marble when we push it? (*it will not go in a circle)* After: What happened to the marble when it got to the cut out? (*It left the plate in a straight line)* What if we eliminate the force, what would happen? (*The marble would not move unless it is unbalanced)* **<u>Side to Side Motion</u>** We can say that motion is the change of position of an object with respect to time. A book falling off a table,

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		water flowing from the tap, rattling windows, etc., all exhibit motion. Our daily activities, like walking, running, closing the door, etc. involve motion. There is a change of position of the object involved in these activities. Even the air that we breathe exhibits motion! Forces cause all motions. Every time the motion of an object changes, it's because a force has been applied to it. Force can cause a stationary object to start moving or a moving object to change its speed or direction or both. Today we will be observing the motion of some everyday objects. Are there patterns in the way things move? Let's find out using marbles! **Activity One** Experimenting with marbles *Materials: large, deep glass bowl and a marble (Can be done in groups or as a demonstration)* In this experiment we are going to try to predict the motion of a marble. When we predict, we are sharing what we think is going to happen. If we were to place the marble in the center of the bowl, what do you think would happen? Write down your prediction. If you were to place the marble on the left side of the bowl near the top, what do you think would happen? Write down your prediction.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		Let us try this out. [***Student will drop the marble into the bowl. Studnets will observe the marble as it moves slightly further and further away from the center, and up the sides. Students observe its motion and record.***]  Retrieved from: https://profmattstrassler.com/articles-and-posts/particle-physics-basics/tunneling-a-quantum-process/ What happened to the marble that was placed in the bottom of the bowl at the center? (*Moves slightly and eventually is at rest*) What happened when the marble was placed on the side of the bowl? (*It swings from side to side and eventually it stops*)

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		Did it continue swinging from the same distance every time? (*Swinging movement got shorter and shorter*) When you placed the marble closer higher up the side of the bowl, did it affect the motion of the marble? (*Yes*) How? (*Moved faster from swinging from side to side/ same pattern of motion but faster*) We can see that the motion pattern is repetitive. If I were to place the marble closer to the edge of the bowl, can you predict its pattern of motion? A pattern of motion is the repeated process of an object moving. Let's observe! [Students observe the marble being dropped from a greater height, very close to the edge of the bowl.] (*Same side-to-side movement but at a faster speed.*) Why is the marble moving faster? (*Greater height, larger force is exerted increasing the speed*) Why is the speed of the marble reduced and the height of the swing gets shorter as time goes by? (*Friction, the motion of the marble against the wall of the bowl slows it down, reducing its energy*) **Activity Two** **Pendulum** Making a simple pendulum with everyday materials: https://youtu.be/aPOmduWJlAg?si=OoRhdiyoaAarumwo (1:25 mins)

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		*****Can also be done in Arts and Craft.**  **How to make a pendulum** Retrieved from: https://www.youtube.com/watch?v=aPOmduWJlAg  Retrieved from: https://ithink-oli.medium.com/pendulum-experiment-50e2116f55d4

<table>
<tr><th>Specific Curriculum Outcomes</th><th>Inclusive Assessment Strategies:</th><th>Inclusive Learning Strategies</th></tr>
<tr><td></td><td></td><td>We have created a pendulum. Play with it for a minute. Observe its motion!

How would you describe the motion of the pendulum? (Swings back and forth/side to side)

Is this motion repeated? (yes). The pendulum moves in a pattern.

Have you ever seen a pendulum before? (Yes/No) Have you seen any object at home or at play that has a pendulum as part of it? (Student share: pendulum clock, amusement park rides, wrecking ball, metronome)

Let's investigate how a pendulum works!

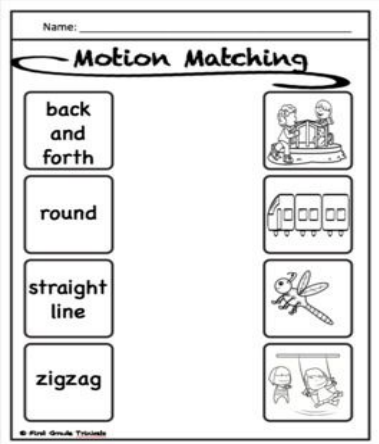
How can you make the ball of our pendulum move faster? Write down your suggestions in your activity sheet.

Let us test our ideas using our pendulum. We will test our ideas in an orderly way by writing down the position that we drop our ball and what happens when we do so.

<table><tr><td>Description of release position</td><td>Description of observed behaviour</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td></tr>
</table>

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		When a pendulum is set in motion, gravity causes a restoring force that will accelerate it toward the center point, resulting in a back and forth swinging motion. The path of the pendulum is an arc. How will changing the length of the rope affect the movement of the ball? What happens if I use a heavier ball instead?

Additional Resources and Materials



Retrieved from: ***https://i.pinimg.com/474x/94/9f/5c/949f5c3ec4d6eb2d30416a50f2951442.jpg***

How Things Move https://www.youtube.com/watch?app=desktop&v=MMPSwId4CBY (7:34 mins)

Patterns of Movement https://www.youtube.com/watch?v=C1wvXhXyVmk (8:54 mins)

Patterns of Motion ***https://www.youtube.com/watch?v=N9cTYkOyf9A*** *(3:00 mins)*

Additional Useful Content Knowledge for the Teacher:

Patterns of Movement https://www.acaedu.net/cms/lib3/TX01001550/Centricity/Domain/441/Stemscopepediamovement.pdf

How Things Move

Cross-Curricular Focus: Physical Science

We can watch things around us move. When something is in **motion**, it **changes** its position. Objects can move from one place to another. They can move in many directions. I f you roll a ball, it might move in a straight line. It might also move in a curve. A swing can move back and forth. A light switch can move up and down. Fans have blades that move in a circle.

If you want to know if something is moving, you can compare it to other things around it that are not moving. I f the things behind the object are changing, the object is probably moving. If they are not changing, the object is probably not moving.

You can measure the distance an object moves. Just measure the distance between where it was when it started to move and where it was when it stopped. Distance can be measured in inches, feet, yards or miles. Those measurements are in the customary system. It can also be measured in millimeters, centimeters, meters and kilometers. Those measurements are in the metric system.

Name: _____

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

1) When something is in motion, what does it change?

_____

_____

2) How does a swing move?

_____

_____

3) How does a light switch move?

_____

_____

4) How can you test if something is moving or not?

_____

_____

5) What is one unit of measurement you could use to measure distance?

_____

_____

Retrieved from: https://www.k12reader.com/worksheet/how-things-move/

Opportunities for Subject Integration:

Language Arts:

- The game "Stay on the Path" can be integrated into the language lesson to provide practice in telling directions and using the words, left, right, opposite, next to etc.
- Writing a short paragraph on how objects move.
- Engaging in class discussions about various scenarios for example what would happen if objects only moved in one direction?

Mathematics - Finding or completing various AB patterns

Music: Rhythmic patterns, melodic patterns

Art and Craft - Drawing different patterns to show the various motions, drawing pictures depicting various ways objects move. Putting pictures or drawings together to form posters for the classroom.

Physical Education - engaging in activities that show ways objects move, for example rolling a ball in a straight line, walking or running back and forth, jumping up and down etc.

Social Studies: use legends to find information from maps and present information on maps (activity three - stay the path)

Strategies that Support the Curriculum and Assessment Framework

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have:	**Where might this competency be promoted/developed in this learning outcome and associated lessons?**
Developed Citizenship Competencies	Working collaboratively in groups and respecting each other's opinions during class discussions.
Developed Critical Thinking and Ethical Communication Competencies	Students will engage in various experiments which will develop their critical thinking skills. Providing explanations why things move in various ways. They will also learn to work with their peers in order to accomplish various tasks.
Developed Well-being Competencies	Expressing themselves fluently when reporting various tasks, example experiments.

Developed Knowledge and Entrepreneurial Competencies	Using the knowledge gained, students can design various gadgets such as tops, cars, bows and arrows using materials in their environment (local materials) which other people can purchase. These materials can be used as teaching aids/ materials to demonstrate the various ways objects can move.

Elements that are integrated across subjects: developed critical thinking and ethical communication:

Elements from Local Culture, Technology, TVET, Environment that are integrated:

- Using local materials to make gadgets, example trucks, cars to be used to teach concepts. Plait the pole/maypole, greasy pole, making clay pots - local activity that demonstrates motions.
- The motions that create patterns when hair braiding or twisting, weaving grass mats or coconut straw hats, etc.
- The movement of waves, river flow, ripples in a pond.

Items of Inspiration (teaching tips, inspirational passages, connections to educational research):

Passage about

Teaching tips: The use of hands-on resources inquiry based so students can make inferences. Avoid just providing definitions on the types of motion. Use as many examples as possible to deepen understanding. Use the things in your environment to demonstrate patterns and motion. Encourage students to play with the objects so as to investigate, draw conclusions and develop deeper understanding about motion.

Quote by Isaac Newton: An object that is at rest will tend to remain at rest. An object that is in motion will tend to remain in motion unless acted upon by an outside force.https://cdn.graciousquotes.com/wp-content/uploads/2020/08/An-object-that-is-at-rest-will-tend-to-remain-at-rest.-An-object-that-is-in-motion-will-tend-to-remain-in-motion-unless-acted-upon-by-an-outside-force..jpg

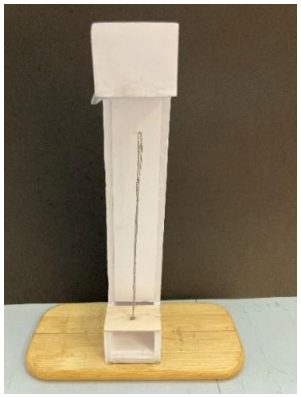
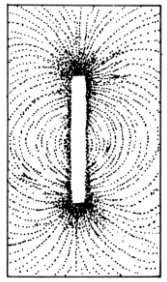
Quote by Clay P. Bedford, President of Kaiser Aerospace & Electronics and More:

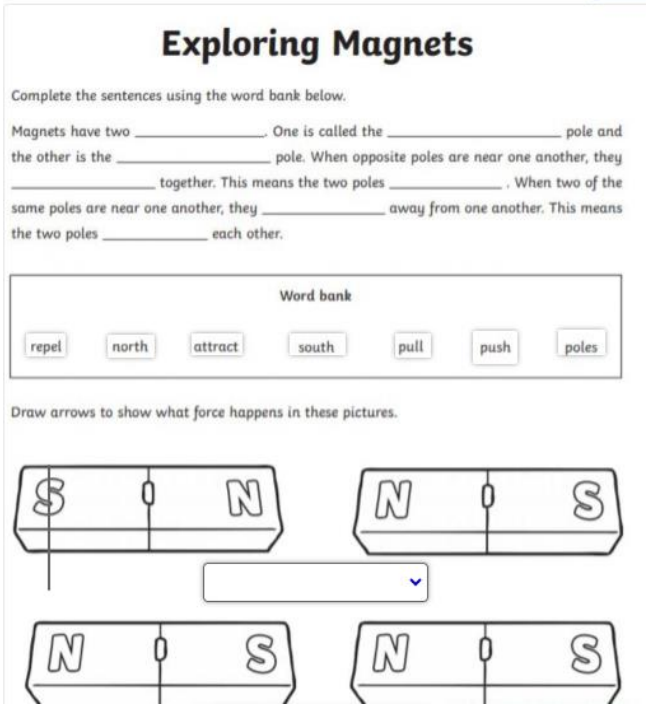
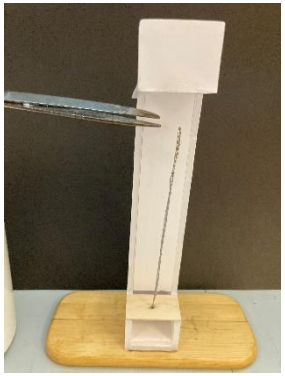
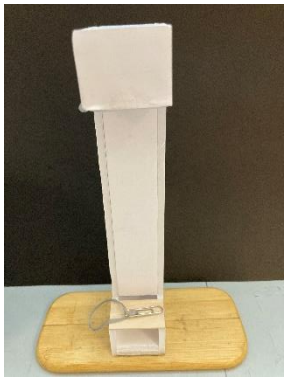
"You can teach a student a lesson for a day, but if you teach him to learn by creating curiosity, he will continue the learning process as long as he lives." 33-quotes-about-education-play-and-stem-for-kids

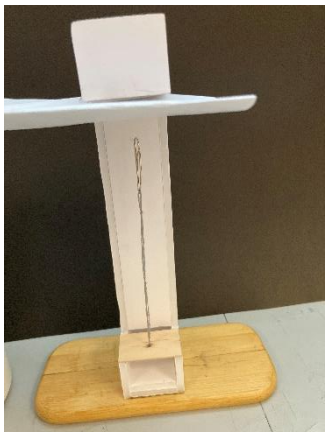
Science Grade 3

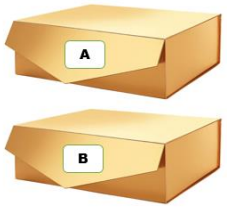
Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it.
Strand (Topic): Forces and Interactions Force and motion are important parts of everyday life. As students study this unit, they will learn how these physical factors impact their lives and work. The lessons and activities will help students become aware of factors like friction, gravity, and magnetic force.
Essential Learning Outcomes: (ELO-3) Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other**.** [Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paper clips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause-and-effect relationships could include how the distance between objects affects the strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:

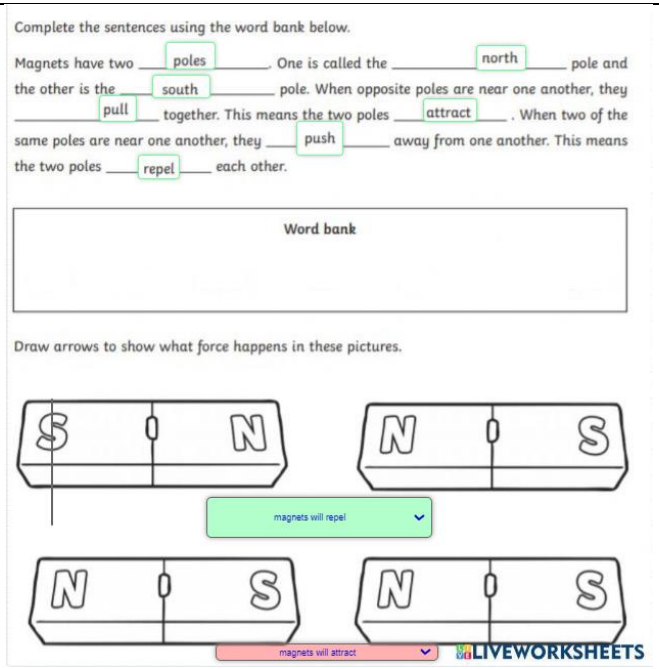
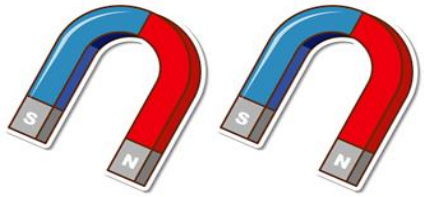
Learners are expected to:
 	
<u>Knowledge</u>
• Define the terms:
  ○ Magnet
  ○ Invisible force
  ○ Lines of force
  ○ poles
  ○ static electricity
  ○ magnetic interactions
  ○ electrical forces
  ○ attract
  ○ repel
  ○ permanent magnets
  ○ temporary magnets
  ○ electromagnets
• Identify objects attracted by a magnet.
• Understand that magnets have two poles.
• Identify different types of magnets and understand that magnets have two poles, north and south. (When two like poles (N-N or S-S) come in contact, they will repel. When two unlike poles (N-S) come in contact, they will attract.)
• Demonstrate the effect of static electricity on objects.
• Compare the force exerted by one magnet compared to the force exerted by two magnets.
	Pre-instruction assessment
	
	All magnets have the ability to attract other magnets or magnetic objects (such as iron, nickel and cobalt and their alloys). Try this activity to learn more about magnetic force.
	
	Materials needed:
	
	paper clip
	
	eraser
	
	scissors
	
	two or more different magnets
	
	1. Tie a length of thread to a metal paper clip so that thread hanging is 10 cm long.
	2. Place a magnet on the table
	3. Hold the paper clip approximately 5 cm above the magnet
	4. Gradually and gently lower the paper clip.
	
	"What did you observe? What did you feel? What did you see?" (As the paperclip is lowered, the paper clip is attracted to the magnet and moves towards to the magnet)
	
	5. Repeat with the eraser and then the scissors
	
	https://www.liveworksheets.com/w/en/science/953382
		Students, I want to show you an amazing invisible force. Look at the special apparatus I have made.
		
		 
		
		Retrieved from personal pictures (G. MacKinnon)
		
		Why do you think the paperclip is suspended in the air like this? (*I think there is a magnet in the top that is attracting the paperclip.)*
		
		If I take a piece of paper and add iron filings to it (iron is what nails are made of) and place a bar magnet underneath it will produce a special pattern where the magnet is attracting the iron filings.
		
		 

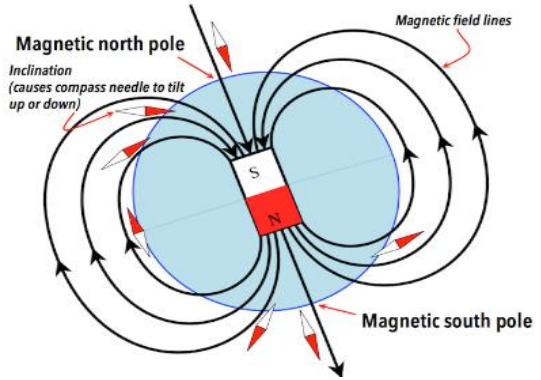
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
• Explain the use of magnets in the home and the community • Distinguish between magnetic and non-magnetic materials. • Match simple gadgets (magnetic) to the use to which they are put. (ST 2 TE TM 2) • Observe and demonstrate the effects of magnets on the motion of different materials (e.g. iron filings, non-metallic materials).(ST 3 PS FMS 3) • Describe and demonstrate the forces push and pull. (ST 3 PS FMS 1) • Identify, with examples, forces at work in everyday situations in the home and community. (ST 3 PS FMS 2) • Match with relevant examples, properties of materials which make them useful for certain specific purposes. (ST 3 PS MM 4) • Investigate the ways in which different forces can change the speed and direction of a moving object. (e.g. magnetism, static electricity) (ST 4 PS FMS 1) • Account for how the concept of static electricity can explain simple balloon experiments.	 **Exploring Magnets** Complete the sentences using the word bank below. Magnets have two _____. One is called the _____ pole and the other is the _____ pole. When opposite poles are near one another, they _____ together. This means the two poles _____. When two of the same poles are near one another, they _____ away from one another. This means the two poles _____ each other. Word bank repel north attract south pull push poles Draw arrows to show what force happens in these pictures. S N N S N S N S Below is a worksheet. Each student or group will receive two sheets. One will be used to make predictions as to whether the items are magnetic or non-magnetic. For the second worksheet, students will be given a magnet to test the items and indicate whether their predictions were accurate. This will be a class discussion.	Retrieved from: https://www.exploratorium.edu/snacks/magnetic-lines-of-force The patterns you see are called **lines of force**. Let us go back to our initial demonstration. Watch as I use a pair of scissors and cut the lines of force. The paperclip falls! Did I really cut those lines? (*no teacher, the scissors got in the way of the invisible force*)  

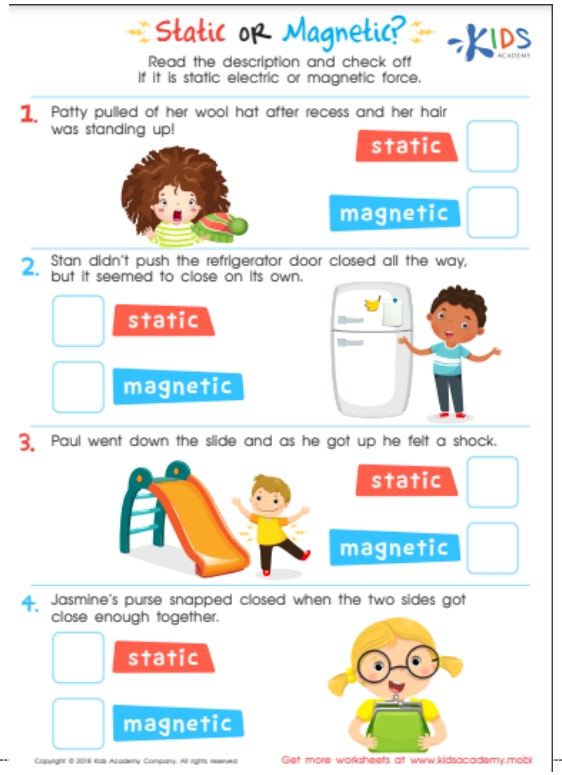
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
• Differentiate true north and magnetic north as it relates to the use of a compass for navigation. **Skills** • Observe how magnets attract or repel each other and attract some materials and not others • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet • Investigate how the orientation, size and distance of magnets affects the strength and the direction of the magnetic force. **Attitudes/Values** • Appreciation for magnets in everyday life • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges. • Participate actively in classroom discussions. • Identify and appreciate that the gadgets, tools and structures used in their homes and community are made by humans. (ST 3 TE UT 1)	Name _____ **Magnetic and Non-Magnetic** Test the objects with a magnet. Check off the box to show which are magnetic and non-magnetic. Object / Magnetic ✓ / Non-Magnetic ✗ Wooden blocks Metal Paper clips Buttons Pom poms Nuts and bolts Ruler Staples Eraser Wrench Rocks E.C coin Keys wooden Sticks Dice Adapted from: https://www.teacherspayteachers.com/Product/Magnetic-items-and-Non-magnetic-Items-3997653?st=cf4ec1ceff693b17c18e345231a80dd5	What else could we put between a magnet and the paperclip. Let us try a piece of paper, a ruler, a cloth, cookie sheet). What do you notice? (*things that are metal seem to break the force lines but nonmetal objects don't.*)  Today we are going to investigate invisible forces even more. **Review: What are magnets and how do they work?** Materials: 2 closed boxes, box A and Box B - one with iron nails and the other with toothpicks, bits of paper and glass marbles).

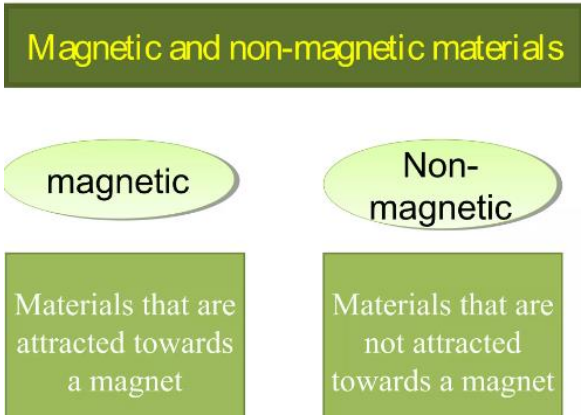
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
	Answer to worksheet Name _____ **Magnetic and Non-Magnetic** Test the objects with a magnet. ✔Check off the box to show which are magnetic and non-magnetic. (Ctrl)	 *Retrieved from: https://www.amazon.com/PACKHOME-Rectangular-14x9-5x4-5-Bridesmaid-Collapsible/dp/B07S5KVDRL?th=1 and modified* The two boxes will be passed around the classroom so students can shake the two boxes and feel the mass of each box. Alternative: provide boxes to students in small groups. Question: What type of materials do you think these objects in box A and box B are made from? Why do you think so? (Write down student's suggestions) *Possible responses: box A has metal objects. The objects make a clang/ringing sound. Box B has nonmetal/wooden/plastic objects. They make a much softer sound.* Students will then be shown two identical magnets.

Object	Magnetic ✔	Non-Magnetic ✘
Wooden blocks		✘
metal Paper clips	✔	
Buttons		✘
Pom poms		✘
Nuts and bolts	✔	
Ruler		✘
Staples	✔	
Eraser		✘
Wrench	✔	
Rocks		✘
E.C coin	✔	
Keys	✔	
wooden Sticks		✘
Dice		✘

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
	 **Magnets in the World** Have students do research and find at least ten examples of how magnets are used to solve problems in the real world. They should come to class prepared to report. **The Earth is a Magnet with Invisible Lines of Force** The earth has a North and South Pole similar to a magnet. It also has invisible magnetic field lines much like a bar magnet.	 What are these objects called? *(Magnets)* What are magnets? How do they work? Students share what they remember about magnets. Let's watch a video that explains how magnets work. https://youtu.be/7HHs98PBgk0?si=0wdGSqSn5HCvuGpg (up until 2:06 of 5:04 mins) Give students 2 magnets to observe and test. What did you notice about the magnets when you try putting them together? (*They come together on one side but push away when I try the other side*) Why do you think they do different things on each side? (*They have two sides, They are not the same)* A magnet has two sides that are called **poles.** A north pole and a south pole. No matter how hard you try to force two of the same poles together, they will push away, for example: north pole to north pole. We say

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
	 Retrieved from: https://pressbooks.bccampus.ca/geoclone/chapter/3-4-earths-magnetic-field-2/ The earth's magnetic field allows us to use a compass for navigating because the compass needle always points to the north. Have students do research to find out what the term "true north " means with regard to the earth's magnetic field. See explanation here: https://www.rmg.co.uk/stories/topics/true-north-magnetic-north-whats-difference **Static Electricity in the World** Have students do research and find at least five examples of where you would see static electricity in the real world. They should come to class prepared to report. **Mary has a problem** Mary likes to wear dresses to her workplace. One day she walked into her carpeted office and sat	that they **repel** when they push away. However, if you flip one of the magnets around so that opposite poles now face each other, the two magnets will **attract** each other and come right together. **Magnetic and Nonmagnetic Materials** What do you think will happen when we place the magnets at the bottom of box A and box B? (T*he objects in box A will be attracted because they are metal objects. The objects in box B will not be attracted to the magnet.*) The teacher will allow the students to observe what happens when a magnet is placed under box A and box B. Why were the objects in box A attracted to the magnet? (*Metal objects*). These objects are made from magnetic materials. Why were the objects in box B not attracted to the magnetic? (*Nonmetal objects*) Let us now look to see what objects are inside our two boxes. What materials are these objects made from/ (*Wood, plastic, glass*) These are nonmagnetic materials. Magnetic materials are those which are **attracted** to a magnet e.g. some metals such

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
	down in her office chair, only to find her skirt sticking to the back of her legs. How irritating! Describe why and how you think Mary might have a problem with static electricity. (*she collects charge by walking across her carpet and her legs must be neutral like the wall; therefore they are attracted)* **Distinguishing Invisible Forces** Let us now complete a short activity. Read each short scenario and tick whether its caused by static electricity or a magnet.  	as iron. Non-magnetic materials are those which are not attracted by magnets e.g. wood, paper, plastic. What would happen if we mix our objects in box B and Box A? How would we be able to separate the magnetic materials from the non-magnetic materials? Allow students to mix the objects and then attempt to separate them. (*students may hover magnet over the box; students may move the magnet below the box; students may place the magnet into the box*) How did you separate the objects? (*Only the iron nails were attracted to the magnet, so we were able to remove them*) Materials can either be magnetic or non-magnetic

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
	Retrieved from: https://www.kidsacademy.mobi/printables/grade-3/science/physical-science/grade-3-static-or-magnetic-printable-worksheet.pdf **Extended Activities for Student Research** **Did You Know?** 1) That a photocopier uses a charged drum to attract the powdered toner ink for making copies! See: https://www.bu.edu/simulation/classes/505classnotes/PhotoCopier.pdf 2) That a very large magnet is used for getting images of our bodies when we aren't feeling well? (magnetic resonance imaging.) See: https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/magnetic-resonance-imaging-mri 3) That magnets are used to make high speed trains by levitating the train above the rail (repulsion) thereby reducing friction? See: Maglev trains at: https://en.wikipedia.org/wiki/Maglev	 Retrieved from: https://www.slideshare.net/mahahussain/magnetic-and-non-magnetic-48784163 What types of objects attract magnets? (*Metals*) ***Do all metals attract magnets?*** Provide students with samples of aluminium, silver, copper, iron filings, steel, nickel and allow them to test these pieces of metal with a magnet. The students will use the following table to record their observations. Objects that can be used: iron nails, aluminium foil, sterling silver jewelry, galvanized nails with zinc coating, copper wire, 25 cents piece - has over 60% copper, steel wool.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:

Name of Metal	Metal is attracted to the magnet	
Aluminium	Yes	No
Silver	Yes	No
Copper	Yes	No
Iron filings	Yes	No
Steel	Yes	No
Nickel	Yes	No

Were all the metals attracted to the magnets? (*No*)

Which metals were not attracted to the magnet? (*Aluminium, silver, copper*) Which metals were attracted to the magnet? (*iron, steel, nickel*)

All magnetic objects are made of metal, but not all metals are magnetic.

Let's now classify objects as magnetic and non magnetic.

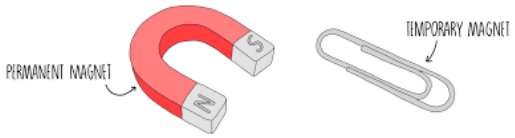
Types of Magnets

Materials needed: paper clips/staples, permanent magnet, nail, dry cell, wire.

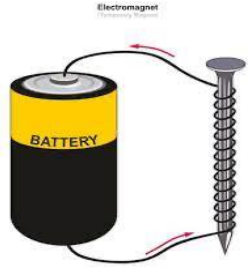
Guiding question: How can you make a nail into a magnet?

The students will be given some paper clips (5) or staples, a magnet and a nail.

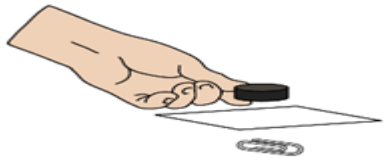
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		Use the paper clips/ to demonstrate when your nail has become magnetised. Allow students to explore and be creative with the objects provided. How did you make your nail magnetised? (*stroke the nail in one direction and lift the magnetic off the nail after each stroke*) The students will demonstrate to the class when their nail is magnetised. Students view this video on How to Magnetise a Nail https://www.youtube.com/watch?app=desktop&v=ok9GkzRiymM (1:27 mins) ***Guiding question: How can we increase the strength of our magnetised nail?*** Let us see which group can pick up the most paper clips/staples. Count how many times you rub the nail to the magnet. How many strokes did it take before the nail picked up one, then several paper clips/staples? You created a temporary magnet. This allowed you to use the nail to lift the paper clips/staples.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		What is a temporary magnet? **Temporary magnets** are objects that have magnetic properties for a limited time period under certain conditions. They are only able to create their own weak magnetic field while in the presence of a stronger magnet. Temporary magnets are objects made from iron and iron alloys (mixture of metals). However, when the field is removed, the object gradually loses its magnetism  Retrieved from: https://www.thesciencehive.co.uk/magnetism-gcse We have just learnt about temporary magnets. Magnetics can also be permanent. ***What are permanent magnets?*** **Permanent magnets** are made from metals like iron or nickel that are naturally magnetised and have their own magnetic fields. Once they are magnetised, they do not easily lose their magnetism.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		Some of the magnets you have been using are permanent magnets. Can you identify the permanent magnets? Have these permanent magnets lost their strength over the time we have been using them? (*No*). This is because they are permanent magnets. Let us watch a video on the types of magnets. How many types of magnets are there? Can you identify any other type of magnets? Students will watch the second part of the video **https://youtu.be/7HHs98PBgk0?si=s3vTHaoLEVdefAsv (2:05 - 2:28 mins)** Did you learn about another type of magnet? what is it called? (*Electromagnets*) There are three types of magnets: temporary magnets, permanent magnets and electromagnets. ***What are electromagnets? (see:*** (*https://kids.kiddle.co/Electromagnet*) An **electromagnet** can be created when electricity flows through a metal. They are magnets that are only magnetic when there is a coil of wire that has electricity flowing

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		through it. The magnetic force starts when electricity flows and stops when the electricity is no longer flowing. Let us see if we can make our own electromagnet. Students will be given a wire, battery and a nail to create their electromagnet. They will test their electromagnets to pick up paper clips using their electromagnet.  Retrieved from: https://www.shalom-education.com/wp-content/uploads/2021/04/image-74.png How can we make our electromagnet stronger? Students will be given more batteries, longer wires and bigger nails, galvanized nails and iron nails to try to create a stronger electromagnet.

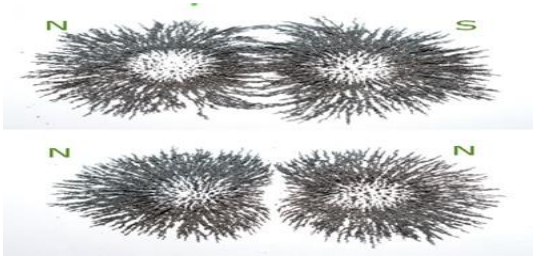
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		Electromagnets can be made stronger by adding more coils to the copper wire, or adding an iron core through the coils (for example a nail). The current can also be increased to make the magnetism stronger. (*Taken from https://kids.kiddle.co/Electromagnet*) Computers, TVs, and electric motors use electromagnets as well as burglar alarms, electric relays and fire bells. **Use of Magnets** Magnets are used very much in the world arounds us. Students, can you identify the uses of magnets? Teacher can access uses here: https://youtu.be/7HHs98PBgk0?si=s3vTHaoLEVdefAsv (2:28 - 4:01 mins) **Forces of Magnets** Today we are going to observe and compare the force exerted by one magnet compared to the force exerted by two magnets. We are going to engage in a simple experiment. Magnet Experiment: ***Are Two Magnets Twice as Strong as One?*** In this experiment we will determine whether the strength of the magnetic field created by two magnets is twice

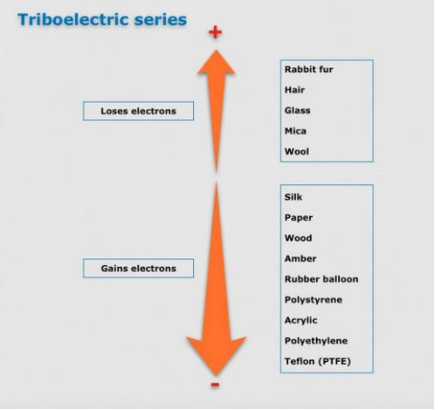
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		the strength of the magnetic field created by one magnet. For this experiment you will gather the following materials to work in your groups. ● 2 identical magnets ● metal paper clips ● Stack of index cards, sticky notes, or paper ● Stack of felt or cloth squares ● Ruler **Instructions** 1. Take one of the magnets and place an index card in between the magnet and the paper clip. Does the magnetic force of the magnet hold up the paper clip through the card? Record the data and your observations in a chart like the one below.  Number of Magnets | Pieces of paper | Pieces of cloth | Does it hold? | Observations 1 | 1 | 0 | Yes |

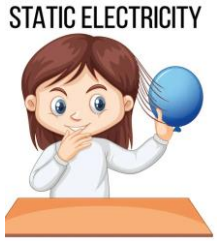
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		2. Add another card between the magnet and the paper clip and record your observations. 3. Keep adding cards one at a time until the magnet cannot hold the paper clip. 4. Count how many cards are between the magnet and paperclip. 5. Repeat the experiment using squares of felt or cloth. 6. Repeat both parts of the experiment using 2 magnets stuck together. When you combine magnets, you will need to use a magnet that does not have any casing so that they will stick together. 7. Graph your results. Try making a bar graph with "Number of Magnets" on the x-axis and "Number of Index Cards" or other material on the y-axis. This will help you determine if two magnets are twice as strong. Discussion questions based on the results. Does the material between the magnet and the paperclip matter? Why? Is the magnetic force greater when there is more than one magnet? Conclusion of the experiment: *two magnets together are stronger than one magnet, but two magnets will not be twice as strong as one.*

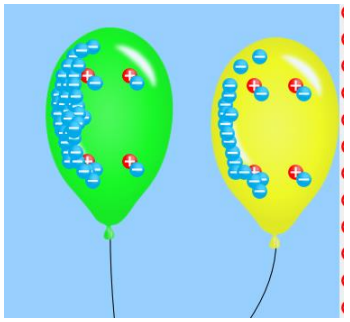
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		Experiment retrieved from: https://www.education.com/science-fair/article/two-magnets-twice-strong/#:~:text=Two%20magnets%20together%20will%20be,add%20the%20magnetic%20fields%20together **Magnet Experiments: The Effect of Orientation, Size and Distance** **Experiment 1** I want you to think about a fridge magnet. What happens when you bring it close the refrigerator door? (*It begins to pull towards the door*) When is the pull the greatest, when you are close or far away? (*When we are close)* We would say that the magnetic force gets greater when the distance is smaller. The amount of magnetic force depends on distance. Closer magnets are, the stronger the force. On a magnet, the force is the strongest at both poles (North and South) As objects move closer together, the magnetic forces between them increases. Like poles repel, opposite poles attract.

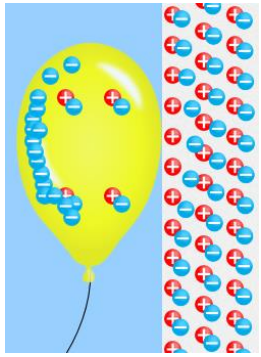
Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		Experiment 2 For this experiment you will need: Magnets, iron filings and pieces of paper. **Instructions** Put two magnets underneath a piece of paper with 1 inch apart.  1. Carefully and slowly shake some iron filings onto the piece of paper above the magnets.  2. If the iron filings are too far from the magnets, gently tap or shake the paper to move them closer to above the magnets. 3.Observe how the filings move and distribute on the paper.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		4.Next, remove the iron filings or carefully pour them back into the bottle. 5. Flip one of the magnets upside down. 6. Repeat steps 1-4 to see what iron filing pattern is formed this time.  Retrieved from https://www.rookieparenting.com/magnetic-field-science-experiment/ **Another Invisible Force: Static Electricity** Did you ever walk across a carpet and then watch as a spark jumped from your finger to a nearby friend or piece of furniture? That spark was electric charge moving from the carpet through you to another object! That type of charge is different from electricity in the wall where electric charge is moving all the time. We call this spark that you experience **static electricity.**

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		Let's now find out what it is. **Static electricity** is the buildup of the electrical charge in an object when it is rubbed against another object. ***Teacher background***: Electric charge gets transferred from objects that are electron donating to those that are electron receiving. To judge which objects are likely to donate electric charge, one must refer to the **triboelectric series**.  Retrieved from: https://www.sciencelearn.org.nz/images/3879-triboelectric-series **From this chart** you can see that rabbit fur would readily give electrons to a plastic rod. Or human hair would donate to a rubber ballon. (a popular, readily available

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		combination is to rub a rolled-up plastic transparency in hair or fur) Static electricity causes objects to stick together when they have opposite charges and repel when they have the same charge. **Demonstration 1** Based on our table above**,** if we rub a balloon in our hair, it picks up electric charge. If we begin to pull the balloon away from our head, it pulls some hair towards it because the hair has given away the charge and the ballon has received it. They are opposite in charge, so they attract- our hair seems to pull away!  Retrieved from: https://st.depositphotos.com/1763191/55714/v/450/depositphotos_557141770-stock-illustration-science-experiment-static-electricity-illustration.jpg

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		Demonstration 2 If we charge up two balloons separately by rubbing them in our hair, they will have the same charge and the balloons will repel each other!  Retrieved from: https://phet.colorado.edu/en/simulations/balloons-and-static-electricity/about **Demonstration 3** A wall is overall neutral in charge. It does not have an excess of electric charge. If we rub a balloon in our hair, the balloon will have electric charge and be attracted to the wall because of the positivity in the wall.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies:
		 Retrieved from: https://phet.colorado.edu/en/simulations/balloons-and-static-electricity/about **Static Electricity Simulation** If the teacher has access to a computer, they may do a demonstration or set up a learning center for their students using a computer simulation of static electricity. See: https://phet.colorado.edu/en/simulations/balloons-and-static-electricity/about

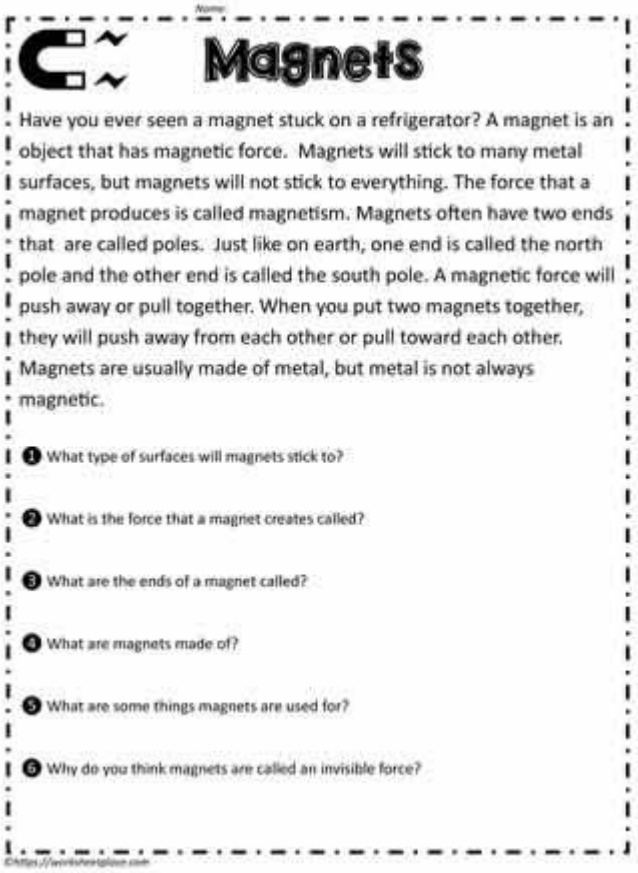
Additional Resources and Materials

https://www.youtube.com/watch?app=desktop&v=-aNpmCSZHbk (3:46 mins)

https://www.slideshare.net/mahahussain/magnetic-and-non-magnetic-48784163

https://www.worksheetplace.com/mf_pdf/What-are-magnets.pdf

Students will listen to a story about magnetic force https://www.youtube.com/watch?v=n5ChBJo4k3w (8:32 mins)



Name:

Magnets

Have you ever seen a magnet stuck on a refrigerator? A magnet is an object that has magnetic force. Magnets will stick to many metal surfaces, but magnets will not stick to everything. The force that a magnet produces is called magnetism. Magnets often have two ends that are called poles. Just like on earth, one end is called the north pole and the other end is called the south pole. A magnetic force will push away or pull together. When you put two magnets together, they will push away from each other or pull toward each other. Magnets are usually made of metal, but metal is not always magnetic.

1. What type of surfaces will magnets stick to?
2. What is the force that a magnet creates called?
3. What are the ends of a magnet called?
4. What are magnets made of?
5. What are some things magnets are used for?
6. Why do you think magnets are called an invisible force?

Grade 3 Science

Magnetic Attraction

Cross-Curricular Focus: Physical Science

An object that attracts metals, especially iron, is called a **magnet**. The area near the magnet where it has enough power to attract things is called its magnetic field. The farther away from the magnet an item is, the weaker the magnetic field is. When it is weak, it is less likely an object will become attracted to the magnet.

Magnets can be either **permanent** or **temporary**. A permanent magnet stays magnetized for a long time. A temporary magnet loses its magnetism after only a short time. You can even turn something made out of iron into a temporary magnet by rubbing it against a permanent magnet. The more you rub, the stronger your temporary magnet gets. However, the effects will wear off over time.

The two ends of the magnets are called **magnetic poles**. The poles are found at the ends of bar magnets and the tips of the horseshoe magnets. They are the strongest parts of the magnet. Each magnet has a north pole and a south pole. Opposite poles attract, or pull toward each other. Poles that are the same repel, or push away from each other. A north pole and a south pole will pull toward each other. Two north poles will push away from each other. The same happens with two south poles. When you hold magnets, you can actually feel the push and pull effects of magnetism.

A special kind of temporary magnet uses electricity to create a magnetic field. It is called an **electromagnet**. An electromagnet can be an extremely strong magnet. However, it only acts like a magnet when it has electricity. A stronger electrical current will produce a stronger magnet. Unlike other magnets, an electromagnet can be controlled by a switch. When the switch turns the electrical current off the electromagnet loses its magnetism. Whatever the electromagnet was holding drops to the ground. We use this technology to operate large cranes that lift heavy metal objects, such as cars.

Electromagnets are also used to make motors run in small appliances. Combining regular magnets and electromagnets makes it possible for electrical energy to be turned into energy of motion.

Name: _____

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

1) Explain the difference between a temporary magnet and a permanent magnet.

_____

_____

_____

2) Would two north poles attract each other or push away from each other?

_____

_____

3) What is different about an electromagnet?

_____

4) What do we use electromagnets for?

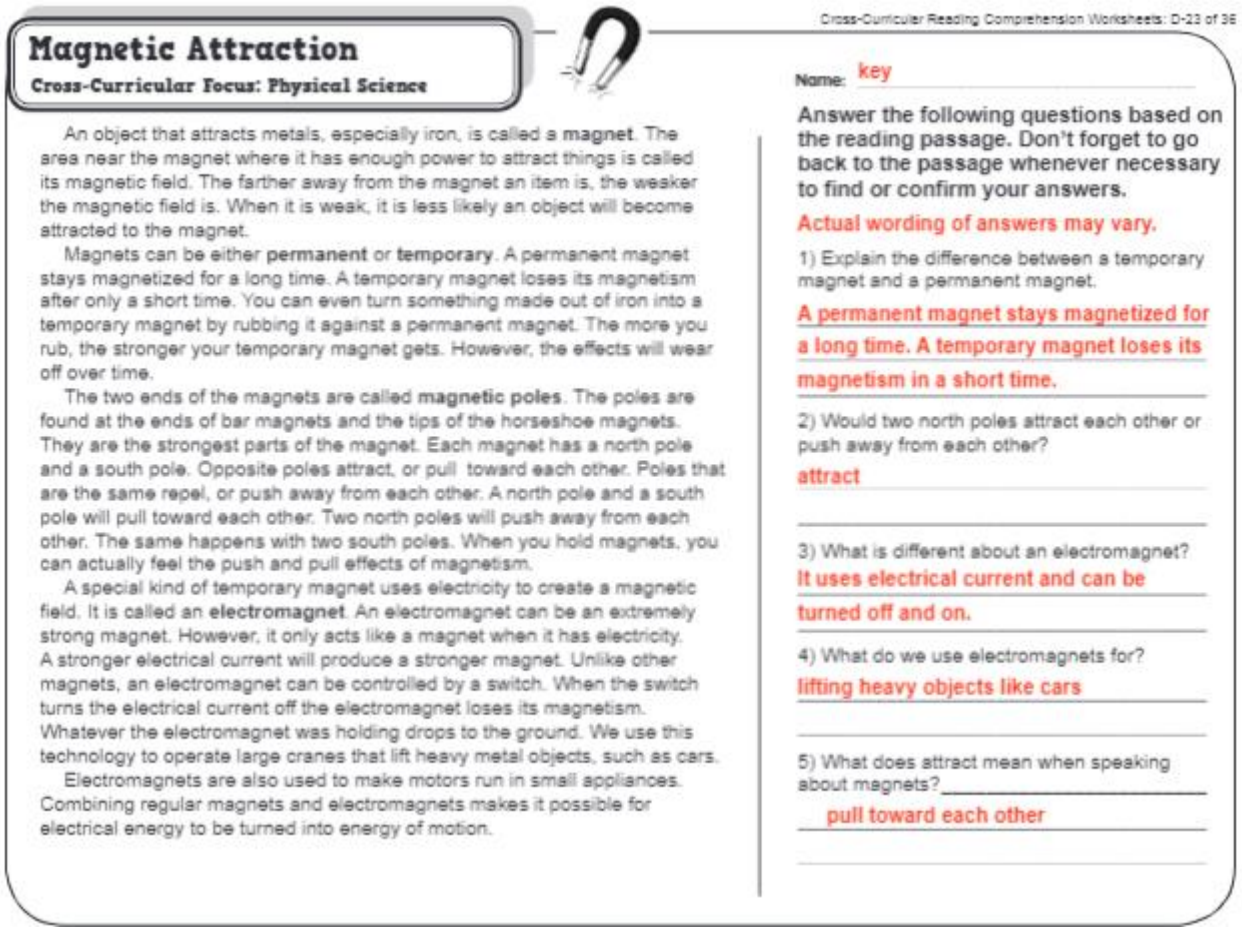
_____

_____

5) What does attract mean when speaking about magnets?_____

_____

_____



Cross-Curricular Reading Comprehension Worksheets: D-23 of 36

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Name: key

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

Actual wording of answers may vary.

1) Explain the difference between a temporary magnet and a permanent magnet.

A permanent magnet stays magnetized for a long time. A temporary magnet loses its magnetism in a short time.

2) Would two north poles attract each other or push away from each other?

attract

3) What is different about an electromagnet?

It uses electrical current and can be turned off and on.

4) What do we use electromagnets for?

lifting heavy objects like cars

5) What does attract mean when speaking about magnets?

pull toward each other

Additional Useful Content Knowledge for the Teacher: (*any additional knowledge that the writers believe would be helpful for the teacher such as reading material at a lower or higher grade level, links to curriculum documents for other grades)*

Objects in contact exert forces on each other. (ST 3-PS2-1)

Electric, and magnetic forces between a pair of objects do not require that the objects be in contact.

The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (ST 3-PS2-3),(ST 3-PS2-4)

Opportunities for Subject Integration: *(Additional ideas about how the inclusive learning strategies might be adapted and/or applied to include other subjects in the curriculum)*

Art and Craft- 1. Drawing magnetic fields using magnets and iron filings, 2. Poster depicting magnetic and nonmagnetic materials. 3. Drawing the different kinds of magnets, for example bar magnet, horse shoe magnet.

Reading and Comprehension - 1. Reading passages and answering questions based on passages. 2. Writing a short paragraph on how magnets are important to us.

Mathematics- 1. Drawing pictographs showing data collected from surveys of magnetic and nonmagnetic materials (at home, in the classroom).

Strategies that Support the Curriculum and Assessment Framework

Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework It will be used to guide the writing but will not appear in the curriculum guides.

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	Developing an appreciation of the importance of magnets in our everyday lives.
Developed Critical Thinking and Ethical Communication Competencies	Predicting the outcome of various experiments conducted.
Developed Well-being Competencies	Working cooperatively in groups.
Developed Knowledge and Entrepreneurial Competencies	Developing gadgets using magnets.

Elements from Local Culture, Technology, TVET, Environment that are integrated:

Technology is about solving problems- applications of magnetism and static electricity are good examples of technological development.

Items of Inspiration (teaching tips, inspirational passages, connections to educational research):

These activities are great for child centred learning or teacher demonstrations depending on the resource base.

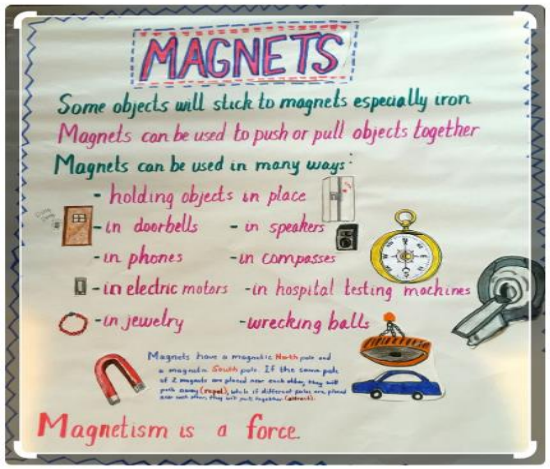
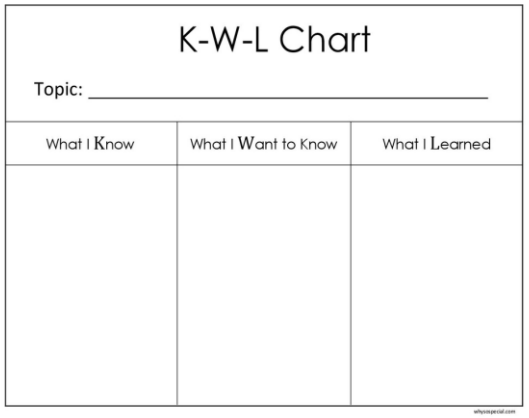
Science Grade 3

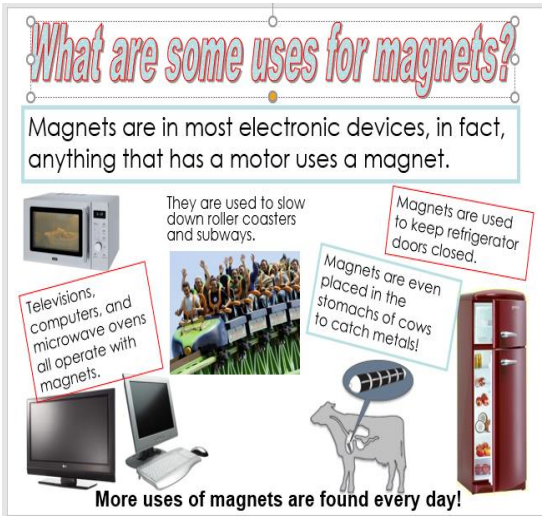
Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it.
Strand (Topic): Forces and Interactions Force and motion are important parts of everyday life. As students study this unit, they will learn how these physical factors impact their lives and work. The lessons and activities will help students become aware of factors like friction, gravity, and magnetic force.
Essential Learning Outcomes: (ELO-4) Define a simple design problem that can be solved by applying scientific ideas about magnets**.** [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

Learners are expected to:
 	
<u>Knowledge</u>
 	
• Define the terms:
  ○ Magnet
  ○ Attract
  ○ Repel
  ○ Electromagnet
	Activities illustrating the Use of Magnets
	
	Students will work collaboratively in groups to design a chart illustrating the uses of magnets.
	
	Roles will be assigned to students to ensure full participation by all students, example: Materials Manager is responsible for collecting the necessary materials.
		Review of Magnetism
		
		In today's session, we will do a quick review on magnets.

Grade 3 Science

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Match simple gadgets to the use to which they are put. (ST 2 TE TM 2) • Describe the use of magnets in the home and community, suggesting other novel ways in which magnets can be used. (ST 3 PS MM 3) • Formulate problems and do research in the development of technological devices.(e.g. construct models and gadgets).(ST TE.TM.1) • Match, with relevant examples, properties of materials which make them useful for certain specific purposes **Skills** • Suggest novel and innovative ways of using a magnet in the home. (ST 4 PS FMS 5) • Design and construct a simple object using chosen materials. (ST 2 PS MM 4) • Given problems, be able to design and construct simple gadgets. (ST 2 TE TM 1)	 Retrieved from: https://www.pinterest.com/pin/376191375099250569/	 Today we will learn about the uses of magnets. I will distribute a worksheet (K-W-L chart) where you will: 1. Write the topic: Uses of Magnets 2. Write in the first column what you know about the uses of magnets. 3. In the second column, what you want to know about the uses of magnet. 4. Click on the video below and enjoy!! **https://www.youtube.com/watch?v=yXCeuSiTOug (3:16 mins)** **5. Click on the link below to learn more uses of magnets.** **https://www.youtube.com/watch?v=zg_vlW97S5A (2:19 mins)**

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Attitudes/Values • Appreciation of how magnets make life easier • Realize the critical importance of safety in handling tools and making gadgets. (ST 2 TE NT 3) (Safety) • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges. • Participate actively in classroom discussions. • Share information with peers in a collaborative manner on the nature of technology. (ST 2 TE NT 2)	 Retrieved from: https://www.liveworksheets.com/w/en/science/1475514	**or PowerPoint on the uses of magnets** https://slideplayer.com/slide/10882326/ **or a poster depicting the uses of magnets**  Retrieved from: https://www.primaryresources.co.uk 6. Now fill in the last column of the K-W-L chart and write down what you learnt about magnets.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Project: Students will design a magnetic toy or game in groups or individually. The following will be used by their peers to assess their magnetic toy or game. They will present their toy or game to their peers and also display examples at a school science fair or science corner in the class. **Student's Checklist for Activity Three** My Magnetic Toy / Game Self-Assessment The student made a toy / game. (You can play with it. It has a purpose.) The student's toy / game has a magnet. The student reused materials to create toy / game. The student made a toy / game which shows an understanding of "attract" and "repel". The student made a detailed plan on how to create the toy / game. The student followed the plan to create the toy / game.	Magnets can be very useful in making our daily lives more comfortable and manageable. There are many awesome ways we can use them. Please note that magnets are hazardous if swallowed. Do not put magnets in your mouths. Click on the link below to learn a few awesome ideas. https://www.youtube.com/watch?v=o-lPZtCffpk **(3:25 mins)**  **Magnetic screwdriver holds screw.**  **Magnets hold chip bag closed.**

<table>
<tr><th>Specific Curriculum Outcomes</th><th>Inclusive Assessment Strategies</th><th>Inclusive Learning Strategies</th></tr>
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Teacher's Checklist for Activity Three

sourced and amended from: https://grade2explorers.weebly.com/student-learning.html

My Magnetic Toy / Game Self-Assessment

The student made a toy / game. (You can play with it. It has a purpose.)	YES NO
The student's toy / game has a magnet.	YES NO
The student reused materials to create toy / game.	YES NO
The student made a toy / game which shows an understanding of "attract" and "repel".	YES NO
The student made a detailed plan on how to create the toy / game.	YES NO
The student followed the plan to create the toy / game.	YES NO

Activity Two Assessment

The teacher will engage students in a Spelling quiz and the students will record their responses on paper.

The class can also engage in a Spelling competition.
</td>
<td>

Magnetize a pin to make a compass

ACTIVITY 1:

At times there are little errands we have to complete but quickly forget. The fridge is a place most people enjoy going to.

We can create awesome devices to help us with that.

Get coloured paper, design them with markers or crayons, staple them together or hold with a paperclip and attach a flat piece of magnet to the back.

This notepad can be stuck on the fridge and important notes, grocery list, home - work reminders, etc., can be written on them.
</td>
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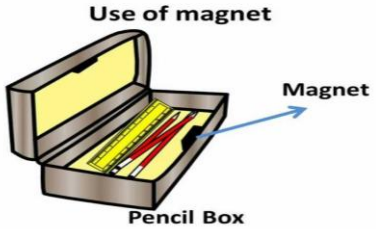
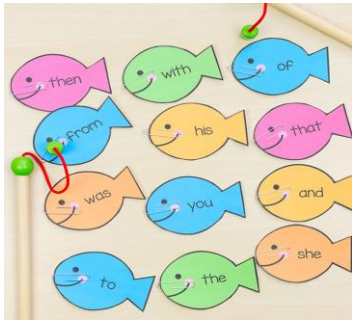
</table>

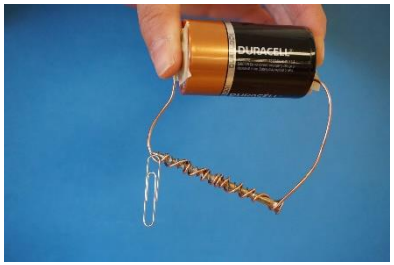
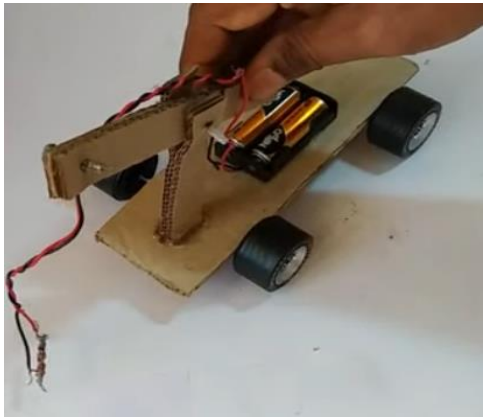
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		 Retrieved from: https://www.pinterest.com/pin/365073113520374893/ **Design Challenge #1:** You have a pencil box which refuses to stay shut. Devise a way to keep it closed using a magnet. This can be done in pairs or in groups. Students need to show an appreciation for each other's ideas and contribution. 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Retrieved from: https://niceringvs.life/product_details/46872100.html **Teacher Scaffolding Suggestion 1:** Teacher places one bar magnet each inside two match boxes. Teacher will ask students what they think will happen if both boxes are brought close to each other. **Teacher will then ask one student to bring one box closely to another box.** **Possible answers:** **Scaffolding Suggestion 2: Show students the magnets in everyday items that they use: e.g.** a) Have students play with toy cars which move. Teacher may show students the magnets inside a motor. b) The magnet in a large speaker. **ACTIVITY 2:** Teacher will explain that games can also use magnets as well. Teacher will ask students to create or make a game that will require magnet forces to play.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Design Challenge #2 You have a friend in your class who is having trouble remembering his/her sight words. Devise a way to help by creating a game using magnets. This can be done individually or in groups.  Retrieved from: https://funlearningforkids.com/editable-sight-word-games/ **Suggested game:** Fishing for sight words Fish-shaped flash cards are printed on cardstock paper with a metal staple or metal paper clip as the eye. Make a fishing rod using a stick, string and magnet.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Place fish shaped flash cards in a container and use the fishing rod to attract the fish. Pull it up and read the word. **<u>ACTIVITY 3</u>** Now that you have engaged in activities where magnets are used to create gadgets, it is now your turn to create your own. Your classmate and yourself will be provided with a checklist while you are creating your gadget. BE CREATIVE! The teacher will also use a checklist to access your gadget. **Here are some possibilities for students to choose from:** • How could we use magnets to keep a cupboard door closed? • How could we use magnets to prevent two toy cars from colliding? • How could we use magnets to stick a shower curtain to the bathtub and prevent leaking? • How could we use magnets to make a a calendar or folder that would stick to a school locker?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Extended Design Challenge: Electromagnets Have you ever seen a crane that lifts metal in a junkyard? Look at the picture here:  Retrieved from: https://www.youtube.com/watch?app=desktop&v=lSmuqLtmuwg This metal disc is called an **electromagnet**. It uses electricity to create a magnet. Something we will learn more about later. **Teacher demonstration** As you have seen before, we can make a simple electromagnet with a nail and a

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		battery. This type of magnet is useful for making lots of useful gadgets and tools.  Retrieved from: https://greatbasinobservatory.org/lesson-plans/build-electromagnet Could you make your own crane using an electromagnet? (see: https://www.youtube.com/watch?v=o918_yf5lXo&t=9s 5:14 mins) 

Additional Resources and Materials

Powerpoint magnets including the uses of magnets

https://www.slideshare.net/pm18aug/uses-of-magnets

Additional Useful Content Knowledge for the Teacher:

Activities on the uses of magnets

https://www.whatdowedoallday.com/magnet-activities-for-kids/

Opportunities for Subject Integration:

Language Arts: *1. Students can describe the steps they followed to make their gadgets.*

2. Writing a short paragraph on how magnets make our lives better.

Art and Craft: *1. Students can design posters depicting the uses of magnets.*

2. Students can design various games to use in the various subject areas for example, fishing for sight words.

3. Designing various gadgets to be used, example magnetic bookmarks.

Health and Family Life: *Research on the uses of magnets in improving our health, example removing bits of iron in the eye, ventilators. MRI machines, Insulin pumps. Presenting research information to classmates.*

Mathematics*: 1. Measuring various materials to construct different gadgets or devices.*

2. Students can design magnetic games or toys depicting various mathematical concepts, for example Snakes and Ladders, Fishing game - matching numbers to number names etc.

Social Studies*: Compare how magnets were used in the past vs. how they are used today.*

Strategies that Support the Curriculum and Assessment Framework

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	1. Work cooperatively in groups discussing various problems and ideas communicating ideas effectively, for example describing gadgets and their uses (providing a rationale for their gadgets). 2. When conducting practical and group work, display sensitivity and offer assistance to peers especially those who may have physical or learning challenges.
Developed Critical Thinking and Ethical Communication Competencies	Engaging in critical thinking activities to encourage students to think critically to solve various problems
Developed Well-being Competencies	Participate actively in group discussions.
Developed Knowledge and Entrepreneurial Competencies	Build/construct useful gadgets with magnets to be used in the home and in the classroom

Elements from Local Culture, Technology, TVET, Environment that are integrated:

Technology - Students can do research in development of technological devices, for example in the medical field MRI, insulin pumps. Research on the various ways these gadgets or devices make people's lives better.

TVET - Students can create devices or gadgets using magnets, example motors, pulley systems and electrical devices.

Items of Inspiration (teaching tips, inspirational passages, connections to educational research): design and create inspirational fridge magnets, badge magnets

Grade 3 Science

Retrieved from **https://www.pinterest.com/pin/355643701828101394/**

Grade 3 Science

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Interdependent Relationships in Ecosystems All living things grow, survive, and reproduce because they exist with other living and non-things that help provide the food and other resources that sustain them. These are interdependent relationships. No living thing can exist without these interdependent relationships, hence the necessity to study these complex interactions.
Essential Learning Outcomes: ELO-1: Construct an argument that some animals form groups that help members survive.
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

Specific Curriculum Outcomes	**Inclusive Assessment Strategies**	**Inclusive Learning Strategies**

Learners are expected to:
 	
<u>Knowledge</u>
 	
● Define the terms:
  ○ survive
  ○ groups (e.g. herds, nests, swarm, packs, pride, troops, flocks, etc.)
  ○ members
  ○ social
  ○ solitary
  ○ predator and prey relationship
	Activity 1:
	
	Answer the following questions:
	
	1. Which animal is a member of a
	  a. Herd *(cow, elephant)*
	  b. Flock *(bird, sheep)*
	  c. Swarm *(bee)*
	  d. Pride *(lion)*
	  e. Troop *(monkey)*
	2. What are TWO reasons why some animals form groups? *(for protection and food or to survive)*
	3. "Animals can survive better when they are alone." Discuss the above statement
		Students, do you prefer to play with others or by yourself?
		
		Note to teacher: Remind students there is no wrong answer, everyone is unique. Right now, you are part of a group called your _____ (class or family).
		
		What are some of the things that you do as a group and some things you do alone?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
○ structure or organization within a group ● Identify and name the different types of ecosystems in the country indicating their location on a map (ST 3 LS ECS 4). ● Identify collective nouns used to describe common groups of animals such as a pride of lions, a herd of cow, troop of monkeys, a swarm of bees, flock of sheep or birds, etc. Demonstrate they understand by: ● Identifying types of animals (e.g. honey bees, jack Spaniard wasps, termites, elephants, wolves, sheep, goats, whales, dolphins, mosquitoes, lizards, monkeys, lions, birds) that form or live in groups of varying sizes. ● Identifying at least one animal that does not live in a group. ● Explaining how some animals are able to survive alone. ● Showing situations when it is better to live in a group than as an individual. ● Explaining the roles of different animals in a group. ● Explaining how the different roles of members in a group benefits the group as a whole.	by stating ONE thing that you agree or disagree with. **<u>Worksheet on Why Animals Form Groups</u>** **Retrieved from:** **http://www.varsitytutors.com/3rd_grade_science-help/life-science/why-animals-form-groups** **Question #1: Why Animals Form Groups** Why do animals form groups? **Possible Answers:** They enjoy having friends They do not form groups To help them survive To do as they are told **Correct answer:** To help them survive ***Explanation:*** Animals form groups to increase their chance of survival. The animals work together to hunt, raise their young, protect each other, and more. Survival would be much more difficult if some animals lived on their own rather than in a group **Question #2: Why Animals Form Groups** Meerkats live in large families. Some are look-outs while others care for the young. Other meerkats are in charge of digging tunnels, and some are hunters. The meerkats will trade jobs and take turns.	How do you benefit from being in this group and how do the other members of your group benefit from you? Just like you, some animals prefer to be alone and therefore spend most of their lives alone. On the other hand, some animals prefer to live in groups. Watch the video below to learn the names of some animal groups. Look out for some local animals and their group names as well: <u>https://youtu.be/Pd4MglL97nQ?si=_p8Bf1HTfFEZNOlv</u> (5:59 mins) **Song - Animal Friends (Learn Animal Group Names)** **Note to teacher:** The table below shows a list of some common animal group names.

<table>
<tr><th>Specific Curriculum Outcomes</th><th>Inclusive Assessment Strategies</th><th>Inclusive Learning Strategies</th></tr>
<tr>
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- Giving multiple examples of animals in groups of various sizes: 1. Obtaining more food for each individual animal compared to the same type of animal looking for food individually. 2. Displaying more success in defending themselves than those same animals acting alone. 3. Making faster or better adjustments to harmful changes in their ecosystem than would those same animals acting alone.

Skills

- Observe the behaviour of individuals in a group.
- Compare how an individual member of a group of animals behaves when it is in the group and when it is separated from the group.
- Infer what could happen to members of a group if they are separated from the group.
- Communicate information gained from observations, texts, videos etc. with members of your group and the class.
- Predict how members of a named animal group may respond to certain changes in their environment.

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Why does living in this large family benefit the meerkats?

Possible Answers:

The meerkats don't have to do as much work, so they get to be lazier.
The meerkats like having company around and other animals to play with.
There are more members to split up the work and help with survival needs.
There is no benefit to meerkats living in family groups; they just do it out of habit.

Correct answer:

There are more members to split up the work and help with survival needs.

Explanation:

Living in a large family benefits the meerkats because they can split up the work and have

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Animal group	Group name
Cows or Elephants	Herd
Bees	Swarm or Colony
Fish	School
Wolves or dogs	Pack
Lions	Pride
Monkeys	Troops
Sheep or Birds	Flock
Ants	Nest or colony

https://www.youtube.com/watch?v=WRQfUD2W6Bg (4:08 mins)

Usually, the animals that live together benefit from each other in some way. What do you think are some of the ways that different animals can benefit from being in a group?

Note to teacher: Record students' responses on the board and guide the discussion towards the three main benefits which are **protection from predators**, **gathering food** and **responding to changes in the environment.**

Let us now watch the following video to find out about some of the ways that animals benefit from being in a group.

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Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Compile data on the behaviour of different members of identified/named groups. • Analyse data on the behaviour of different members of identified/named groups. • Graph data provided/generated on the behaviour of different members of identified/named groups • Interpret data provided/generated on the behaviour of different members of identified/named groups **<u>Attitudes/Values</u>** • Show an appreciation for the work that scientists do in studying animal behaviour. • Appreciate that there are solitary animals. • Be persistent when studying the various groups as it can take a lot of time. • Show interest in what is happening in the group or at the class level. • Use the inquiry approach in conducting various investigations.	members of the family working together to keep the family safe and healthy. Rather than all of the work falling on a few animals, it can be split up amongst dozens. Living in large groups like this help with protection, food collection, and general survival. **Question #3 : Why Animals Form Groups** Elephants live in large herds. When traveling, they keep the babies in the middle of the line or center of the group.  How do these large groups help babies survive? **Possible Answers:** These groups do not help babies survive. The group allows babies to drink more water. These groups protect babies from predators. The group keeps the babies from seeing the scenery. **Correct answer:** These groups protect babies from predators.	**<u>https://youtu.be/msdqmE6sRPs?feature=shared</u> (3:12 mins)** ***Teacher Note***: A useful book that can respond to these questions if technology is not available: Kalman, Bobbie (2016). Animals That Live in Social Groups. Crabtree Classics Publishing **As you watch** the video, please gather information that will help you answer the following questions. 1. What are the different ways that animals benefit from being in a group? 2. Are these benefits similar to the benefits that humans gain from being in a group? 3. Name some of the groups of animals shown in the video (ants, lions, elephants, birds, penguins, etc.) 4. Name at least one group that is protecting its members? *(meerkat, penguin, etc)*. For each group identified, how was this being done? 5. Which group is helping the members to gather food? *(ants, birds, lions)* Let's discuss the video that we just watched: From the video we learnt that some animals form groups for protection. Through strength in numbers each member of a group is protected.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Show respect for evidence in making various claims about animals living in groups • Develop different ways that animals may be studied. • Design ways to model the behaviour of different members of a group. • Work collaboratively with their group members to complete various tasks. Stewardship/Respect for Living Things • When observing animals, students should make sure that the animals or the environment are not harmed. Safety • While observing animals, students should exhibit appropriate behaviour to ensure that the animals or students did not get hurt. • While observing animals, students should be respectful of the animals they study.	***Explanation:*** Large herds of elephants can be seen moving across the plains of Africa with their babies in the middle of the group's lines as they travel. If predators attack them, the babies are usually targets because they are smaller and weaker. If the female elephants keep them hidden and guarded, they are protected. This technique is to help babies survive. **Question #4: Why Animals Form Groups** Fish are one of many animals who form groups for survival. They will form "bait balls" with hundreds (even thousands) of fish to scare away predators and make it more difficult for predators to catch them.  Fish form these groups to help them _____. **Possible Answers:** swim hunt splash survive	Some other animals, for example, lions and wolves form groups to find food. Animals which hunt other animals for food are called **predators**, e.g. lions, sharks, sea gulls, etc. The animals being hunted are called the **prey**, e.g. fish, small birds, lizards, etc. Now that we know how animals benefit from living in a group, we will now look closer at some of the things that animals do with their group members that help them to **survive**. What do you think the word survive means? To survive means to *remain alive*. **The following are videos focusing on some of the benefits of being in a group. The teacher should pose the questions before the video is viewed such that children are prepared to answer after the video plays.** In Video No. 1, we will find out how being in a group provides better protection than being alone. 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Students should be aware that some animals can harm them. For example, ants can bite. • When conducting practical and group work, students should display sensitivity and offer assistance to classmates/group members who may have physical or learning challenges. • Participate actively in classroom discussions.	**Correct answer:** survive **Explanation:** Fish form these "bait balls" to distract their predators and make it more difficult for them to be eaten. This technique is all about survival. Forming groups makes each fish safer than if they were swimming alone. **Question #5: Why Animals Form Groups** How do groups help animals to survive? **Possible Answers:** It does not help them to survive; it makes their lives worse. It helps them to find food, care for young, and protect one another. It helps them to feel less lonely, have more fun, and play together. It allows them to look cooler like they have more friends. **Correct answer:** It helps them to find food, care for young, and protect one another. ***Explanation:*** Living in groups provides animals with many benefits. A large group of animals is less likely to be bothered by predators, there are more females to care for and protect the young, and more members to look for food sources.	**1. Protection** **Video 1:** Cobra Vs. Meerkat | Wild Africa | National Geographic Wild UK (5:00min) Timestamp 2:50 min - 4:38 min Let's discuss the video: 1. When the young Meerkat encountered the King Cobra, it was alone. a. What did it do? b. What happened next? 2. How are the animals in this group helping each other? (They worked together to fight the snake) 3. Why didn't one meerkat fight the snake alone? (There is strength in numbers) 4. The Meerkat babies were moved to a safe place away from the snake. Why was this done? 5. What would happen if the Meerkats were unable to chase the snake away?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Working together provides them with more opportunities for survival than living alone does. **Question #6: Why Animals Form Groups** Which answer choice(s) is a benefit of animals forming groups? **Possible Answers:** All of the answer choices are correct. Animals can assist each other with jobs and tasks when in a group. Animals help each other raise the babies in the group. Animals can help to protect each other when in groups. **Correct answer:** All of the answer choices are correct. ***Explanation:*** All of the answer choices list a benefit to animals forming groups. When animals form groups for survival, they can help each other raise the young, hunt, keep watch, gather food, find shelter, and survive. Animals in groups have more eyes looking for predators or prey. They also have less work to do individually because they can share the workload. Animals in groups often survive better than if they lived alone.	**2. Easier to Hunt for Food** Lions are animals that hunt and eat other animals. The lion is called a predator and the animals it hunts are called its prey. While lions do hunt alone sometimes, they often hunt in groups, using teamwork to catch their prey, which are sometimes much larger than them. Let us now look at the next video to see how this is done.  How a Lion Pride Hunts Prey | Cat Attack-tics (5:00 min) 1. How are the lions working together as a team to take down the buffalo? 2. Why didn't one lion hunt alone? (There is strength in numbers. The buffalo is a very large and heavy animal. It is difficult for one lion to take it down. A lone lion can be easily harmed by the buffalo.)

Question #7 : Why Animals Form Groups
Monkeys live in family groups that can grow quite large in numbers. If monkeys lived alone, there are some tasks they could not complete. Based on the photo below, what is a task that requires a group to help with?

Possible Answers:

Eating
None of the answer choices require a group.
Grooming
Sleeping

Correct answer: Grooming

Explanation: Monkeys are very social and live in large groups with extended family. Monkeys help each other groom and use it as a chance to spend time with each other. Without a group to help the monkeys could not groom themselves properly. They rely on each other for help with their survival needs.

3. Do you think catching the buffalo would have been so easy if it was not separated from the herd? Explain your answer?

4. What statement in the video tells us that lions are not as successful hunting alone as they are, hunting in a group? (A lone lioness kills in only 1 in 5 attempts whereas the pride brings down its prey in only 1 in 3 attempts.)

3. Social Interactions (e.g. Grooming and Playing)

In some groups, some members can be seen grooming each other, where they remove dirt, insects, etc., from each other's body. Let us look at the next video, to see how the monkeys are benefitting from living in a group.

Monkey Picking Lice From Another Monkey In Love || Why Do Monkeys Eat Lice ?

(1:01 min)

Question #8: Why Animals Form Groups

Living in large groups puts animals at risk and makes them less likely to survive.

Possible Answers:

False
True

Correct answer: False

Explanation: Living in groups provides animals with many benefits. A large group of animals is less likely to be bothered by predators, there are more females to care for and protect the young, and more members to look for food sources. Working together provides them with more opportunities for survival than living alone does. Animals often fare better when living together than those outcasted to living alone.

Question #9 : Why Animals Form Groups
Fish are one of many animals who form groups for survival. They will form "bait balls" with hundreds (even thousands) of fish to scare away predators and make it more difficult for predators to catch them.

1. How are the monkeys helping each other? (by removing lice from its fur)

2. Do you think the monkey would have been able to remove the lice by itself? (No)

4. Making faster and better responses to harmful changes in their environment

Sometimes the environment where an animal lives changes and the animal has to be able to respond to these changes in order to survive. Living in a group helps members to respond to these changes much more quickly than if that animal was living alone.

Let us look again at the video that we looked at in the beginning of this topic:

Video: Why Do Animals Form Groups

retrieved from:
https://youtu.be/msdqmE6sRPs?feature=shared
(3:12)

In this video (0:30 to 1:01 min) we see how penguins are able to survive the cold temperatures by working together as a group.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Why would it be better for a fish to join the "bait ball" rather than swim alone? **Possible Answers:** A single fish would stand out and be easier to catch than a fish mixed in with thousands of others. Fish prefer to be in groups because it prevents them from being lonely and sad. There is no reason for a fish to join a "bait ball" instead of swimming alone. A fish can swim faster and longer when it is in a group compared to being on their own. **Correct answer:** A single fish would stand out and be easier to catch than a fish mixed in with thousands of others. ***Explanation:*** Fish form these "bait balls" to distract their predators and make it more difficult for them to be eaten. This technique is all about survival. Forming groups makes each fish safer than if they were swimming alone. If a fish is swimming alone, it stands out and is more likely to be chased and eaten. When the fish are in a group, their chances of being singled out and eaten are decreased, and many times the large gathering of fish scares the predators off completely.	 Questions: 1. What would happen to the penguins if they were not able to huddle together to stay warm? (They would freeze to death) 2. Why do they rotate between being on the inside of the group and the outside of the group? (When those on the outside get very cold, they move to the centre of the group to get warm). 3. What are some of the things that humans do as a group to respond quickly to the changes that may occur when a hurricane hits their country? (Help to clear roads, move fallen trees, repair damaged electrical lines, repair homes, etc.) Sometimes, the homes of some animals may get damaged or totally destroyed. Living in a group helps the members to repair/rebuild their home

Question #10: Why Animals Form Groups
Meerkats live in large families. Some are look-outs while others care for the young. Other meerkats are in charge of digging tunnels, and some are hunters. The meerkats will trade jobs and take turns.

What could happen to the meerkats if they started living alone instead of in groups?

Possible Answers:

They could die without the group to help them.
They could become very mean.
They could do all of the different jobs by themselves.
They could get lonely and find new friends.

Correct answer

They could die without the group to help them.

Explanation: Living in a large family benefits the meerkats because they can split up the work and have members of the family working together to keep the family safe and healthy.

very quickly. Let us look at the next video to see a group of ants in action.

Rebuilding Home as a Team

Timelapse: Fire Ant Colony Rebuilding After a Storm **(2:22 min)**

Anthill at 6:00 PM

Anthill at 7:00 PM

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Rather than all of the work falling on a few animals, it can be split up amongst dozens. Living in large groups like this help with protection, food collection, and general survival. If the meerkats were forced to live alone rather than in family groups, they might die. If they are busy gathering food or digging tunnels, they may not see predators. It would be hard for a meerkat to do all of the jobs by itself. **Predator/Prey Assessment** Observe the following pictures and identify which animal is the predator and which is the prey.  Photo retrieved from: https://www.flickr.com/photos/francesco_veronesi/7394699170	1. How are the ants helping each other? 2. Why are the ants working as a team? 3. Do you think that a single ant would have been able to rebuild its home in such a short time? (No, yes) Give two reasons for your answer. **Investigating the structure within some social groups** Within some group of animals there is a **structure** *(organization of the roles of members)*; each member has an important role to play in ensuring the survival of the group. If any member of the group does not complete its role then the survival of the group is at risk or jeopardised. **Activity: Exploring How Ants work together to survive** In this activity, we are going to gather evidence from various sources about ants (observing them outside, by watching videos about them, reading texts, etc.) to answer the question: How do ants work together in colonies to help them survive? **Note to teacher:** Identify several anthills on the school grounds or nearby field, where students will be able to observe them safely, in small groups.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Predator: _____ Prey: _____  Photo retrieved from: https://www.pickpik.com/grizzly-bear-dangerous-animal-wild-life-canada-9433 Predator: _____ Prey: _____	Class we will begin by going outside to observe ants to see what happens when we put out food for them. **Note to teacher:** If it is not possible to take out the entire class at the same time, students can be taken out group by group with the help of another teacher or a parent. Before taking students outside, review safety rules concerning observing ants. Once outside, place a small amount of food near each of the anthills. Assign a small group to each anthill. Students, before you begin your observations, I want you to predict what the ants will do with the food when they find it. Give one reason for your answer. Record the behaviour of the ants and any other details that you observe. Record your observations in the form you are provided with. You can also take photos and/or videos of what you observe. We will return to the site an hour later. You will again observe and record the ant behaviour again.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

Photo retrieved from: https://www.flickr.com/photos/noaaphotolib/39125333685

Predator: _____

Prey: _____

Activity 2:

Observe the following pictures and discuss what is happening in each scenario:

Where information was gathered	What you saw the ants doing	How might this help the ants to survive?
Ants observed outside (First observation)		
Ants observed outside (Second observation)		
From the ant video		

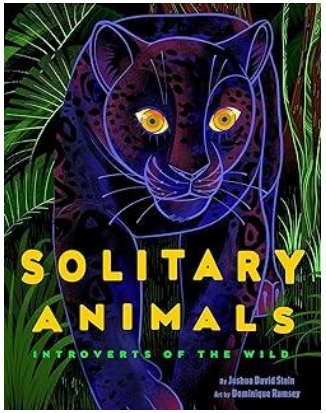
Note to teacher:

After all observations have been made, ask students to share their observations with the class and chart their observations. Review these observations with the students.

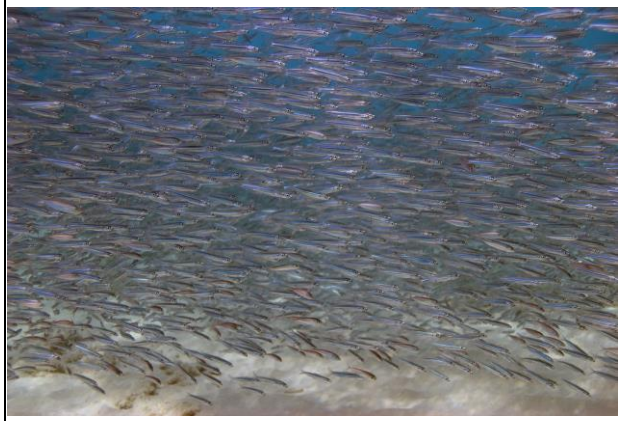
Students, we will now watch two videos to gather some additional information about ants. Video: https://youtu.be/HedZXw_hAbs?si=-LKpTgJnUHiXGKRU (3:14 mins) and The Social Structure of Ant Colonies (1:20 mins)

Worker Ants Carrying a Leaf Together

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Photo retrieved from: https://commons.wikimedia.org/wiki/File:Lioness_vs_Cape_Buffalo.jpg  Photo Retrieved from: https://commons.wikimedia.org/wiki/File:Lions_hunting_a_buffalo.jpg Discuss the benefits of being in a group from the perspective of the lions and the buffalo. **Activity 3:** Answer the following questions: 1. Meerkats live in large groups of about 40 members called gangs or mobs. Some members act as look-outs, some take care of the young, some hunt for food while others dig tunnels.	After students finish watching the videos, provide texts for students to gather any additional information that they may need. After students have had a chance to gather data from multiple sources, have them review their information and group their evidence into common categories as shown below. How ant are working together in colonies to help them to survive Claim / Evidence from direct observations, videos, etc. Ants work together to provide shelter and a place to raise and protect their young, Ants work together to gather food Ants work together to protect themselves from predators Building their homes Now that you have gathered information about ants from different sources, you will now write a claim about how ants work together as a group, to help them survive. Back up your claim with evidence that you have gathered or learned during class or from any other source.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	a. State two things that could happen to a meerkat if it started to live alone instead of in a group. b. What do you think will happen if the female meerkats (mothers) or the lookouts, did not play their role? Write your answer in the table below. What if one of the above roles did not exist, what would be the outcome? In the blank spaces indicate what might happen if the member identified stops playing its role. **Member** / **Effect** **Meerkat Mother**  Photo retrieved from: https://www.flickr.com/photos/tambako/53059350093/	**Solitary Animals** Some animals prefer to spend most of their time alone and only form groups when they need to reproduce. We call these animals, **solitary animals**. Can you think of any solitary animals? A good book:  https://youtu.be/w8sX6DfFvvU?si=kT3Nnj-RUBx4mn0M (3:34 mins) Why do you think these animals are more often seen alone? What are some of the advantages of being alone? *(easier to hide from predators, more food for the individual animal, etc.)* What do you think are some of the disadvantages of being alone? How does being alone affect an animal's ability to survive?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Lookouts  Photo retrieved from: https://commons.wikimedia.org/wiki/File:Suricatos_%28Suricata_suricatta%29,_parque_nacional_Makgadikgadi_Pans,_Botsuana,_2018-07-30,_DD_32.jpg **Activity 4:**  Photo retrieved from: https://depositphotos.com/photo/two-young-elephants-playing-together-africa-	

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	cute-animals-amboseli-park-334780024.html 1. Elephants live in large herds. When traveling, they keep the babies in the centre of the group. a. How does this help the babies to survive? 2. Fish form "bait balls" with hundreds (even thousands) of fish.  Photo retrieved from: https://www.flickr.com/photos/actor212/3848876936 a. How does this make it difficult for predators to catch them? b. Why would it be better for a fish to join the "bait ball" rather than swim alone?	

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	3. If monkeys lived alone, there are some tasks they could not do for themselves. Look at the photo and identify the task a monkey requires a group to help it with?  Photo retrieved from: https://www.flickr.com/photos/ekilby/15462035441 **Activity 5** Poster on a local animal living in a group Ask each student to select an animal that lives in groups. Give students time to find out about the animal they have chosen. Ask students to use the information gathered to prepare a poster about the animal. Have students draw a picture of their animal group. Each poster	

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	should also include at least two bullet point facts below the drawing, explaining how these animals live and work together to survive. Have students submit their posters for grading. **Activity 6:** Create a digital poster or multimedia presentation summarising their findings about specific animal's group behaviour. **Activity 7:** Group Assignment Students will research and gather information about specific animals and their group behaviour. The gathered evidence will be used to construct arguments about the benefits of group living for specific animals. The arguments will be presented to the class and they will review and provide feedback on each other's arguments. Tech/Software that can be used: Websites for animal facts and data, word processing software for typing out arguments, digital images or diagrams to support their arguments, presentation software, and online collaboration tools or shared documents. Rubric: Argument Content: 4	

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Organisation and Structure: 4 Presentation and Clarity: 4 Supporting Visual: 4 Overall Persuasiveness: 4 Total: 20 **Activity 8:** 1. Write a story from the viewpoint of an ant explaining your role in helping the colony to survive. 2. State two ways in which the group behaviour of ants is similar to that of humans. 3. State two ways in which the group behaviour of ants is different to that of humans. **Activity 9: Humans Benefit from Groups Too!** What does this famous quote mean? ***"Many hands make light work!*** **(**Many hands make light work" **emphasizes the importance of teamwork and cooperation**.	

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	This idiom represents how a tough, "heavy" task can become easier, quicker, and "lighter" when multiple people help.)	

Additional Resources and Materials

Let's look at how a honey bee colony is structured. Use the diagrams below to identify and discuss the roles and functions of the bees within their colony.

The Honey Bee

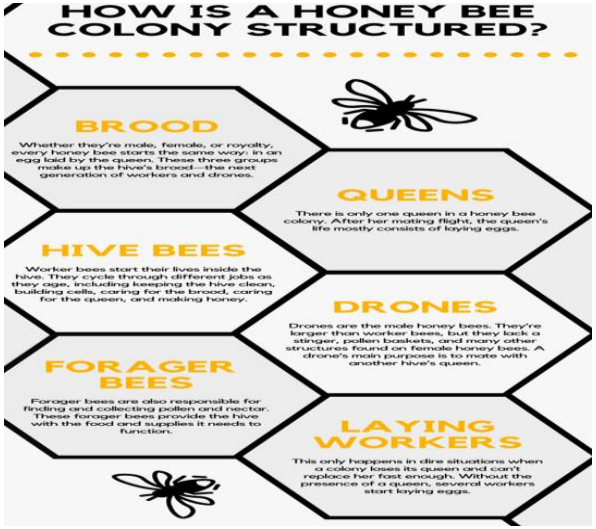
Honey bees are the only insects that produce a food that is consumed by humans – honey. They are social insects. A colony of bees includes a queen, drones and workers. There is only one queen per hive. She is the largest bee in the colony and may live up to five years. She will lay up to 2500 eggs per day and has the ability to control whether she lays male or female eggs.

If the queen dies, the workers will create a new queen by selecting a young larva and feeding it a special food called "royal jelly". This will enable the larva to develop into a fertile queen.

All worker bees are females, they are unable to reproduce, and live for about six weeks. A colony can have 50,000 – 60,000 workers who collect nectar to make honey. An average worker bee produces about 1/12th of a teaspoon of honey in her lifetime. A hive of bees will fly 90,000 miles and visit an average of four million flowers to collect 1 kg of honey. A bee visits between 50 and 100 flowers during one collection flight from the hive. They dance to communicate direction and distance of flowers.

Drones are the male bees that have no stingers. If the colony is short of food, the drones are forced out of the hive. Bees have five eyes and four wings. A bee's wings stroke 11,400 times per minute, thus making their distinctive buzz.

Source: https://englishunite.com/product/short-story-the-honey-bee/



Source: https://www.mannlakeltd.com/blog/how-is-a-honey-bee-colony-structured/

Activity Showing how tasks can be achieved faster by a group

Assign a task (one that would be completed faster in a group than by an individual, such as drawing shapes and then cutting them out, fitting pieces of a puzzle together, etc.) to three or four groups of students, then assign the same task to several individual students to complete alone. Allow a few minutes for completion.

Once the time is up, ask each group to state how far they got with the task. Then ask the individual students to do the same.

Ask the groups to state what made it easier for them to complete the task. Then ask the individual students to state why they were unable to complete the task. Also ask the individual students what they would need to complete the task.

Additional Useful Content Knowledge for the Teacher: (*any additional knowledge that the writers believe would be helpful for the teacher such as reading material at a lower or higher grade level, links to curriculum documents for other grades)*

What Kind of Animals Live in groups?

Some animals such as robins and polar bears live alone. Other animals such as gorillas, bats, honey bees, deer, buffalo and lions live in groups. Animal groups vary greatly in size and function.

Why do Animals Live in Groups?

Animals live in groups to help each other survive. Living in groups provides animals with many benefits. Animals can hunt together, protect each other and help raise their young. Survival would be much more difficult if some animals lived on their own rather than in a group.

Animals can form groups that are big or small. For example, an African lion pride usually consists of about 13 lions, while Wildebeest can be found in huge groups of over 1 million in Eastern Africa. In some groups such as bees and ants, the members have special jobs. This helps the group to succeed.

Groups can help animals defend themselves.

One of the main reasons animals form groups is to defend themselves. When there are more individuals in the group, there are more eyes to look out for danger and more animals to defend the members of the group.

Groups can help animals gather food.

Another reason why animals form groups is to gather food. Animals such as the honeybee and the ant, gather food and take it back to the colony. This food is shared with the other members of the colony.

Groups can help animals find mates.

When animals live together it is much easier for individuals to find mates, as they do not need to travel far to find mates. This helps them survive because if they have to travel far to look for a mate they could get eaten.

Groups can help animals respond to changes in the environment

Living in a group helps animals defend themselves against predators in several ways. A lone animal must rely only on its own senses, but an animal in a group, benefits by having others alert it when danger is near. An animal in a group also has a smaller chance of being picked out by a predator.

Definition of animal group behaviour

Group behaviour is what animals do with other animals to help them survive.

Examples of animal behavior in groups

- Leaf cutter ants chop leaves and carry them back to their colony.
- Migrating birds fly in a V-formation to help them conserve energy.
- Most fish swim in schools to avoid predation.
- Some animals such as penguins huddle in groups for warmth.
- Some animals such as ants work in groups to build homes.

Opportunities for Subject Integration: *(Additional ideas about how the inclusive learning strategies might be adapted and/or applied to include other subjects in the curriculum)*

English language

- Participate in collaborative conversations with group members on the topic.
- Follow steps in a procedure when carrying out observations/experiments, etc.

Mathematics

- Draw a picture graph and a bar graph to represent the data set generated/data provided. Write explanations about observations/analyses, etc.
- Use a stopwatch to time observations.
- Record number of times observations are seen/taken.
- Graph the average number of organisms that make up a group among a variety of species.

Social studies

- Identify different social groups found in their local country and determine the composition/structure of these groups.
- Determine how persons benefit from being part of the different groups named in a.
- How living in groups impacts the thoughts, feelings and actions of persons.
- How certain group dynamics (for e.g. gang culture) are being used to commit crimes or perpetrate violence on the community.
- Benefits of persons living and working in groups.
- Role of different groups in social development.

Agriculture

- Identify local agriculture groups, e.g., farmers' groups, research groups, marketing groups.
- Determine the role of the different farmers groups identified.
- Determine the importance of different groups of workers in achieving the objectives of the agriculture sector. For example, picking fruits on time, planting seedlings on time, weeding on time, transporting produce, etc.

Strategies that Support the Curriculum and Assessment Framework

Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework It will be used to guide the writing but will not appear in the curriculum guides.

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have::	**Where might this competency be promoted/developed in this learning outcome and associated lessons?**
Developed Citizenship Competencies	Through analysing animal groups, students develop citizenship competencies such as: ● Being active and supportive citizens. ● Understanding and respecting the roles of each citizen while also recognizing the importance of their role as a citizen. ● Understanding the social, economic and political concepts and structures within a group. ● Appreciating that forming groups improves the sustainability, development and survival of an individual and the species as a whole.
Developed Critical Thinking and Ethical Communication Competencies	The activities included in this section call on students to use their critical thinking to see the animal groups, human groups and world by extension from different perspectives and to make ethical decisions based on their understanding and analysis of groups.
Developed Well-being Competencies	The well-being competencies developed in this curriculum are linked to survival of species as animals form groups which provide them with protection, food, social interactions and the support needed to make fast adjustments to environmental changes. Analysing these factors helps students to appreciate how humans also use groups to ensure their well-being.
eveloped Knowledge and Entrepreneurial Competencies	This curriculum develops knowledge as students explore, make observations and learn about the various groups around them. By exploring the organizational structures within animal groups, students learn about the management structures in organizations and the role of its members. Having an appreciation for these

	structures can be useful for developing and managing their own businesses in the future.

Elements that are integrated across subjects:

Elements from Local Culture, Technology, TVET, Environment that are integrated:

Local Culture

- Different groups involved in the development of local culture e.g. church groups, community groups and social clubs.
- The role of different groups in keeping certain aspects of our culture alive. OR
- The role of social groups in the transmission of culture in their society.

TVET

- Many activities under TVET, need different groups of persons to achieve them.
- Some machines in TVET need a group of persons to operate them.
- Factories need different groups of persons to operate them.
- Many different stakeholder groups exist in TVET.
- The different stakeholder groups in TVET each have different roles.

Technology

Information obtained from studying animal groups can be used in designing different technologies.

Items of Inspiration (teaching tips, inspirational passages, connections to educational research):

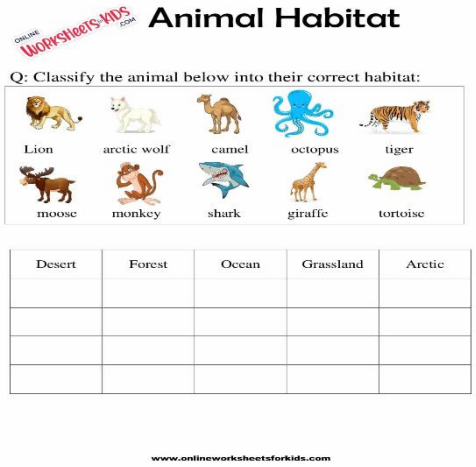
Teamwork is the secret that makes common people achieve uncommon results. - Ifeanyi Enoch Onuoha

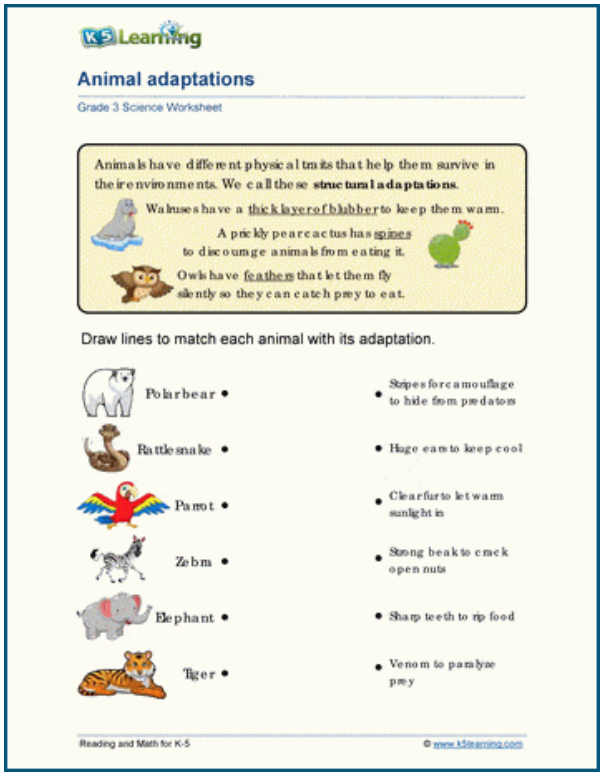
https://www.southernliving.com/culture/teamwork-quotes

Grade 3 Science

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Interdependent Relationships in Ecosystems All living things grow, survive, and reproduce because they exist with other living and non-things that help provide the food and other resources that sustain them. These are interdependent relationships. No living thing can exist without these interdependent relationships, hence the necessity to study these complex interactions.
Essential Learning Outcomes (ELO -3): Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms**,** and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

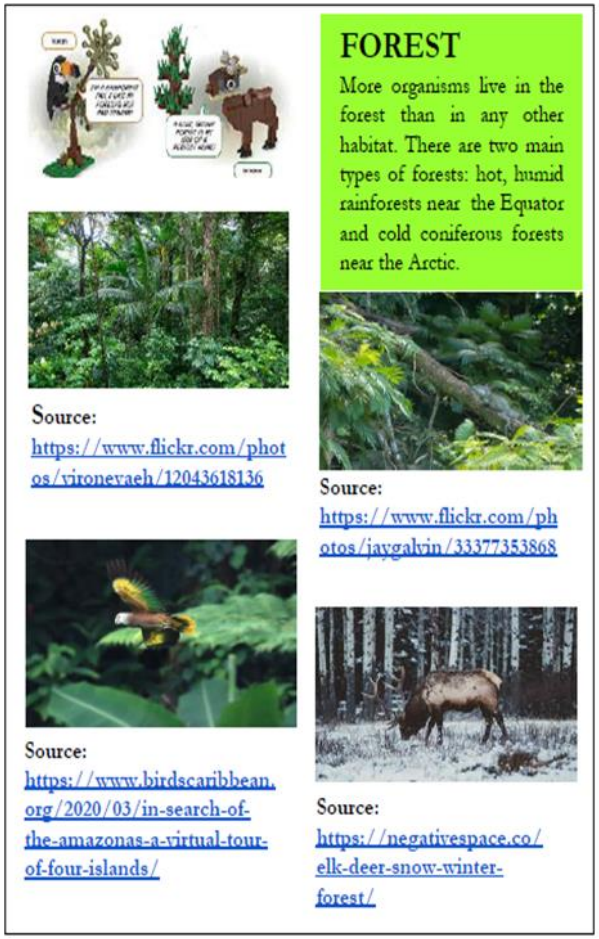
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Learners are expected to: **<u>Knowledge</u>** ● Define the terms: ○ Adaptations ○ Ecosystem ○ Environmental balance ○ Habitat ○ Interdependence	**An Online Habitat Quiz** Click the link to do a short quiz on habitats: https://www.cserc.org/sierra-fun/games/match-habitat/	**Opening Scenario: Reviewing Habitat** A factory in the Caribbean uses water from a river to cool its overheating machinery. The water is then cycled out to the river again. The local people notice that fish and water animals like frogs are showing up dead on the banks. The company is adamant that they are not polluting the river but still animals are dying.

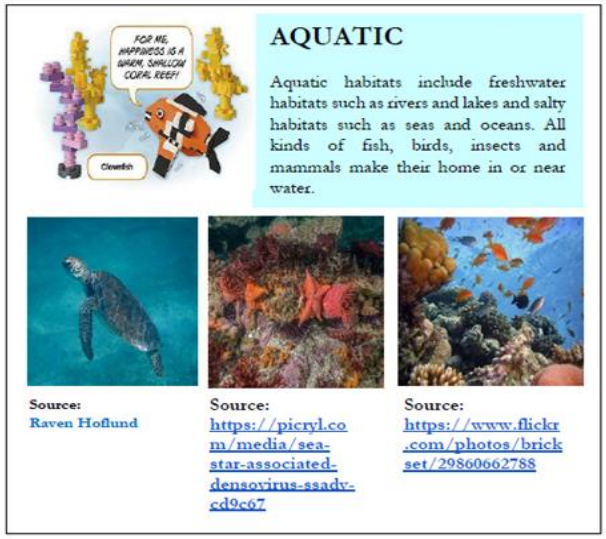
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
○ Diversity ○ Abiotic ○ Biotic • Demonstrate that they understand that habitats are different and that some animals survive well in a particular habitat, some survive less well, and some cannot survive at all. • Show evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all. • Account for adaptations observed in organisms found in different habitats. • Explain how some features of organisms enable their survival in their habitats. (ST 2 LS ECS 5) • Distinguish between activities that harm and those that preserve habitat/the environment. (ST 2 LS ECS 6) • Explain, with examples, what are endangered species. (ST 2 LS ECS 12) • Identify and describe ways of protecting endangered species e.g. laws, change of human's attitudes to life and the environment. (ST 2 LS ECS 13) • Explain how adaptations of organisms enable their survival in their habitats.	**Matching the Habitat Table**  Retrieved from https://www.onlineworksheetsforkids.com/api/util/pdfview?key=bc298938467a1ff68e5825078f94a715 **Classroom Map of Habitats** ***Teacher:*** Label each corner of the classroom with the name of a different habitat. Give each student the name of an organism, (one which the student should be familiar with). Ask him/her to stand in the corner of the class to show the habitat the given organism lives in. **Note to teacher:** If pictures are used instead of names, organisms that the students may not be familiar with can be used.	Where an animal lives, is called its **habitat**. When animals are displaced from their natural habitat this can cause problems but also humans have a role in protecting the natural habitat of animals. What do you think is the problem with this situation in the river? (*proper water temperature for aquatic animals can be very important for survival*) Teacher Note: This would be a good opportunity to mention global warming and its potential to cause habitat problems with water temperatures worldwide. And/or Winston had a pet turtle (Mirtle) he took with him everywhere. Even when he was on his bicycle, he would keep him in a tiny box in his backpack. In summer, Winston was invited for a holiday at his cousins in California. He insisted to his mother that his turtle come with him. His cousin Michael told him to pack light clothing because he lived in a desert, and it was pretty warm most of the time. Winston had never been to a desert before, and he couldn't wait to ride their bicycles across the sand. Unfortunately, on the first bike trip, Mirtle the turtle mistakenly fell out of his backpack. It was only after an hour that Winston recognized her missing. What would he do? He had to find her. Was Mirtle likely to survive in the desert habitat long enough for Winston and Michael

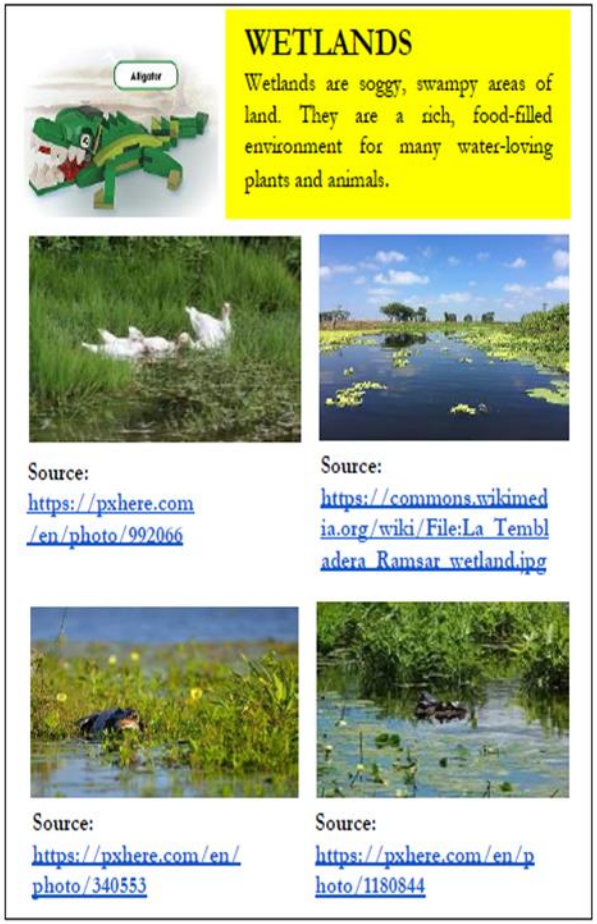
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Explain how some features of organisms enable their survival in their habitats. (ST 2 LS ECS 5) • Identify, with examples, ways in which organisms in a particular habitat depend on each other (feeding, shelter, protection, beauty) • Identify, with examples, ways in which plants and animals depend on each other (feeding, shelter, protection, beauty) (ST 2 LS ECS 17) • Explain to their classmates the need for environmental conservation in their country, outlining possible scenarios if such protection is neglected. (ST 3 LS ECS 7) • Reiterate the meaning of the concept of balance in the environment. (ST 3 LS ECS 5) • Explain that living things compete for food and space in the environment and describe how breaking the flow or supply of food can have serious consequences. (ST 5 LS ECS 2) • Explain with examples, the ways in which the structure of the land influences the types of ecosystems. (ST 3 LS ECS 3) • Identify and name the different types of ecosystems in their country indicating their location on the map. (ST 3 LS ECS 4)	Once the student has selected a habitat for his/her organism, ask him/her to explain why his/her organism would survive in the habitat selected. The process may be repeated with new animals and plants. **Note**: Some organisms may be able to survive in multiple habitats. **Can you match the Adaptations?**  	to find her? We are going to investigate habitats so that you can answer that question! Students, let us look at the variety of habitats that living things prefer and think about how important it is that their habitat be preserved. Students, what can you recall about habitats? **To teacher:** Write students' responses on the board. Students, you have given some very good responses. We will now watch the following video to obtain more information about habitats and to see what they provide for organisms, including human beings. **https://youtu.be/um0hAdGcZsk (0:58 mins)** Let us now summarize what we learnt from the video. 1. A habitat is a place where plants and animals normally live and grow. 2. There are many different habitats. Examples of habitats include forests, grasslands, deserts, polar regions and aquatic/water habitats.

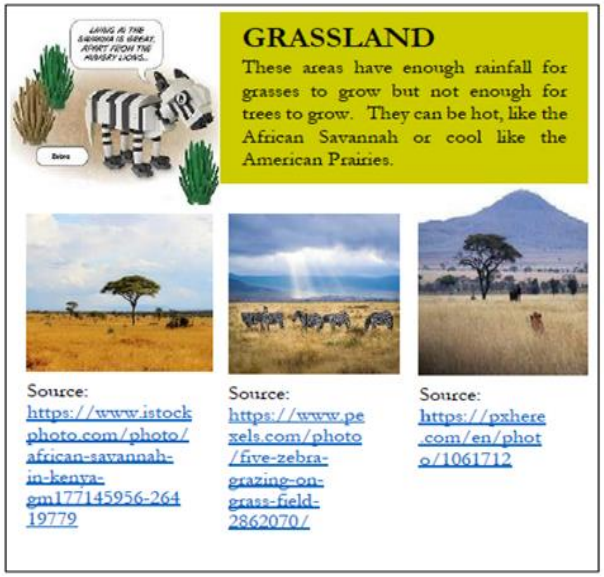
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Skills • Identify organisms found within a particular habitat. • Identify the basic needs of living organisms in various habitats. • Describe the characteristics of different types of environments (e.g., soft earth, trees and shrubs, seasonal flowering plants). • Identify at least five different habitats that exist in different ecosystems. • Compare the habitats of many different kinds of Caribbean plants and animals. • Construct a model of a habitat for a given organism. • Describe the characteristics of particular organisms that help them to adapt to particular environments.	**Photo retrieved from:** https://www.k5learning.com/science-worksheets/third-grade-3/living-things/adaptations **What can you observe in this picture?** Use the photo below to answer the following questions:  Photo showing fish in a pond Retrieved from: https://www.rawpixel.com/search/fish%20pond%20koi?page=1&sort=curated&topic_group=_topics 1. What features (characteristics) do fish have that allow them to survive in a pond? *(gills, body shape, scales, tails, fins)* 2. The features that the fish have that allow them to survive in the pond are called _____. *(adaptations)* 3. How does the pond provide the fish with the things they need to survive (i.e. food, air/oxygen, water, shelter and space)? *(food - by feeding on other organisms in the pond, water- from the pond itself, oxygen- from the water in the*	3. A habitat provides food, air or oxygen, water, shelter and the space an organism needs to survive. **Note to Teacher:** The flashcards below list some of the habitats we saw earlier. These cards may be used, along with the video in the link below, to help students explore habitats further. **Video link:** https://youtu.be/PyO8XbFrde4 (7:59 mins) The flashcards were prepared using the poster found at this link below along with other sources. **https://www.flickr.com/photos/brickset/29860662788** Let us now explore the habitats, one by one, to see the characteristics of some of these habitats and the organisms that live in them. As you observe the materials, pay close attention to the following 1. List the animals and plants you see in each habitat. 2. Describe the features of each habitat. 3. Which of these habitats can be found in your country and what are some of the

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Identify the needs of named organisms in a particular habitat (e.g., shelter from predators, food, water). • Identify characteristics of organisms that might affect their survival. • Compare the needs of at least three types of organisms found in a particular habitat. • Determine how and what features of the habitat are meeting the needs of each of the organisms (i.e., the degree to which a habitat meets the needs of an organism). • Determine what features of the habitat are meeting the needs of each of the organisms (i.e., the degree to which a habitat meets the needs of an organism). • Determine what features of the habitat that are not meeting the needs of each of the organisms (i.e., the degree to which a habitat does not meet the needs of an organism). • Observe different habitats to determine key features/their	*pond, shelter- rocks/ aquatic plants, space- from in the pond itself)* 4. What would happen to the fish if they were removed from the pond and placed: • on a sand dune in the desert (a dry, hot climate) • on the grass in a grassland • on the snow *(the fish will not be able to breathe, feed, find water, shelter or space and it will eventually die)* **Mix and Match Habitat Activity** **a. What's wrong here?**  **in a**  **Photos retrieved from:** https://commons.wikimedia.org/wiki/File:Polar_Bear_Sitting_%286292639587%29.jpg https://commons.wikimedia.org/wiki/File:Wadi_Rum_Dry_Desert,_Jordan.jpg Is this the polar bear's correct habitat? Will the polar bear be able to survive well here? What features/adaptations of the polar bear make it difficult for survival in this habitat?	animals that can be found in those habitats? 4. How the particular habitat is meeting the needs of these organisms. **Food Chains- A Review** Have students create a simple food chain within one of their country habitats. Have a class discussion about how each part of that chain is important in order to maintain a **healthy environmental balance** of food and energy for each part of that food chain. **Flashcards of organisms in their habitats**

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
characteristics and that of the animals living there. • Recognize that organisms and their habitat form an interconnected system. • Develop a clear argument about the survival of organisms in the habitat, supported by evidence. • Make comparisons between different organisms' abilities to survive in the habitat. • Classify different habitats based on their characteristics / Classify animals found in different habitats based on their characteristics/adaptations. • Infer which habitat an organism might survive best in based on its physical/behavioral characteristics. • Measure different variables within a given habitat, such as temperature, pH, etc. • Communicate information gained from observation text, videos etc. with member of your group and the class.	**b. What's wrong here?**  **in a**  **Photos retrieved from:** https://www.flickr.com/photos/usfwssoutheast/5840602412 https://beechpower.eu/2021/08/25/forestry-contributes-to-warming-of-forest-ecosystems-during-extreme-summers-study-says/ Is this the turtle's correct habitat? Explain your answer. Will the turtle be able to survive well here? What features/adaptations of the turtle make it difficult for survival in this habitat? **Helping Froggy the frog find its habitat.** In this exercise, we are going to help Froggy the frog find its habitat! There are four main parts of a habitat: food, water, shelter, and space.	

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Construct an argument supported by evidence about the ability of organisms to survive in a habitat. • Compile/analyse data obtained from organisms observed in a habitat. • Create and Interpret graph on data obtained from organisms observed in a habitat. • Carry out simulations exercises to demonstrate the behaviour of animals in a habitat. • Observe homes/habitats of different animals, indicating how each habitat satisfies the various needs of animals. (ST 2 LS ECS 3) • Infer how food webs help to maintain nature's balance, and identify the factors that may disrupt this balance. (ST 3 LS ECS 2) • Construct and label simple food chains to depict feeding interrelationships among animals and plants. (ST 2-LS ECS 20) • Construct and label simple food webs to show feeding linkages among animals in a given area(e.g., pond, a	Small frogs eat insects such as flies and moths, as well as snails, slugs and worms. Water is needed for drinking and for laying their eggs. They use camouflage, so that they are less visible to their predators, such as birds and fish. They use rocks, logs and tree stumps for shelter. Four different habitats are shown below. Each habitat has something that Froggy would need to survive. However, there may be things missing from each habitat that Froggy would need to survive.  Desert - Source: https://pixabay.com/photos/desert-dunes-nature-namibia-tree-6785856/ Coral reef - Source: https://pixabay.com/photos/underwater-reef-dive-1656618/  Grassland - Source: https://pixabay.com/photos/cheetah-animal-safari-nature-7538286/  Rainforest - Source: https://pixabay.com/photos/greenery-flora-hawaii-landscape-	 Source: Raven Hoflund Source: https://picryl.com/media/sea-star-associated-densovirus-ssadv-cd9c67 Source: https://www.flickr.com/photos/brickset/29860662788  Source: https://pixabay.com/photos/polar-bear-arctic-ice-landscape-3775941/ Source: https://pixabay.com/photos/penguins-antarctica-bird-south-2810724/ Source: https://pixabay.com/photos/seal-antarctica-nature-wildlife-4622266/

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
section of the school yard) (ST 3 LS ECS 1) • Infer how food webs help to maintain nature's balance, and identify the factors that may disrupt this balance. (ST 3 LS ECS 2) • Interpret simple food webs, referring to the need of natures balance. (ST 4 LS ECS 1) • Investigate the characteristics of mangroves, swamps, rainforests, pods and explain the importance of these habitats. (ST 4 LS ECS 2) • Design and construct the model of a habitat. (ST 4 LS ECS 3) **Attitudes/Values** • Appreciate the role that the different parts of a habitat play in the survival of an organism. • Develop an appreciation for the role that adaptation to the habitat plays in an organism's survival. • Appreciate that not all organisms can survive well in a given habitat as not all habitats will meet all their needs.	**Questions:** 1. For each habitat given, state which part of the habitat, if any, Froggy could use to survive. a. Desert _____ b. Coral Reef _____ c. Grassland _____ d. Rainforest _____ 2. State what things, if any, Froggy may need that are missing from each habitat. a. Desert _____ b. Coral Reef _____	

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Show persistence when conducting studies of organisms within different habitats. • Demonstrate interest in conservation of resources in each habitat to ensure that organisms' needs are met. • Use the inquiry approach in conducting various investigations. • Show respect for evidence in making various claims about organisms living in habitats. • Work collaboratively with their group members to complete various tasks. • Stewardship/Respect for Living Things. When observing animals in their habitats, students should make sure that neither the animals nor their habitats are harmed. • Safety ○ While observing organisms in their habitats, students should exhibit appropriate behaviour	c. Grassland _____ d. Rainforest _____ 3. Answer the following questions. a. Which of the four habitats do you think Froggy the frog would survive best in? _____ b. Explain your answer. _____ 4. Answer the following questions. a. Which habitat would be the worst for Froggy the frog? _____ b. Explain your answer. _____ c. Name two animals that would survive better in that habitat.	 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
to ensure that neither the organisms nor themselves get hurt. o While observing organisms in their habitats, students should be respectful of the organisms and their habitats. o Students should be aware that some organisms can harm them. For example, ants can bite or plants can cause hives etc. • When conducting practical and group work, students should be sensitive about the physical or learning challenges of classmates or group members. • Participate actively in classroom discussions and activities.	**Chip the tortoise: Adapting in the Desert**  **Retrieved from:** https://deserttortoise.org/wp-content/uploads/Cat_1_Robinson_Jacob-845x684.jpg Chip the tortoise lives in the desert, which is very hot and dry. Chip has many adaptations that allow it to survive in the habitat. Chip is hungry and has set out on a journey across the desert to find some food. Questions: 1. What adaptation will help Chip to walk through the sand?	**Special Features or Adaptations that allow Organisms to Survive in their Natural Habitat** **Students now that we have looked at a number of organisms in their habitats, we are now going to focus on a few of them to see how the animals and plants are able to survive in their habitats.** **1. Desert** We know that some deserts can be very hot and dry. There isn't a lot of food or water and they can also be very sandy yet some plants and animals are able to survive there very well. What is it about these plants and animals that make it possible for them to survive well in a desert? Note to Teacher: Allow students to respond if they wish. Let us watch the following video to learn more: Video link: https://www.youtube.com/watch?v=3XF42x_72Xs&t=56s (3:47 mins) **Questions:**

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	_____ _____ _____ 2. Chip has predators. On its way across the desert, it comes into contact with one of the predators. _____ _____ _____ 3. What adaptation does Chip the tortoise have that will help to keep it safe from the predator? _____ _____ _____ 4. How will the adaptation stated above be used? _____ _____ _____ 5. After finding some food, Chip returns to the burrow. How does the burrow help Chip to survive in its habitat?	 **Photo showing camels in the desert** Source: https://www.pexels.com/photo/camels-grazing-in-desert-area-7432780/ 1. What are some of the special features that the camel has that allow it to survive in the desert? (***Camels*** *have soft feet that help them to walk on the loose sand. They also have hair over their eyes and inside their ears that protects them from getting sand in those delicate areas. Additionally, camels have large humps which they use to store fat which can be used as an energy source. This allows them to go for long periods without food or water.*) 2. Where does the camel get its water from? 3. Where does it get its food from? We also learnt from the Habitat for Kids Video (Timestamp 1:49-1:57 min) that **cactuses** have

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	_____ _____ _____ 6. After reading about Chip, you would like to hike across the desert like Chip with a hiking team. What would you bring that would help you cope with the conditions in the desert and get across safely? _____ _____ _____ 7. Chip would not be able to survive in the Arctic. What two adaptations would be needed to survive there? _____ _____ _____ **Comparing organisms in different habitats** Below is a picture of three animals that live in three different habitats. Look at each picture carefully and use your observations along with any information you may know about them, to answer the questions below.	special features that allow them to survive in the desert. **Questions:** 1. What special features do cactuses have that allow them to survive in a desert? *(**Cactuses** have sharp spines and needles to protect them from animals and to reduce water loss. They are also able to store water in their roots and trunks so they can survive a long time without rain.)* So, the camels and cactuses are able to survive well in the desert because of the special features that they have. We call these special features **adaptations**. Adaptations are the physical or behavioural features of an organism that helps it to survive in its habitat. **Question:** What are some other animals and plants that live in the desert? *(scorpions, rattlesnakes, lizards, vultures, date palm trees, aloe vera plant)* Take a look at some more animal adaptations by watching the video below: https://youtu.be/liZ5j1k-XIk (3:55min) Examples of other adaptations that plants and animals have to help them to survive in their habitats include the following:

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	 Source: https://www.pexels.com/photo/selective-focus-photography-of-brown-frog-on-grass-2815727/  Source: https://pixabay.com/photos/polar-bear-bear-animal-nature-snow-404317/  Source: https://pixabay.com/photos/blacktip-shark-shark-dangerous-1294753/ Complete the table below by including the following: 1. Identify each animal and the habitat it is shown in. 2. Compare these three animals in terms of the following: ✓ The food they eat ✓ How the animal moves ✓ How they obtain air/oxygen from their habitat ✓ Special adaptation each animal has to enable it to survive in its habitat.	• Webbed feed - Ducks • Thick fur - Polar bears • Long tongue - Some frogs • Large ears - Elephant • Shape of leaves - Various plants **1. Polar Habitats/Snow and Ice** The last habitat we looked at, the desert, is a very hot and dry place. Now let's look at a very cold habitat to see what types of animals and plants survive well there. Watch the video below and be prepared to discuss the following: A Walk in the Arctic for Kids | Educational Video for Early Learners (3:37 min) 1. In your own words describe the habitat. 2. What are some of the animals that live in this habitat? 3. Describe the characteristics that help these animals to adapt to this environment. 4. What features of the habitat meet the needs of the organisms (i.e. where do the organisms get their shelter, food, water, oxygen and space) and indicate how?

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<tr><th></th><th>Frog</th><th>Polar Bear</th><th>Shark</th></tr>
<tr><td>Habitat</td><td></td><td></td><td></td></tr>
<tr><td>Food</td><td></td><td></td><td></td></tr>
<tr><td>Source of Air/Oxygen</td><td></td><td></td><td></td></tr>
<tr><td>How it moves</td><td></td><td></td><td></td></tr>
<tr><td>Special Adaptation(s)</td><td></td><td></td><td></td></tr>
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Comprehension Activity: Unpacking the Complex Interactions in Ecosystems: The Wolf Island Story

Have students watch the following video read-aloud and explain how it is a story about ecosystems and habitats.

https://www.youtube.com/watch?v=N6LsBdRnboI (6:29 mins)
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Ecosystems

From observing the different habitats, you would have seen that each habitat has different characteristics.

We can group the things found in a habitat as living things and non-living things. The living things (plants and animals) found in a habitat are known as the biotic components. On the other hand, the non-living elements like rocks, soil, air, water, etc. in the habitat are referred as the abiotic components of a habitat.

Living things in a habitat, not only depend upon each other for their survival, they also depend on the non-living things found in their habitats. We say that the organisms and the other components of their habitat, make up a system in which the parts depend on each other. This is called interdependence. However, in order to survive, the living things must interact with the non-living things. These interactions along with the physical environment within which these organisms are found is referred to as an ecosystem.

Within an ecosystem, one or more habitats can be found.

Let us now look at a tropical rainforest ecosystem in which many different habitats can be found.
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Key questions students should answer in the writing or oral presentation:

1) How do each of the living things rely on each other?
2) How is the habitat changed for the animals?
3) How is balance re-established in the ecosystem?
4) Can students describe an equivalent balance in their own community ecosystem with at lease 5 different living things?

Teacher note: Wolf Island (2006) by Celia Godkin is a very good book to add to your classroom library

Our Country Habitats: A Research Project

In groups of 4, students will divide a large single piece of paper, cardboard or Bristol board into four quadrants. Based on their research online and asking questions of community leaders, in each quadrant they will make bulleted lists of information which answers the quadrant question as below:
<table>
<tr><td>What are the habitats in your country?</td><td>What activities in your country are a threat to those habitats?</td></tr>
<tr><td>What animals are endangered in your country because of changing habitat?</td><td>What are communities doing to protect those habitats and the living things that reside there?</td></tr>
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Habitats Rainforest
https://www.youtube.com/watch?v=fGXYULMDpSk (1:30 min)

A tropical rainforest has many different types of plants and trees of varying heights. Starting from the ground up these plants and trees make several vertical layers in which organisms make their habitat. In a rainforest you may also find soft earth, rivers and a variety of animals such as frogs, snakes, birds, monkeys, sloths, jaguars and more. The rainforest has many different habitats.


Photo showing a Forest

Photo retrieved from https://pxhere.com/en/photo/1542143
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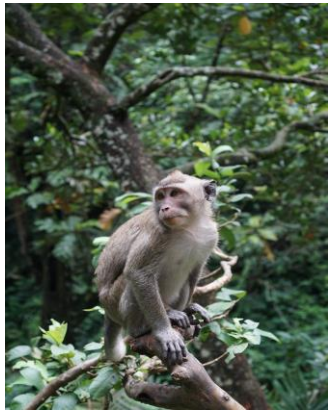
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Rubric Evidence of research 5 marks Factual information 5 marks Clarity of poster 5 marks Clarity of oral explanation 5 marks **Why are our local habitats important?** Student research and short presentation. Have students choose one of the following habitats in country and give a description of the characteristics and explain the importance of these habitats. ● Mangrove ● Swamp ● Rainforest ● Pod **Rubric** Evidence of research 5 marks Factual information 5 marks Clarity of poster 5 marks Clarity of oral explanation 5 marks	Here is a story about Timber the Monkey and the Ecosystem in which he lives. https://youtu.be/qr_U1P7XwhI?si=sY19z_zgauvXHqAg (1:05 mins)  **Timber the Monkey** Photo retrieved from: https://www.pexels.com/photo/brown-monkey-sitting-on-tree-branch-3560352/ Timber the monkey lives deep in the forest with his family. He spends most of his time high in the trees eating juicy fruits and playing with the other members in his troop. He and his family love to help each other remove lice and other insects from their fur, those times are the best.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Question: How is Timber's body adapted for life in the forest? Watch the video below to observe a monkey: **Cool Facts About Monkeys** https://youtu.be/A6lmmAyvl3I?si=Kuh9iwniF2mZCaIP (2:05 mins) Timber and his family made the forest their home because they have adaptations which help them to survive there. They all have long limbs that are great for climbing trees; long tails which they use to swing from the branches and a fur colour that allows them to hide between the leaves of the tree. **Question**: How do you think the forest habitat meets Timber's needs? Do you think monkeys, like Timber, help to meet the needs of other organisms? The trees in the forest offer Timber and his family shelter, food and protection. The trees in turn benefit from Timber's troop when they move from tree to tree spreading seeds which grow to become new trees. As they move they also spread their droppings, which provides nutrients for the trees. Timber feels safe when

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		he's high in the trees but on occasion he has to leave the tree to drink water from the nearby river. Visiting the river can be dangerous for Timber because of the many predators that also live on the forest floor and in the river. **Question:** What other organisms would you expect to find in Timber's ecosystem? Timber and his family are not the only animals that live in the trees of the forest. There are also iguanas, snakes, various insects, frogs and birds but of all the creatures he has met, he finds Boo the Sloth to be the most fascinating.  **Boo the Sloth**

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Photo retrieved from: https://www.rawpixel.com/image/3305450/free-photo-image-costa-rica-animals-sloth **Question:** What features make it possible for a sloth to survive in the same habitat as a monkey? Watch the video below to observe a **Three Toed Sloth** https://youtu.be/OTp8W251aiQ?si=ZWQkGSApS5QKbNoS (1:55 mins) Like Timber the monkey, Boo has long limbs but his limbs are tipped with giant claws which he uses to climb the trees. His colouration allows him to hide against the tree branches but instead of eating the fruit of trees he prefers to eat the leaves, twigs and buds. He also uses the forest for food, shelter, protection and to get his water. However, unlike the agile monkeys that leap and swing through the trees with ease, Boo the sloth moves extraordinarily slowly. Timber enjoys swinging in circles around Boo. He wants to play with Boo, but Boo is just not interested in his monkey games.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		 **Millie the Jaguar** Photo retrieved from: https://stock.adobe.com/search?k=jaguar+tree Millie the Jaguar is hungry, what should she eat? She has an excellent sense of smell and vision. Millie is built to be a superb predator and now it's time for lunch. She stalks stealthily around the base of a tree where she just saw a monkey swinging. Who could that monkey be? *(Timber)* Millie knows she will need to approach the tree very quietly so that the monkey would not get away. She uses her spotted coat to hide between the bushes and dry leaves at the base of the tree. She then leaps onto a tree branch using her sharp claws and strong muscles to climb the tree.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Question: What do you think happens next in the story?? **Activity:** students work in groups or individually to finish the story by either making a video, drawing, audio recording or short paragraph of the story's ending. **Question:** What would happen to the animals in this ecosystem if their habitat is changed in a negative way? *(Less or no food, no shelter, no protection from predators)* **<u>Can organisms survive in habitats that are not their natural habitats?</u>** From the videos and pictures, we have looked at, you would have observed that the animals that live in the different habitats have special adaptations that allow them to survive in these habitats. Results from studies done on plants, and animals in their habitats, have caused scientists to conclude that in some habitats, some organisms survive very well, others not as well, while others cannot survive in them at all.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		The picture below shows a polar bear in a habitat.  **Something is wrong here?** **Photos retrieved from:** https://commons.wikimedia.org/wiki/File:Polar_Bear_Sitting_%286292639587%29.jpg https://commons.wikimedia.org/wiki/File:Wadi_Rum_Dry_Desert,_Jordan.jpg 1. Is this the polar bear's natural habitat? 2. Will the polar bear be able to survive in this habitat as well as the animals that live there? 3. What features/adaptations of the polar bear make it difficult for it to survive in this habitat? 4. What adaptation would the polar bear have to undergo for it to be able to survive in this habitat? 5. Give reasons for your answer. 6. What about the camel, do you think it will be able to survive in the habitat that the polar bear lives in? 7. What is the name of the habitat which the camel survives well in?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		8. What is the name of the habitat that the polar bear survives well in? 9. Compare both habitats and state two ways they are different and two ways they are similar. While the polar bear may not survive in the desert, or the camel may not survive in the arctic region, some animals or plants may be able to survive in other habitats, even if they may not be able to survive as well as they would, in their natural habitat. Let us look at a couple of examples. 1. Alligators are reptiles that live in freshwater habitats. They need warm, wet environments to live in. They move from water body to water body. They thrive well in swampy areas. They are however able to survive in saltwater for short periods. Which of the following habitats would the alligator be able to live in but not as well as if it was living in its natural environment? a. A grassland b. A shoreline c. A tropical rainforest d. A desert Explain your answer.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		2. A cactus thrives very well in the desert. Which of the following habitats will it be able to survive in but not as in the desert? a. A grassland b. The arctic region c. A tropical rainforest d. A desert Explain your answer. Questions for discussion: Discuss which of the following habitats humans survive well in, survive less well in and cannot survive in at all: 1. grassland 2. ocean 3. polar region 4. desert What are some of the things humans do to survive in harsh environments? **Exploring an ecosystem close to home** By this time in the unit, students would have watched several videos about different habitats, the animals and plants that live in them and how these habitats provide their basic needs. **Note to teacher:**

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		To help students learn more about adaptations, take them to a nearby ecosystem such as a pond, stream, park, rock pool, field, forest, etc. Ask students to describe the ecosystem. For example, at a stream, students might observe that it is made up of water, rocks, mud, sticks and dead leaves. When students are finished describing the ecosystem, ask them to observe and describe the organisms they observe living in and around the ecosystem. They should be encouraged to take pictures and videos. Students should also be reminded not to remove plants, rocks, animals, from the ecosystem as they explore it. Here are some questions that the students could be required to answer as they explore the ecosystem. 1. List the animals that you observed living in the ecosystem. 2. List the plants that you observed living in the ecosystem. 3. Select three of the plants you have seen living in this habitat, then answer the following questions. a. Are the plants growing inside the water, around the pond or are floating on the water?

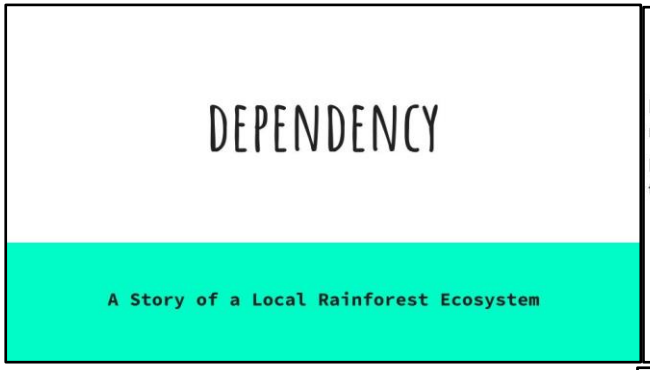
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		b. How are these plants adapted to survive there? c. How does the habitat meet the needs of these plants? 4. Select three of the animals that you have seen living in this habitat. then answer the following questions. a. Are the plants living inside the water or around the pond? b. How are these animals adapted to survive there? c. How does the habitat meet the needs of these animals (What do the animals eat? How do the animals get air? Where do they hide from predators, etc. **Habitat Game** See simulation of habitats here**:** https://ssec.si.edu/habitats

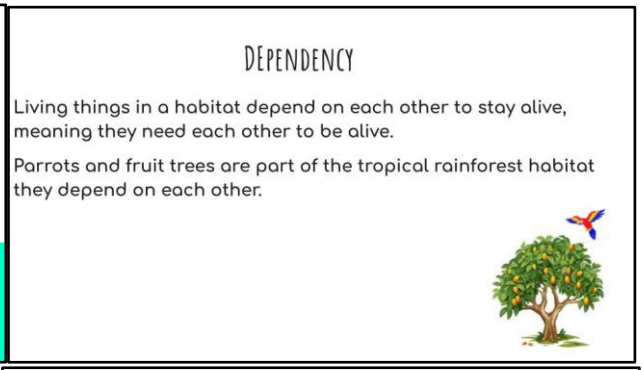
Additional Resources and Materials

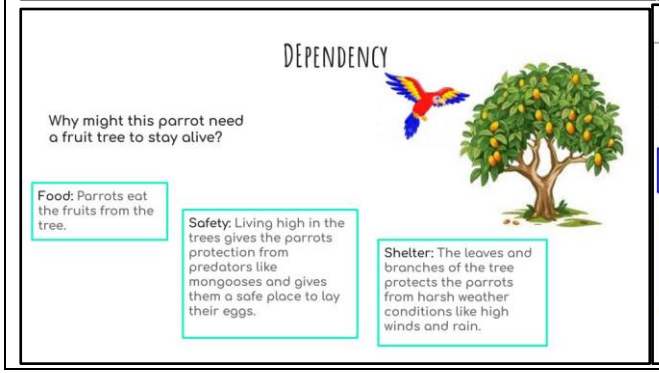
Grade 3 Science

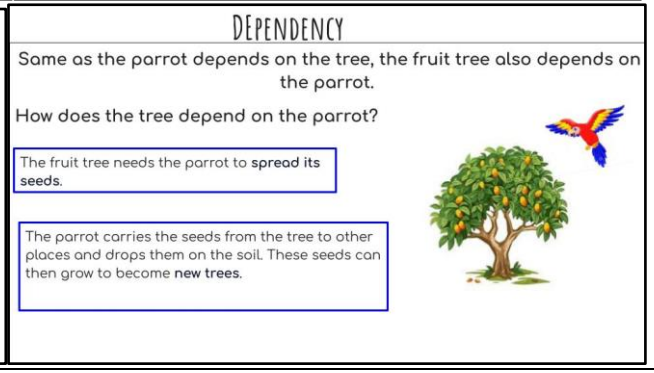
Source: https://www.flickr.com/photos/opalsson/8620948317

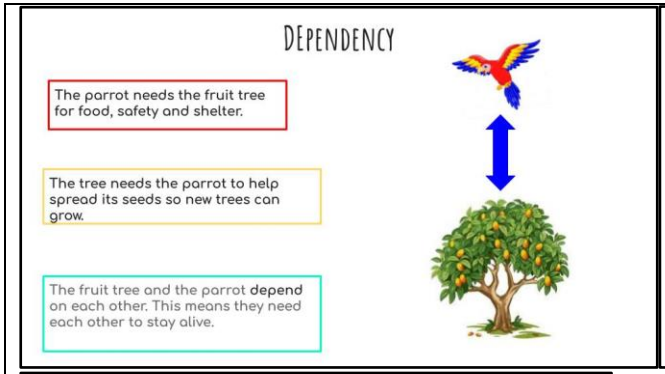
Source: Clyornique Durrant

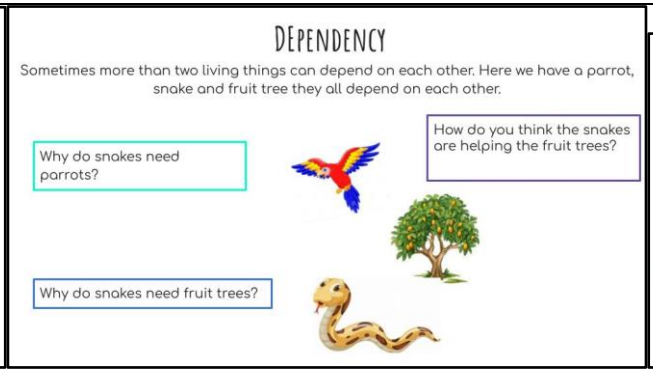


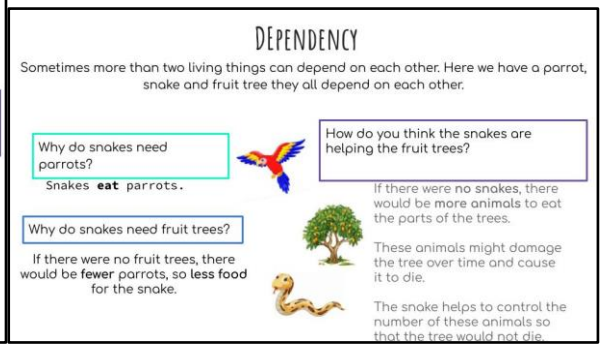












Additional Useful Content Knowledge for the Teacher:

Wolf Island book. See: https://www.amazon.ca/Wolf-Island-Celia-Godkin/dp/1554550084/ref=sr_1_2?crid=2MH4D047MJ9NG&keywords=wolf+island+book&qid=1703201422&sprefix=wolf+isalnd%2Caps%2C90&sr=8-2

Habitat simulation: https://ssec.si.edu/habitats

Opportunities for Subject Integration:

Language Arts: new vocabulary, story (stealthily, ecosystem, adaptation, interdependence)

Mathematics: Data collection Social Studies: Environment, Home/Shelter, Disaster, Protecting habitats Technology: Habitat simulation: https://ssec.si.edu/habitats	
Strategies that Support the Curriculum and Assessment Framework Elements of the Essential Education Competencies that are addressed:	
An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	This curriculum includes competencies such as: Respect for the environment Interdependency Unity Family cohesion
Developed Critical Thinking and Ethical Communication Competencies	Conduct studies on habitats Report the findings of these studies honestly. Use data to develop policy.
Developed Well-being Competencies	Some habitats are used by persons for recreational, educational and spiritual benefits
Developed Knowledge and Entrepreneurial Competencies	Businesses that involve the removal of species from their habitat may cause species to become extinct. Understand the effects that certain trends may have on species and their habitats.

Elements from Local Culture:

Some habitats are of cultural importance to certain groups.

Certain species are of national significance (national birds, national plants, species used as national foods).

Technology:

Use of technology in studying and protecting habitats.

TVET:

Use of some equipment can affect the habitats of some species (loud sounding equipment, industrial machinery, water use)

Environment that are integrated:

Hunting Season, local forests, natural disasters and their effect on local habitats, rainy and dry season effects on habitats, endangered species (St. Vincent Parrot: Amazona Guildingii), other local animals (agouti, tattoo)

Items of Inspiration (teaching tips, inspirational passages, connections to educational research):

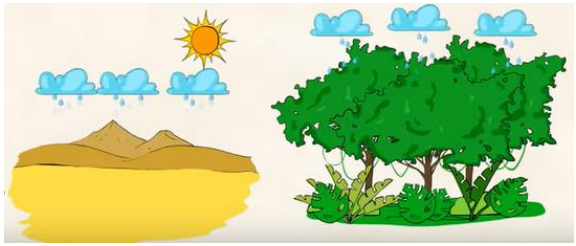
Prickly Pear (Locally called: Prickly pay)

Grade 3 Science

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Interdependent Relationships in Ecosystems All living things grow, survive, and reproduce because they exist with other living and non-things that help provide the food and other resources that sustain them. These are interdependent relationships. No living thing can exist without these interdependent relationships, hence the necessity to study these complex interactions.
Essential Learning Outcomes: (ELO-4): Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
Learners are expected to: **Knowledge** Define the terms: ➢ environment ➢ environmental change ➢ environmental destruction ➢ pollution and pollutants ➢ conservation and preservation	**1. What is an environment?** **2. What do the following terms mean?** a. environment b. environmental change c. environmental destruction d. pollution and pollutants e. conservation and preservation f. endangered species g. extinct species h. ecosystem restoration	**What is Environmental Change?** In our last set of lessons, we looked at different habitats, the organisms that live in them and how these habitats meet the needs of these organisms. Each habitat had a different set of features and a different set of organisms living in them. The

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
➢ endangered species and extinct species ➢ ecosystem restoration ➢ habitat fragmentation ● Demonstrate they understand that changes in the environment affect the organisms that live in that environment. ● Compare the effects of a habitat change on two different groups of organisms in the same habitat. ● Account for changes that are observed in an ecosystem/habitat. ● Explain the importance of environmental conservation in their country. ● Distinguish between the terms endangered and extinct. ● Explain how loss of habitat results in the endangerment or extinction of species. ● Investigate the factors that cause and prevent environmental destruction.	i. habitat fragmentation **Activity on Environmental Changes** **Note to Teacher:** The assessment is limited to a single environmental change. Select any ONE of the following changes shown in the photo bank below: Take a look at the before and after pictures of environmental change shown below and identify: 1. What change(s) occurred? 2. What may have caused the change(s)? 3. For the change state if it was caused by humans, animals or a natural disaster? 4. How does the change affect the plants, animals and the nonliving parts of the environment? *Below is a photo bank of before and after environmental changes for use in the assessment.*  ***Before and After Urban Development***	conditions and features of the habitat in which an organism lives is called the **environment**. The environment can however undergo changes or disturbances, we call these changes **environmental changes**. Let us now watch a video to learn more about environmental changes: https://youtu.be/94cA_JLDcFk?si=Rly-Tv2xvcOFjTtq (7:03 min) As you watch look out for the following: **Questions:** ● What is an environment? *(Certain conditions in which plants, animals and humans live)* ● What are some examples of environmental change? (*weather conditions, landform changes, human development of land and waterways, access to food and shelter*) ● What can cause environmental change? *(humans, animals and [natural events])* From the video, you would have seen that environmental changes can occur slowly or very rapidly. You would also have observed that these changes can be caused by nature

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
• Identify organisms that are deemed to be endangered in the OECS region. • Identify ways of conserving the environment. • Identify local ecosystems in need of conservation or restoration. • Identify some ways in which environmental destruction may be prevented. • Identify solutions to specific problems caused when an ecosystem/habitat has undergone change. • Describe ways in which plants respond to changes in their environment. • Describe ways in which animals respond to changes in their environment. • Identify some ways in which an ecosystem can change.	https://www.flickr.com/photos/noaaphotolib/5278037228 https://picryl.com/media/grenada-caribbean-island-nature-landscapes-f0b7b4  ***Before and After Deforestation*** https://libreshot.com/forest-background/ https://www.flickr.com/photos/noaaphotolib/5278037228  ***Before and after a Drought***	(natural events) the actions of humans and animals. ***Teacher Note***: If you don't have access to technology, pose the following questions about these two captures from the video.  **What happens to living things when the desert gets too much rain or the rainforest gets too little rain ? (***this poses a change to the environment which will affect plants and animals***)** A closer look at **environmental changes caused by natural events** **Note to teacher:** If your country has undergone changes and there are students in the class who may have experienced these changes or seen the result of these changes, this could be used to initiate a discussion on environmental events and their effects on the environment. The discussion

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
• List factors that can bring about changes to ecosystems. • Describe an ecosystem before changes occurred in it. • Describe changes that have occurred in an environment. • Describe the problems caused for the organisms living in this area. • Assess the effects of the solution on the plants and animals within the environment. • Document the resulting changes to plants and animals living within the changed environment, after the solution has been implemented. • Give examples of organisms that have become extinct due to change in their habitat. • Evaluate the solution to determine how the solution reduced the impact of the problem created by the environmental change in the system.	https://commons.wikimedia.org/wiki/File:Small_mountain_stream_-_panoramio.jpg https://www.publicdomainpictures.net/en/view-image.php?image=137909&picture=folsom-lake-drought-87 **Activity:** Let's go for a walk around the community. See if you identify changes in the environment that may have been caused by human actions or natural events. Use your device (if possible) to take a photo or video of that change. For each environmental problem observed, state how natural events or the actions of man may have changed organisms and the physical environment. Present your findings to the class orally and or via a slideshow. **Answer the following questions:** 1. List five natural events that would bring about physical changes to the environment. 2. List two factors that would bring about changes in temperature to the environment. 3. List three activities of humans that would bring about changes in the availability of the following resources in a habitat.	can then be expanded to include other natural events. **Teacher**: Students you would have studied some natural events in the previous grade. Some of these were shown in the video, can you list them? Do you know of other natural events? List students' responses on the board. Videos or pictures can be used to help students describe what happens with each natural event. For example, a volcanic eruption releases ash, lava and hot gases, while a hurricane brings with it a lot of rain and wind and could cause flooding. After students have gone through each natural event, they could then discuss possible effects that each natural event could have on the environment and on organisms. **Teacher**: Let us look at some of the environmental changes that each natural event could have on different habitats and the organisms living in them.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
• Determine how changes to one part of the system due to the solution, affects the other parts of the system. • Explain how environmental destruction can lead to changes in the diversity and number of organisms living in a habitat. Determine how the solution affects plants and animals. • Identify different ways that organisms are adapting to changes in their habitats. • Identify some natural events that cause change in an ecosystem. • Identify some actions or activities of humans that negatively impact the environment. • Describe how pollutants affect people's activities and health. (ST 2 ESS ER 8) • Explain with examples what are endangered species. (ST 2 LS ECS 12) • Identify and discuss ways in which water may be polluted and ways in	a. Water b. Food c. Shelter 4. State what would happen if the following actions were carried out. a. The application of a pesticide to a stream. b. Garbage was dumped into the sea. c. Water was removed from a stream. 5. How might the building of a highway or a bridge affect the environment in which it is built and the organisms that live there? Look at the picture below then answer the following questions:  Photo retrieved from: https://www.pexels.com/photo/forest-on-fire-51951/	**Activity** I will now assign one of the natural events and a habitat to each group. Working in your group, discuss the effects that you think the natural event you have been assigned will have on the habitat you and the organisms living in it. At the end of your discussion, you will make a five-minute presentation to the class. **Environmental changes caused by the actions of humans** While natural events can cause a significant amount of damage to the environment, humans also cause damage to the environment in many different ways. As a matter of fact, humans impact the environment more than any other species. Can you think of the ways that humans change the environment? Watch the following video to introduce the concept: https://youtu.be/mhtB7nJKugU?si=kBM20rT00GGB-C5S (1:16 min) *deforestation, clearing of lands, draining of swamps, release of industrial waste, fires, introduction of certain species, overfishing, overhunting, water*

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
which it may be conserved. (ST 2 LS ECS 21) ● Explain to their classmates the need for environmental conservation in their country outlining possible scenarios if such protection is neglected. (ST 3 LS ECS 7) ● Define the term environmental destruction and investigate the factors that cause and prevent this destruction. (ST 2 LS ECS 24) **Skills** ● Observe and record the effect of changes upon the living organisms and nonliving things in a small–scale environment. ● Distinguish between actions that harm a habitat/the environment from those that preserve it. ● Demonstrate how one would care for a habitat/environment.	1. What is happening in the picture? 2. What effects could this have on the organisms living there? 3. Think about what would happen if your city experienced what is being shown in the picture 4. Where would you go? 5. State three ways you would be affected. Creating a class mural The mural should include animals and plants from different habitats. Once the mural has been completed and displayed, follow up with a discussion about possible negative impacts on the animal's habitats. What are the possible environmental changes that could occur due to littering, pollution, habitat loss, droughts, or wildfire? What new adaptations would the animals need to have in order to survive these changes? Discuss: 1. How do national parks help? 2. What human behaviors would help the environment?	*pollution, improper disposal of garbage, air pollution, introduction of diseases, mining and the use of pesticides, insecticides, and fertilizers.* ***Teacher Note***: If you don't have access to technology, show the students the following pictures (from the video) and ask them to identify how this human change may affect living things in the environment.  

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
• Predict how a specific environmental change might affect the survival of a plant or animal species. • Describe the role of conservation methods in maintaining balance in the environment. • Examine an ecosystem that has experienced change. • Compare and contrast an ecosystem/habitat before and after it has experienced a single disturbance. • Compare an ecosystem that has undergone change before and after a solution has been implemented. • Infer the changes that can occur to a habitat due to an action on a habitat. • Classify changes within an ecosystem based on the factors that caused them. • Take different measurements within an ecosystem that has undergone changes before and after the solution was implemented.	3. "What can you do to protect habitats where you live? **Choose one of the following habitats state a change or disturbance that this habitat may undergo (from natural events)**  **Source:** https://pixabay.com/photos/forest-trees-woods-nature-outdoors-1868028/ Source: https://pixabay.com/photos/camels-sand-dunes-desert-sahara-4134934/ Source: https://pixabay.com/photos/maldives-tropics-tropical-1993704/ **Explain how one of the animals living in that habitat could be affected.** _____ _____ _____ **A major part of the food source found in the habitat has died off. Your animal could either find a new source of food to eat or move to a new location to find food. Which of these solutions do you think will be the better solution? Why?** _____ _____ _____	 Let us look again at the first video which shows some of the impacts of the actions of humans on the environment. See if you can identify them. https://youtu.be/94cA_JLDcFk?si=Rly-Tv2xvcOFjTtq (Timestamp- 3:10 min to end) **Some of the actions of man that could cause negative changes to the environment** **These include:** • Loss of habitat due to cutting down of trees, mining, clearing of land for agriculture, roads, etc. • Habitats become fragmented (broken up into smaller units) by building roads, installing power lines, or even changing the course of rivers or other waterways. This is known as **habitat fragmentation**.

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<th>Specific Curriculum Outcomes</th>
<th>Inclusive Assessment Strategies:</th>
<th>Inclusive Learning Strategies</th>
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Hypothesize how an ecosystem will respond to a solution.
Communicate findings from investigations to the class, group members and in the form of reports.
Communicate effectively about environmental issues and their solutions.
Develop a proposed plan of action for the rehabilitation of a damaged habitat.
Compile data obtained on a habitat/ecosystem that has experienced a disturbance.
Interpret data obtained from the monitoring of a habitat to determine the effectiveness of a solution.
Graph results obtained from investigating damage caused to a named habitat.
Distinguish between the causes of air pollution and water pollution.

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Complete the following table to show two effects that the change stated, would have on the organisms in the area.
<table>
<tr><th>Change</th><th>Two effects</th></tr>
<tr><td>A company clears a large swamp to build a new playing field.</td><td></td></tr>
<tr><td>A beaver builds a dam across a stream, causing a pond to form in an area that used to be dry land.</td><td></td></tr>
<tr><td>A highway is built in the middle of a forest.</td><td></td></tr>
<tr><td>A logging company only plants one tree for every five trees it cuts down.</td><td></td></tr>
<tr><td>A fisherman throws pesticide in the river.</td><td></td></tr>
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Contamination of water bodies due to dumping of garbage, release of factory waste, fertilisers, volcanic ash, etc.
Air pollution due to gases, dust, soil particles, etc. released into the air.

Pollution is the introduction of harmful materials (pollutants) into the environment.

Soil erosion
Destruction of coastal areas, coral reefs, etc.
Drying up of streams and rivers
Loss of some species due to overfishing, overhunting, migration, etc
Introduction of invasive species (new and harmful species)

Activity on Environmental Change

Now that you have looked at natural events and the actions of humans that can bring about changes to the environment. Take a look at some pictures of environmental changes below and discuss:

What change(s) occurred in each picture shown?
What may have caused the change(s) observed?

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Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies

- Infer how food webs help to maintain nature's balance and identify the factors that may disrupt this balance. (ST 3 LS ECS 2)

Attitudes/Values

- Appreciate the fragile nature of ecosystems.
- Appreciate the importance of caring for plants, animals and their environment.
- Recognize the role that humans play in protecting or destroying ecosystems.
- Appreciate that the environment needs to be protected.
- Show persistence in conducting investigations done on habitat destruction and restoration.
- Display interest about what is being done to protect and maintain different ecosystems in their country.

Divers stand on a coral reef.	

Not all human activities are bad for the environment.

What are some ways that humans help their environment?

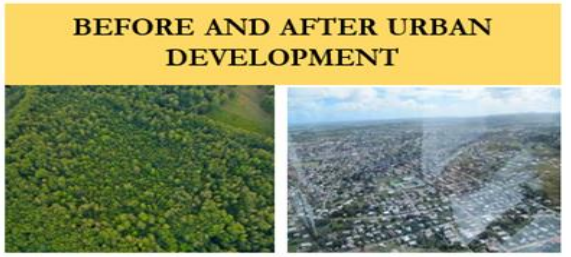
What can humans do to reduce their impact on other organisms?

Assessment Activity

For each of the environmental changes below indicate if the solution being proposed is a merited (an appropriate) solution and explain why.

Note: A merited solution will solve the problem without creating new problems.

3. For each change, state if it was caused by humans, animals or a natural event?
4. How does the change affect the plants, animals, and the nonliving parts of the environment?
5. Which environmental change, if any, have you observed happening where you live?



Source: https://stocksnap.io/photo/forest-aerial-OLWVFFBJSX

Source: Https://www.flicker.com/photo/33037982 @ N04/12125 202096

Grade 3 Science

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<th>Specific Curriculum Outcomes</th>
<th colspan="2">Inclusive Assessment Strategies:</th>
<th>Inclusive Learning Strategies</th>
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Use the inquiry approach in their investigation of different habitats.
Display respect for evidence generated from investigations done on habitat destruction and restoration.
Use their inventiveness in the development of a plan for the restoration and monitoring of a habitat that has experienced change.
Work collaboratively to propose a course of action to protect the habitat within a local ecosystem.
Follow different safety rules which were developed to protect themselves and other organisms in their exploration/investigation of different habitats.
When carrying out their investigations, especially those done outdoors, extend a helping hand to persons who may have certain physical or learning challenges.
Participate actively in classroom discussions on different aspects about habitat destruction and restoration.

</td>
<td>Environmental Change</td>
<td>Proposed Solution</td>
<td rowspan="4">
Source: https://stocksnap.io/photo/forest-aerial-OLWVFFBJSX

Source:
https://www.publicdomainpictures.net/en/view-

<u>Sources:</u>
https://www.needpix.com/photo/956525/volcano-costa-rica-clouds-blue-sky-mountain-landscape-nature-arenal-sky

https://commons.wikimedia.org/wiki/File:Solidified_Lava_Flow.jpg
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<td> 
Deforestation</td>
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Planting new trees</td>
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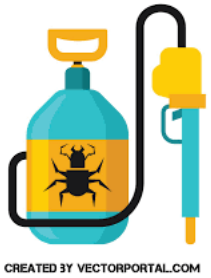
Termite nesting in a tree</td>
<td> 

Kill the Termites</td>
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<td> 
Littering in a local park</td>
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Put up a “No Littering” Sign</td>
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Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
	Photos retrieved from: https://www.publicdomainpictures.net/en/view-image.php?image=296125&picture=deforestation https://www.flickr.com/photos/cifor/52208710573 https://www.flickr.com/photos/noaaimages/20694485941 https://www.crisis-response.com/Articles/668392/Biosurfactants_can_offer.aspx https://www.wallpaperflare.com/termitiera-safari-tanzania-karater-ngorongoro-africa-termites-wallpaper-ggwxi	 **Source**: https://commons.wikimedia.org/wiki/File:Geloi_Wetland,_2020_vs_2022.jpg  **Source:** https://www.flicker.com/photos/guldem/21953611961 https://www.wallpaperflare.com/termitiera-safari-tanzania-karater-ngorongoro-africa-termites-wallpaper-ggwxi

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		BEFORE AND AFTER SARGASSUM WEED  **Before** **After** **Source**: https://www.pexels.com/photo/tropical-beach-on-sea-shore-16652213/ **Source**: https://commons.wikimedia.org/wiki/File:Sargassum_weed_inside_Cobblers_Reef.JPG As you can see from the situations above some **environmental changes** may affect the environment in a negative way which may lead to further changes to animals, plants and other features of the environment. For example, animals or plants may die or lose their homes and the nonliving structures of the environment may be destroyed or damaged. Environmental changes may include changes to the land characteristics, water distribution, temperature, light, food and the number and

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		diversity of the organisms living in these environments. **How organisms are responding to changes in the environment** Animals can react to change in their habitats in only three ways: They can move, adapt or die. **How animals are responding to changes to ecosystems** Some animals are moving to higher ground with cooler temperatures to avoid the heat. ● Some animals, however, seem to be adapting to changing conditions. ● Some migratory animals are delaying their migration time ● As spring arrives earlier, some insects are emerging earlier. ● Some migrating birds are laying their eggs earlier to match insect availability so their young will have food. ● Some species such as corals are adapting to the warmer temperatures. ● Some animals are waking from hibernation sooner.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		How plants are responding to changes to ecosystems Unlike animals, plants cannot move. When the conditions around them change, they cannot head elsewhere to find better conditions; plants have to adapt on the spot to survive or die. These are some of the ways that plants are adapting to environmental changes. ● Increasing temperatures and drought have brought about earlier bloom times. ● Growing in areas that they normally do not grow. ● Having a shorter life span. ● Growing towards light or water. **Activity:** Choose two of the different ways that animals are adapting to changes in the environment and state how these are helping the animal or plant to survive in the changed environment. **New species are moving into the damaged area** While some animals are moving to new locations or some are dying, in some cases,

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		new species are moving into the damaged environments. These species are better adapted to living under these conditions. They are sometimes referred to as **pioneer species**. How is this a good thing? How would these new species help the species that are there? **How are changes in the environment leading to animals and plants becoming endangered or extinct** If animals or plants cannot adapt to any of these changes in the environment, extinction (the loss of an entire group of organisms) of that type of animal or plant can occur. Once a species is extinct, it can never be brought back. Over the years, several animals and plants have gone extinct. This is mainly due to habitat loss, diseases, overhunting, overfishing, overharvesting, pollution, etc. some species have become endangered or extinct. **What are endangered species?** **Endangered species** are living organisms whose population sizes have declined to critical levels, putting them at risk of extinction. These species are categorised as

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		endangered when their populations have decreased to such a degree that they are likely to disappear entirely from their natural habitats if appropriate conservation measures are not implemented. Examples of some organisms that have become extinct include: ● The Caribbean Monk Seal ● Japanese Sea Lion ● Baiji ● Rivero's barn owl **Activity:** Procedures 1. Hide the beads around the room while the students are outside. 2. When they return to the classroom, ask them to hunt for the beads on three different occasions. 3. After each hunt, ask students to count how many beads they found. 4. Discuss the number of beads found each time they looked for beads. They should realise that each time the beads were harder to find and there were fewer of them. The same is true with some of the animals on the earth. There are fewer and they are

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		more difficult to find – that is why they are called endangered animals. 5. Make a list of endangered animals. Why are they in danger? 6. Go to the library and find more information on endangered animals in your country or in the OECS region. Here are a few examples of organisms in the OECS that are endangered   The Grenada Dove — The St. Vincent Whistling Frog   The Big Leaf Mahogany — The White Breasted Thrasher (St. Lucia) **Photos retrieved** from: https://www.flickr.com/photos/46679531@N02/4441098331

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		https://www.flickr.com/photos/75380256@N06/6925165314 https://commons.wikimedia.org/wiki/File:Ramphocinclus_brachyurus.jpg A video showing the St. Lucia Racer Snake https://youtu.be/VKviFhO77gU?si=ZwcjM1KGX_k4p2Sg (3:35 min) **Endangered Species Puppet Show** Let the children make puppets of their favourite endangered animals. Put on a puppet show. Ask the children why their animals are endangered and what people can do to save them. **There is hope** From the videos and pictures you have seen that there is **environmental destruction** (i.e. damage to the environment) everywhere and that more and more environments are being destroyed and several species are either endangered or extinct. However, all is not lost. Many organizations and individuals in your country and around the world (including students like you) are working very hard to

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		protect the environment, reduce habitat destruction and the impact it can have on organisms. So, what are some of the ways that this is being done? **Conservation and preservation** Conservation describes efforts by individuals, communities, corporations, governments, and other groups to conserve the natural environment. With environmental conservation we are trying to use natural resources in the best possible way. Preservation includes protecting the natural environment from being disturbed in the first place. It is the protection of natural areas from human activities. Conservation and preservation efforts include: ● Protecting habitats especially nesting and denning areas, and wildlife habitats. ● Setting up man-made homes for different animals. ● Limiting and modifying agricultural activities. ● Encouraging individuals to care for any wildlife in their area. ● The passing of laws and legislation. ● Monitoring of species/habitats.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		• Encouraging individuals to get involved in conservation efforts, for example turtle watching, beach clean-ups, tree planting, etc. • Restoring habitats to increase local biodiversity and species population. • Development of environmental educational resources to increase awareness. • Finding and rescuing animals on the brink of extinction. **Note to teacher:** To help students understand the conservation and preservation efforts taking place in their country, the region and the world over, personnel from the Ministry or department responsible for the environment, or persons from environmental groups can be invited to the classroom to talk with student on these issues Following the session, students can be asked to find out about the following and to submit a report **in** whatever format they please. Examples should not include those given by the presenter. 1. Two examples of disturbed areas in your country.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		2. Examples of protected areas. 3. Two laws in your country developed to protect habitats from negative environmental changes. 4. Two things that are being done to protect species and habitats in the world. **A closer look at Ecosystem Restoration** Can we repair some of the damage humans have done to habitats and the organisms living in them? Yes, ecosystems can recover from destruction. **Ecosystem restoration** (i.e. ecosystem repair) seeks to do just that by repairing disturbed ecosystems through human intervention. Ecosystem restoration accelerates the recovery of an ecosystem that has been disturbed. Watch the following video on Ecosystem Restoration to learn more. As you watch look for some of the things that can be done to restore ecosystems: https://youtu.be/JYNpHEVCVb4?si=Z116eHE53Ev4Gg7F (1:32 min) Can you think of any ecosystem restoration projects that may be happening in your

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		community? Or are there any projects that you think need to be done to restore any part of a damaged ecosystem in your community? <u>Let us now look at an example of a restoration project carried out by students</u> To help us to understand how a simple restoration project can be carried out, we will now look at a project that was undertaken by some primary school students just like you. **Note to teacher:** Consider having a group of students roleplay how the project was conducted. Students attending a primary school located near to a park which had a stream running through it, noticed that the park was not being used by the residents and that there was a lot of garbage dumped in the stream. It was a very nice park and the students and their teachers felt that something should be done to restore it to its former state and to stop the dumping of garbage in the area.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		 **Picture showing the garbage dumped in the park's stream** **Photo retrieved from:** https://www.americanrivers.org/2022/10/teaming-up-to-take-care-of-urban-streams/ After conducting a biodiversity study of the plants and animals found in the area, the students analyzed their data to determine what can be done to restore the stream to its former state. They then wrote letters to several environmental groups in the area and shared their findings. Following this, they carried out a survey in the local community, produced a brochure which they distributed to the residents.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		With the help of their teacher, the students used mathematics to work out what it would cost to purchase the resources they needed to restore the area. They then prepared presentations so that they could speak to the different environmental groups and to the residents. This helped them to attract some funding, which was used to restore the area. Some of the residents also volunteered to help. After the area was restored, the students continued to monitor the area. Suggested questions for discussion: 1. What are some of the effects that the garbage dumped in the stream could have on the plants and animals living there? 2. Why do you think it was important for the students to involve the residents of the areas in their plans? 3. Why do you think it was important for the students to share their findings with environmental groups in the area? 4. What are some of the organisms that could be found in the stream and other areas of the park? 5. What are some of the reasons why a person may be dumping garbage in the stream?

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		6. What are some of the things that the students and members of the environmental groups can do to ensure that the restored park does not return to the state it was in? 7. When students go to the areas to monitor it, what are some of the things they would be looking for to see if their solution is working? 8. What is some of the information they should include in their brochure? <u>Developing a plan to help to restore an area that has experienced an environmental change</u> **Activity:** Divide the class into groups of three to four students, give each group pictures or a video on their tablet of an area that has experienced an environmental change. Working in their groups, students will then develop a plan on how to make positive changes to the area. They should consider the following: ● The people who may use the area and think about how they might use it. ● The other living things that may use the area when planning. Draw a plan of how you would change the area for the better.

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		Each group would then be asked to present their proposed plan of action. Members of environmental groups in the area can be invited to listen to the presentations and to give feedback to the students. **<u>Assessment of a site that has undergone an environmental change on which a solution for the restoration of the said site has been implemented</u>** The goal of habitat restoration is to try to return a particular habitat or ecosystem to conditions as close as possible to what it was before it experienced an environmental disturbance. Before the restoration project can be carried out, one has to determine what damage has been done and what needs to be done to restore the area. After this, one has to draft a plan of action for a possible solution for the restoration which must include how the success of the solution is to be determined. **<u>Note to teacher:</u>** For this activity, students can be taken on a field trip to a site which has sustained an

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		environmental change and to which a solution has been implemented, to help to reduce the impact of the change. If this is not possible a report (preferable a video report) on a similar site can be looked at and discussed. Pictures of the site before and after the solution was implemented could also be compared and discussed. Additional information can be had from various ministries and organizations that may be involved in the implementation of the solution. Before students begin the assessment, information on the characteristics of the habitat/ecosystem and the plants and animals which lived in the habitat/ecosystem before the given environmental change occurred, should be provided to students where possible. From information obtained from direct observation, through videos, research, books, pictures, etc., students could be asked to do the following: 1. Describe the characteristics of the environment at the moment. 2. Identify the changes in the environment. 3. Describe what problem the change in the given environment caused for the

Specific Curriculum Outcomes	Inclusive Assessment Strategies:	Inclusive Learning Strategies
		plants and animals that were living there, and soluttions introduced to deal with the problem. 4. Identify and describe the effect of the solution on the plants and animals within the environment. 5. Identify and describe the resulting changes to plants and animals living within that changed environment, after the solution has been implemented. 6. How well did the solution help to reduce the impact of the problem created by the environmental change in the system? 7. How did the changes the solution made to one part of the environment, affect the other parts of the system? 8. What is your conclusion on the solution to the problem? Do you think that it was effective? Give reasons to support your answer.

Additional Resources and Materials

Books

- Wild Animal Groups**:** https://www.booksource.com/products/wild-animal-groups__9780744075502.aspx
- What's Your Habitat **(2020)** by Sarah Leidhold
- The Amazon Rainforest: One of Earth's Largest Natural Resources (2019) Baby Professor Publishing
- Can You Protect the Coral Reefs?: An Interactive Eco Adventure (2021) by Michael Burgan

Additional Useful Content Knowledge for the Teacher:

Changes habitats/ecosystems

Many changes can occur within habitats and ecosystems. These changes are referred to as environmental changes.

An environmental change is a change or disturbance of the environment caused by natural events, human influences or by animals. Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food and the composition of organisms in the ecosystem.

Natural events: that can cause changes to the environment

There are several natural events that can cause changes to a habitat or ecosystem. These include: Earthquakes, Hurricane/storm, Volcanic eruptions, Droughts, Wildfires, Dust storms, Landslides and Diseases.

Actions of human beings that can cause changes to the environment

There are many actions of humans that cause changes in the environment that may hurt organisms living in these environments..

- Removal of water from rivers, ponds, etc.
- Introduction of diseases.
- Introduction of invasive species to certain ecosystems.
- Bad agricultural practices leading to soil erosion.
- Deforestation (cutting down of trees) and setting of fires.
- Overgrazing, illegal hunting and overfishing.
- Draining of wetlands such as swamps.
- Water pollution due to the release of industrial waste, use of pesticides and insecticides etc., the improper disposal of garbage, etc.
- Air pollution due to the burning of fuels, dust from construction sites, soil erosion, etc.

How the actions of man and natural events change the environment

Changes to habitats/ecosystems can have serious effects on the organisms living there and the natural environment. These include:

- Changes in the physical characteristics of the ecosystem.
- Changes in light intensity.
- Changes in water availability/redistribution of water sources.
- Increase/decrease in food or nutrients.

- Reduction in the space that organisms need to grow and develop.
- Changes to the diversity and number of organisms living in a habitat.
- Loss of animal homes e.g., bird nests, ant hills, etc.

How humans are being affected by some of these environmental changes

Like animals, human beings are also affected by changes to the environment. These are just a few ways that human being are being affected:

- Loss of homes due to fires, volcanic eruptions, floods, earthquakes, etc.
- Loss of agricultural crops due to drought and plant diseases.
- Persons suffering from respiratory diseases such as asthma due to air pollution.
- Persons suffering from skin diseases due to water pollution.
- Reduced access to clean drinking water due to drought, water contamination, etc.
- Reduced access to certain plant resources which are used as medicines, to make homes.
- Loss of land due to landslides.

How animals and plants are responding to these changes

When the environment changes organisms living there react in three different ways: they move to new locations, adapt to the changes or they die.

How animals are responding to these changes

Many animals are moving to higher elevations and latitudes to escape warming temperatures.

Some animals, however, seem to be adapting to changing conditions. Some examples of this are as follows:

- Some animals are delaying their migration time because warmer than normal temperatures fail to cue them to fly south.
- Some insects are emerging earlier.
- Some migrating birds are laying their eggs earlier to match insect availability so that their young will have food to survive.
- Some animals are waking from hibernation sooner.

Some animals are however, losing the battle and are not surviving

Two examples are given below:

1. Puffins in the Gulf of Maine are also losing their food source as the fish they feed on (white hake and herring) are moving North to cooler waters. As a result, baby puffins are unable to swallow the larger fish, so many are starving to death.
2. Half of the world's coral reefs have died in the last 30 years. Coral reefs, which are actually colonies of individual animals called polyps, have experienced extensive bleaching as the oceans warm due to climate change. When Corals are overheated, they expel the colourful algae that live within them. When corals are without the algae for too long, they die of starvation. Apart from climate change, other factors such as plastic pollution, overfishing, sedimentation, etc., have also contributed to the destruction of Coral reefs.

How plants are responding to these changes

Unlike animals, plants can't move to new locations. Therefore, when the conditions around them change, they can't head elsewhere to find better conditions; they have to either adapt or perish. Some examples of how plants are adapting are as follows:

- Plants are flowering earlier due to increasing temperatures.
- Some plants are having shorter life span.
- Plants are growing towards light or water.
- Plants are growing in environments that they previously did not grow.

Due to environmental changes many animals and plants have become extinct or have been deemed endangered.

Endangerment and Extinction of plants and animal species

- Threatened refers to any species in near or immediate danger of becoming endangered throughout all or most of the area where it lives.
- Endangered refers to any species in near or immediate danger of becoming extinct throughout all or most of the area where it lives.

Examples of plant and animal species which have become extinct

Endangered Animals 4-9 | WebEnglish is a very good website with a lot of information and teaching resources on the topic

Factors contributing to the Endangerment and Extinction of plants and animal species

The main factors that are contributing to the endangerment or extinction of plants and animals are: overhunting or overharvesting, the introduction of nonnative species, the spread of disease and habitat degradation or loss.

What can be done to reduce the endangerment or extinction of plant and animal species

Using fewer fossil fuels by lowering the thermostat, driving less frequently, and recycling is one good way to slow the rate of extinctions. Eating less meat and avoiding products, like ivory, that are made from threatened species also can make a difference. At home, securing garbage in locked cans, reducing water usage, and refraining from using herbicides and pesticides can protect local wildlife.

What is being done to prevent or reduce environmental destruction and restore habitats that have been affected

Examples of conservation preservation efforts in the Caribbean

- Work done by the Nature Conservancy **- https://www.nature.org/en-us/about-us/where-we-work/caribbean/**
- Caribbean Sea Conservation Project - https://www.experiencegla.com/dominican-republic/caribbean-sea-conservation-project/
- Examples of policies and regulation aimed at conserving, preserving and restoring habitats/ecosystems.

Examples of restoration work

- Conserving Coral Reefs in the Caribbean - https://www.international-climate-initiative.com/en/iki-media/news/conserving-coral-reefs-in-the-caribbean/
- Restoration of the Ashton Lagoon - **https://susgren.org/scale-up-restoration-at-ashton-lagoon-for-climate-change-adaptation-and-sustainable-** livelihoods-on-union-island/
- Ocean Spirits Leatherback Sea Turtle Volunteer Project, Grenada - https://www.workingabroad.com/projects/volunteer-leatherback-sea-turtles-caribbean/
- At the UN Decade on Restoration website, many examples of restoration projects being implemented in different parts of the world can be explored.

Research

- o Research is being done on developing species (plants and animals that are more drought-tolerant).
- o Research is also being done to determine the impact of different changes on species different in different habitats.

Some of the things that individuals can do to protect the environment

- Reduce, reuse and recycle our waste as much as possible

- Reduce our energy use.
- Use water wisely.
- Assist with reforestation.
- Protect local water sources.
- Help with the protection of endangered or protected species.
- Buy Local Products.
- Buy Eco-Friendly Products.
- Reduce our use of plastics.
- Dispose of our garbage in a proper manner.

Habitat restoration and monitoring

The International Union for the Conservation of Nature (IUCN) defines "ecosystem restoration" as the process of reversing the degradation of ecosystems to regain their ecological functionality, and to improve their productivity and capacity to meet the needs of society.

One example of ecosystem restoration is the creation of a protected area where there was an overexploited ecosystem. Ecosystems can also be restored by the replanting of trees, the removal of invasive species, etc. The aim is to return the ecosystem to the condition it would have been in if degradation had not occurred.

After a solution is implemented for the restoration of an environment that has experienced change, the area has to be monitored to determine if the solution was implemented properly and to determine the effectiveness of the solution. Some of the things that might be looked at include the number of organisms before and after the solution, the quality of the water source, the amount of garbage in the area, etc.

Opportunities for Subject Integration: *(Additional ideas about how the inclusive learning strategies might be adapted and/or applied to include other subjects in the curriculum)*

Mathematics

- Counting the number of organisms in a habitat.
- Interpreting Population Changes (Stats) Due to Changes in the Environment.
- Graphing the results obtained from investigations.

English Language

- Description of habitats.
- Communicating information in different formats.

- Reporting findings in the form of reports.

Social studies

- The effects of change to habitats/ecosystems directly impact human beings. These impacts may result in many social problems such as migration, scarcity of resources such as water and food, death, pollution, etc.

Strategies that Support the Curriculum and Assessment Framework

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	• Develop respect for the environment. • Awareness and respect for laws developed for the conservation and protection of ecosystems. • Appreciate the need to become involved in protecting the environment.
Developed Critical Thinking and Ethical Communication Competencies	• Use information provided on different environmental issues to make wise decisions with respect to the use, protection and conservation of different ecosystems/ habitats. • Communicate information in a truthful manner. • Develop conservation messaging, to affect positive behavioural change towards conservation.
Developed Well-being Competencies	• Understand how different aspects of the environment contribute to their well-being. • How changes to the physical environment and organisms within different habitats can affect their well-being.

Developed Knowledge and Entrepreneurial Competencies	• Develop tools that can be used to monitor populations of different organisms within different habitats. • Develop educational materials that can be used to educate persons on different environmental issues. • Ensure that their businesses are not having a negative impact on the environment. • Contribute time and finances to the protection of the environment. • Ensure that their businesses are not involved in certain practices such as trading in illegal plant or animal species/illegal animal parts.

Elements from Local Culture, Technology, TVET, Environment that are integrated:

Technologies that make life easier for humans often impact the environment. We must engage discussions with students about the relative environmental costs for establishing human comforts and prosperity.

Local Culture

Traditional knowledge about different ecosystems/habitats contributes to our understanding of plant and animal populations and their interactions.

Hunting/gathering of protected species and its impact on the environment (iguana, manicou, tattoo, turtles, whales, wild orchids, coral, etc.). Include discussion on the laws and reasons for the laws.

Discuss the methods used by local hunters, fishermen, woodcutters, etc. (both legal and illegal) and the impact of these methods on the environment.

Local debates on how tourism can change the environment (e.g. destroying forest habitats to build news roads and hotels, pollution caused by yachts, damage to reef, etc.)

Technology

- Certain technological developments have enabled humans to increase their knowledge about plant and animal populations.
- Certain technologies are being used to monitor environmental destruction, habitat restoration and to map changes in habitats over time.
- Certain technologies are being used to assist with the planting of seedlings in reforestation programmes.
- Certain technologies have impacted the environment.

TVET

Many tools used in TVET are loud and can cause noise pollution which may cause animals to become afraid and disoriented. Noise pollution may also affect human beings. In addition to this, many substances used in TVET such as paints, solvents and spent oils, can cause harm to habitats. Trees are cut down to provide wood to produce materials used in TVET.

Agriculture

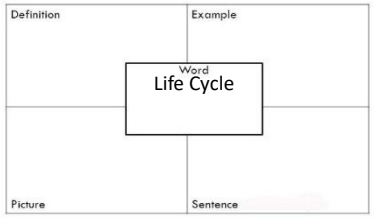
Practices in agriculture such as the use of pesticides, herbicides and fertilisers can cause land and water pollution. Certain agricultural practices can also lead to soil erosion, landslides, etc. These can all have profound effects on the environment.

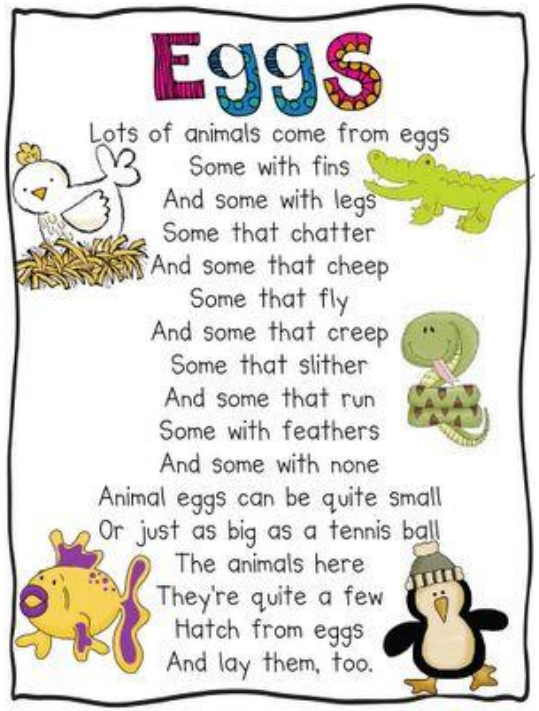
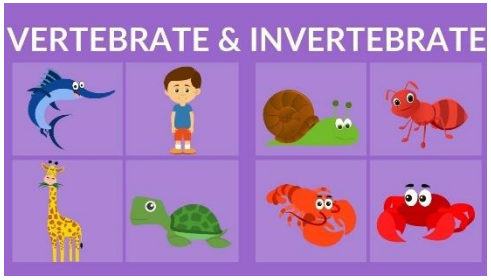
Environment issues

Environmental issues such as climate change, overfishing, illegal hunting of certain species, closed season, coral reef management, etc. will be addressed.

Science Grade 3

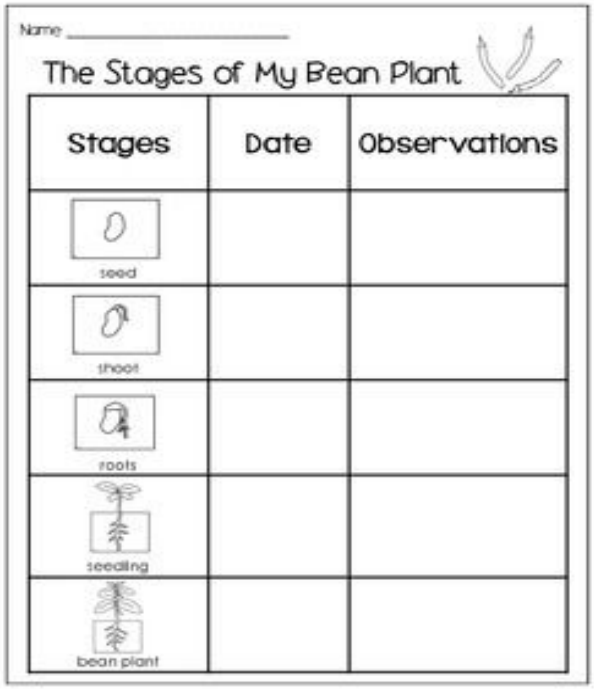
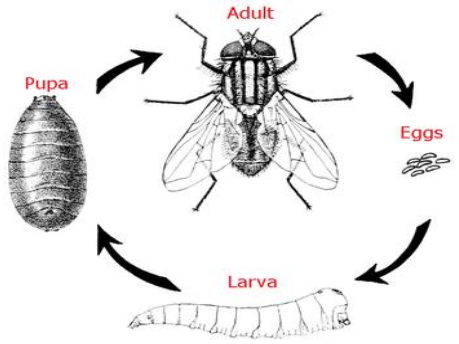
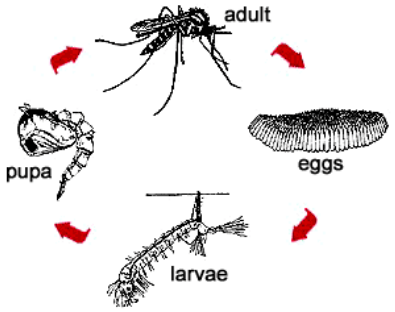
Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Inheritance and Variation of Traits: Life Cycles and Traits Studies of inheritance help students to understand the patterns we see relating parents and offspring in plants and animals. Fundamentally, genetics helps to explain what makes individuals unique and how attributes can be passed down between families of living things.
Essential Learning Outcomes: ELO-1 **Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.** [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Learners are expected to: **<u>Knowledge</u>** Define the terms: ✓ Life cycle ✓ Propagating ✓ Reproducing ✓ Vertebrates ✓ Invertebrates ✓ Metamorphosis ✓ Pollination ✓ Angiosperm ✓ Cotyledon ✓ Monocot ✓ Dicot	**What does the word life cycle mean?** Frayer Model (Four Square) Reinforcing Vocabulary  **Ask students why it is important that life continues in a cycle** and that environmental or human factors don't interrupt that cycle.	Students, have you ever heard the words **life cycle?** What do you suppose it means? If we break down the two words, it suggests a **cycle** which means something that repeats or goes round and **life**. What does it mean to have life? We are alive, what are the characteristics of us as living things? • We breathe. • We eat and grow. • We move. • When we grow to be adults we sometimes have children. • We react to touch, sound, light & smell. • We are affected by our environment. These are the characteristics of living things! Look at this picture of a life cycle of a human male.

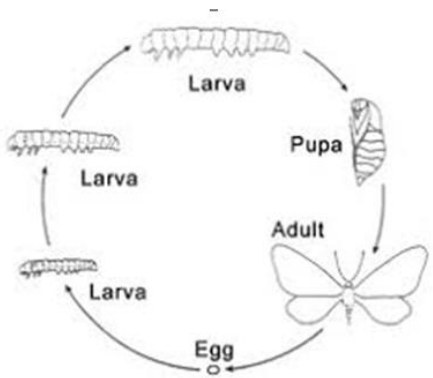
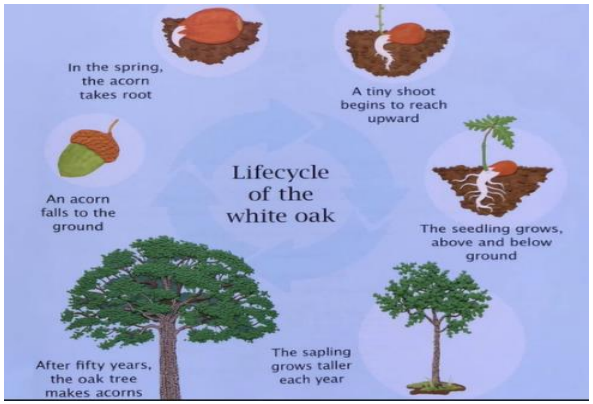
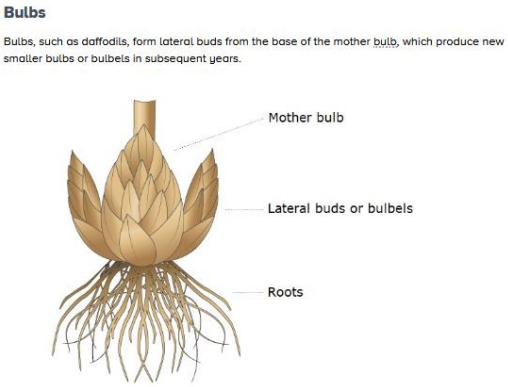
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
✓ Vegetative propagation (ST 3 LS DC 2) ✓ Bulbs ✓ Rhizomes ✓ Stolons (runners) ✓ Tubers ✓ Leaf propagation ✓ Artificial vegetative propagation ✓ Cuttings ✓ Grafting ✓ Layering • Distinguish vertebrates and invertebrates. • Identify similarities in life cycles. • Journaling a life cycle (bean plant). • Describe the main differences between monocots and dicots (ST 3 LS DC 3). • Outline two natural methods of propagation in flowering plants, giving local examples(ST 3 LS DC 4). • Describe and explain methods of vegetative propagation (ST 3 LS DC 5).	*(Plants and animals need to reproduce otherwise their species will disappear after the last adult animal/plant dies.)* *Teacher note:* You might make reference to birth/survival/death as the "circle of life" that is highlighted in the Disney film "The Lion King" **Life Cycles That Involve Eggs**  Retrieved from: Retrieved from https://www.pinterest.com/pin/263460646923961353/	 Retrieved from: https://www.freepik.com Why is this considered a cycle? (*we start as a small human when we are born and eventually when we reach old age we will die and if we have children it starts all over again).* We say that by having children we are **propagating** or producing more humans. Another word for that is **reproducing** humans in a cycle of life. Animals that have lifecycles can be classified as **vertebrate** (with a backbone or spine) and **invertebrate** (without a spine) Some examples of each are shown below.  Retrieved from: https://www.youtube.com/watch?app=desktop&v=KjpGfqqvQ3E (3:36 mins) There are **five main classifications of vertebrates** namely: fish, amphibians, reptiles, mammals and birds.

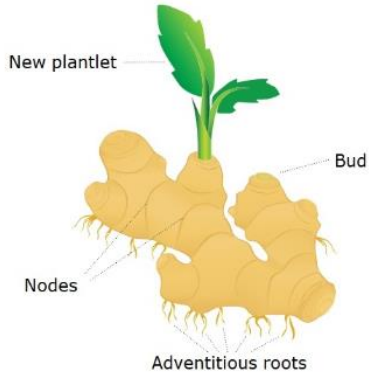
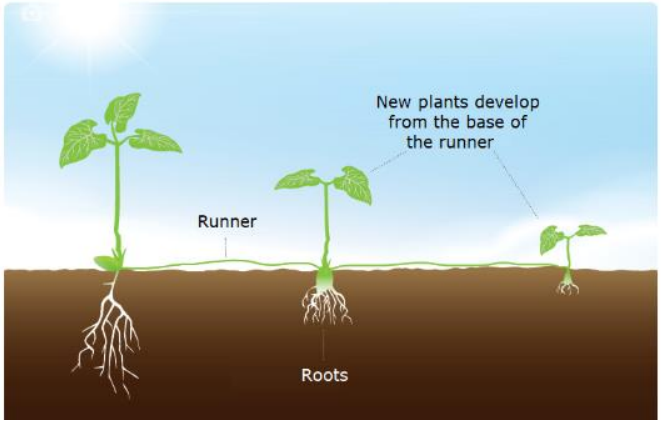
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Define the terms: vertebrates and invertebrates and list the five (5) classes of vertebrates (ST 3 LS DC 8). • Identify and name some characteristics of living things (ST LS DC 2). • Identify and name at least three (3) characteristics of living things (ST 2 LS DC 4). **Skills** • Observe the characteristics of life cycles. • Classify vertebrates /invertebrates • Communicate your research results identifying vegetative propagation in the community. • Research and communicate a graphic of incomplete metamorphosis. • Research and identify plants in the community that use natural vegetative propagation.	**Butterfly Puppet Play** To activate student's sense of wonder around the life cycle of butterflies, create simple puppets and perform the following puppet show. **Scarlet The Butterfly** Scene 1: Scarlet the little caterpillar is talking with her puppet friends about the weather changing and her ferocious appetite. She is merrily indulging in a delicious meal of leaves on a well-endowed branch. She draws attention to her brand-new pink bow. Scene 2 Scarlet the large caterpillar, is found by her friends moving very slowly along a leafless branch. She is complaining of a full tummy and the ensuing cold weather. Her friends suggest they enjoy the fall because of the many apples to eat. Scene 3 The fall weather is upon us. Friends of Scarlet, (bundled in warm clothing) come by looking for Scarlet, calling her by name, searching her out, paying no attention to the pupa hanging on the branch above. Of course, there is no response from Scarlet. At this point little viewers (your students) are telling the puppet friends that the pupa must contain Scarlet, because they see her pink bow hanging from the pupa. In disbelief the friends disperse still calling out for Scarlet.	**Unusual Vertebrate Cycle** Here is an interesting fact about one vertebrate's life cycle. • At first, a baby kangaroo grows inside its mother. But when it is no bigger than your little finger, the baby is born. The tiny baby crawls through the mother's fur into her pouch where it grows into a joey (a young kangaroo). • Kangaroo Life cycle video here: https://www.youtube.com/watch?v=UpsnREY-6no (2:23 min) Ask students why the small kangaroo has to live in the pouch? (*not fully developed as yet-needs milk to grow*)   Baby kangaroo just born. Baby kangaroo in pouch Pictures retrieved from: https://commons.wikimedia.org/w/index.php?curid=1277722

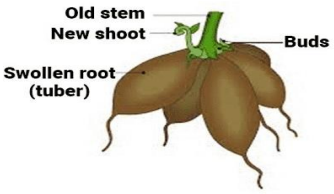
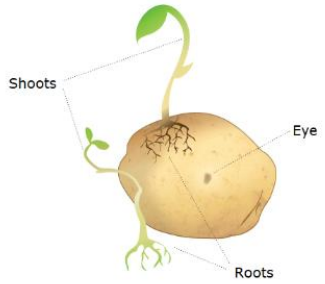
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Investigate information on a particular life cycle. **Attitudes/Values** • Demonstrate Interest/Curiosity for the life cycles of a range of plants & animals. • Demonstrate Stewardship/Respect for living things. • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges. • Participate actively in classroom discussions.	Scene 4 On the same leafless branch, Scarlet appears before her friends as a butterfly. They are surprised that she knows their names but having talked to her and seen the pink bow, they realise that it really is her! They ask her where she has been all winter and she explains that she could hear them calling from inside her cozy pupa. She explains how she makes the pupa to ready herself for the long winter. She invites them to come and watch next fall when she is sure other caterpillars will be preparing for the pupa stage of their life cycle. The puppet friends are amazed at Scarlet's transformation and the forms she assumes as she progresses from a little caterpillar to a butterfly. Have a discussion with students that identifies the stages of development of the butterfly. Emphasize that the life cycle process of a butterfly is called **metamorphosis**. **Butterflies in Trouble** Butterflies are becoming extinct because of spray programs to control weeds and mosquitos. Teachers should summarize the article here and pose the question to students how we could respond and save the Monarch butterflies. See: https://money.cnn.com/2018/05/11/news/companies/monarch-butterflies-endangered-monsanto/index.html	**A Range of Life Cycles** Students let us look at these examples of life cycles and see what we find that they have in common. **Teacher Note:** Some of these pictures are taken from several books which you may find useful to have in your classroom. ➢ *Watch it Grow: Backyard Life Cycles* by Barbara Reid Read Aloud here: https://us02web.zoom.us/j/83648714002 (7:08 mins) ➢ *Amazing Life Cycle of Butterflies* by Kay Barnham ➢ *Amazing Life Cycle of Plants* by Kay Barnham  Life cycle of a butterfly is called **metamorphosis**. 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Journaling the Life Cycle of a Bean Plant If students have yet to grow a plant indoors themselves, they can journal the progress of the plant through it stages.  **Retrieved from:** https://madamemckenzie.wordpress.com/2020/04/ **Teacher note:** **How to grow a bean in a bag** • Wet the paper towel and put it inside the bag. • Put the bean on the paper towel and seal the bag. • Tape the bag to a sunny window.	  **Observations:** eggs start small & increasingly grow, their looks change, which is a cycle that produces more of the living thing (reproduction). **More on Propagation** (continuing the living thing) We have seen before that plants can propagate or reproduce by creating seeds during their life cycle. These then drop into soil and with the proper conditions (soil, moisture/heat) can grow again as another plant.

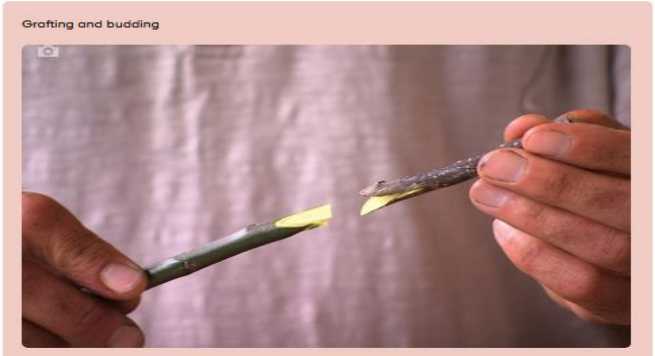
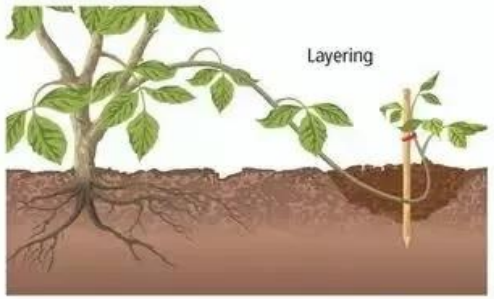
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	• The seed needs warmth to germinate and the sun should provide that. Plus the light will enable everyone to see the germinating seed better. **Water Pollution Disturbs Life Cycles: Impact on the Ecosystem?** A recent World Bank report has warned of the danger of water pollution in the Caribbean. (see: https://documents1.worldbank.org/curated/en/482391554225185720/pdf/Marine-Pollution-in-the-Caribbean-Not-a-Minute-to-Waste.pdf **An Amphibian** is a cold-blooded vertebrate animal of a class that comprises the frogs, toads, newts, and salamanders. They are distinguished by having an aquatic gill-breathing larval stage followed (typically) by a terrestrial lung-breathing adult stage.  For amphibians in their life cycle, they are often in contact with water. Because amphibians also breath through their skin, they are particularly sensitive to chemicals in the water. It has also been found that fertilizer run-off into waterways cause certain parasites to thrive and these infect frogs causing malformations in their life cycle.	The goal of every living organism, including plants, is to create offspring for the next generation. Animals and the wind can physically move seeds from one place to another and promote propagation. Flowers can propagate by insects assisting in a process called pollinating. **Pollination** is the act of transferring pollen grains from the male anther of a flower to the female stigma. *Example*: Bees in seeking out sugar (nectar) in flowers accidently can brush against the flower's parts and allow other partner flowers to create offspring seeds. **Teacher Note**: see more details of pollination below in additional materials. **Angiosperms** are plants that have flowers and seeds encased in fruit. Angiosperms can be divided into two major categories, monocots and dicots. The first leaf to emerge from the seed is called a **cotyledon** and it can be single leaf (**monocot**) or double leaf (**dicot**) (see more detail in additional resources below). Students, let us look at pictures that show life cycles of plants. ➢ *Watch it Grow: Backyard Life Cycles* by Barbara Reid Read Aloud here: https://us02web.zoom.us/j/83648714002 (7:08 mins) 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	(see: https://www.newscientist.com/article/dn12687-frog-deformities-linked-to-farm-pollution/) Have students create a diagram that links the food chain that includes frogs. Ask them to explain how the loss of frogs through pollution could affect the bigger ecosystem. **Teacher note:** Example interactions: Frogs are an integral part of the food chain. Throughout their lifecycles, frogs occupy a vital position in the food chain as both predators and prey. As tadpoles, they consume algae, regulating blooms. Frogs are an important source of food for a variety of organisms, including birds, fish, and snakes. **Complete and Incomplete Metamorphosis** We normally think of metamorphosis to follow the scheme below (egg/larva/pupa/adult)  	 **Natural Vegetative Propagation** Class, did you know that plants can also grow and reproduce without seeds? They do this through a process called **vegetative propagation**. This is when plants reproduce from stems, roots and leaves. There are natural ways that plants make more plants! Retrieved rom: https://www.sciencelearn.org.nz/resources/1662-vegetative-plant-propagation 

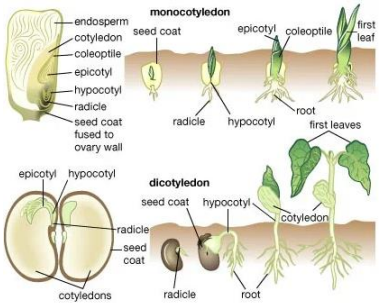
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Have students research and draw a cycle diagram for the incomplete metamorphosis life cycles of such insects as: grasshoppers, cockroaches, dragonflies and earwigs. (see example in Additional Resources below) **Vegetables can Propagate in Different Ways Naturally** Have students identify plants in their own communities that propagate using: Bulbs: Rhizomes: Stolons: Tubers: **Teacher note:** If students have access to phones, have them take pictures of their examples so the teacher can combine them in a PowerPoint® or Word® document for later reference. **Can you Guess?** Which type of Vegetative Propagation do you think these pictures are showing?	**Rhizomes** Rhizomes are root-like stems that grow horizontally under the ground. New roots and shoots form at the nodes with shoots growing upwards to form new plantlets. Lateral buds grow out to form new rhizomes. Examples include iris and root ginger.  **Stolons** Stolons or runners are horizontal stems that grow above the ground, for example, strawberries. Tiny plantlets form along the stolon, and roots form where they touch the ground. When the connection with the parent plant breaks, the new plant becomes independent. 

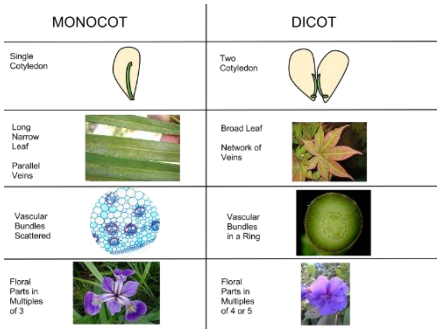
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	  (*tuber*) Retrieved from: https://edurev.gumlet.io/ApplicationImages/Temp/59_15201c33-dee8-4f66-b906-ccb77d64a8cc_lg.png?w=376&dpr=2.6  (*stolon or runner*) Retrieved from: https://www.ruralsprout.com/wp-content/uploads/2021/06/strawberry-runners-feature.jpg **Plants at home: Artificial propagation** Students should research plants at home that family members or neighbors have: a) Started a new plant from a cutting	**Tubers** Tubers are swollen portions of an underground stem that store food so a plant can lie dormant over the winter, for example, potatoes. Axillary buds, commonly known as 'eyes', form over the surface of the tuber and produce shoots that grow into a new plant the following year.  **Leaf Propagation** Plants like Bryophyllum (leaf of life/ miracle leaf plant), have buds coming out from the notches of the leaves. These buds develop into new plants.  Retrieved from: https://d3jlfsfsyc6yvi.cloudfront.net/image/mw:1024/q:85/https%3A%2F%2Fhaygot.s3.amazonaws.com%3A443%2Fcheatsheet%2F10422.jpg

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	b) Start a new plant by grafting. **Teacher note:** As above, have students record and share digital pictures in class of their examples. **Research on Life Cycles** Each student must choose one of the following animals and through research write a single page description of their life cycle which includes a diagram clearly depicting the stages. ➢ A snake ➢ A turtle ➢ A whale ➢ An oriole ➢ Mahi mahi ➢ A spider Rubric: Digital picture (of their own or from the internet) 3 marks Clearly labelled life cycle diagram 10 marks Description of the species and where it can be found 5 marks Description of the stages of the life cycle 10 marks Typical life span of chosen species 2	**Artificial vegetative propagation** Gardeners also use vegetative propagation methods that plants don't use naturally. These methods involve taking a piece of one parent plant and causing it to regenerate itself into a new plant. Retrieved from: https://www.sciencelearn.org.nz/resources/1662-vegetative-plant-propagation **Cuttings** A cutting is a piece that has been cut off a mother plant and then caused to grow into a whole plant. Often this involves a piece of stem that is treated with hormones to encourage new roots to form before planting. Sometimes root cuttings with buds on them will produce new shoots when pressed directly into soil. 

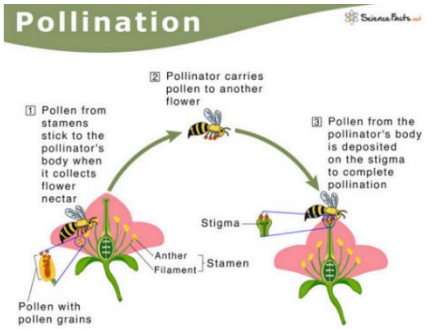
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Grafting and budding This method involves joining a stem piece (as in grafting) or a single bud (as in budding) onto the stem of a plant that has roots. The stem piece or bud is called the scion, and the plant with roots is called the rootstock. Grafting is commonly used to produce fruit trees sometimes with more than one variety of the same fruit species growing from the same stem.  **Layering** In the layering method, one of the branches of a plant is pulled down into the ground and covered with moist soil in such a way that the tip of the branch remains above the surface. After a few days, new roots start growing from the part buried in the soil. This part of the branch is then separated from the parent plant to let it develop into a new plant.  Retrieved from: https://qph.cf2.quoracdn.net/main-qimg-dec699a6705cff1f40948020c859c492.webp

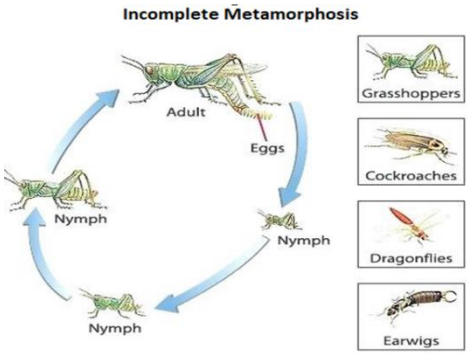
Additional Resources and Materials





Pictures retrieved from : https://en.wikipedia.org/wiki/Dicotyledon and https://www.britannica.com/science/cotyledon-plant-anatomy





Retrieved from: https://www.sciencefacts.net/pollination.html Retrieved from: http://biologydiva.pbworks.com/w/page/14797001/Zoology%20Chapter%2031

Additional Useful Content Knowledge for the Teacher:

Plant and animal life cycle worksheets: https://www.k5learning.com/blog/grade-three-living-things-worksheets
Vegetative Propagation: https://www.youtube.com/watch?v=ZQ7P3gMunpg (8:10 mins)

Opportunities for Subject Integration:

Language Arts:

- New vocabulary
- Books on life cycles
  - *Watch it Grow: Backyard Life Cycles* by Barbara Reid> Read Aloud here: https://us02web.zoom.us/j/83648714002 (7:08 mins)
  - *Amazing Life Cycle of Butterflies* by Kay Barnham> Read Aloud here: https://www.youtube.com/watch?v=aBkqnNOzYc4 (5:29 mins)
  - *Amazing Life Cycle of Plants* by Kay Barnham> Read Aloud here: https://www.youtube.com/watch?v=1Dsbk_1e2VU (5:53 mins)
- Poetry
- Puppet play
- Researching the internet
- Journaling life cycles

Social Studies:

- discussions of the impact of pollution on life cycles.

Strategies that Support the Curriculum and Assessment Framework

Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework. It will be used to guide the writing but will not appear in the curriculum guides.

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have::	**Where might this competency be promoted/developed in this learning outcome and associated lessons?**
Developed Citizenship Competencies	Responsibility to protect plant and animal life cycles from environmental/human dangers
Developed Critical Thinking and Ethical Communication Competencies	Strategies for propagation of plants
Developed Well-being Competencies	Understanding life cycles promotes healthy practices.
Developed Knowledge and Entrepreneurial Competencies	Strong agricultural practices have potential to promote a viable vocation of farming.

Elements that are integrated across subjects:

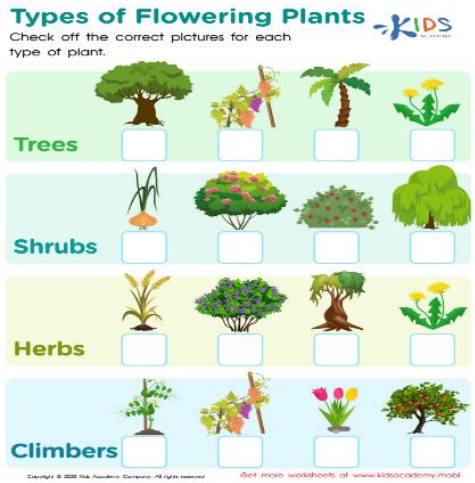
- Agricultural science

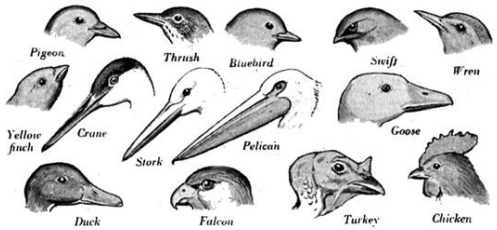
Elements from Local Culture, Technology, TVET, Environment that are integrated:

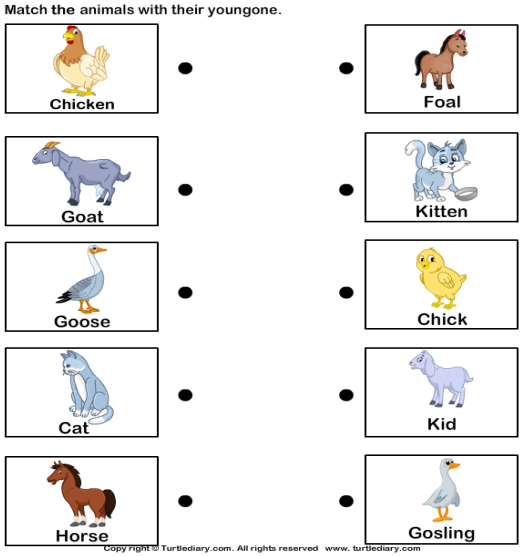
- The study of the life cycles of local plants and animals.

Science Grade 3

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Inheritance and Variation of Traits: Life Cycles and Traits Studies of inheritance help students to understand the patterns we see relating parents and offspring in plants and animals. Fundamentally, genetics helps to explain what makes individuals unique and how attributes can be passed down between families of living things.
Essential Learning Outcomes: (ELO 2): Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms**.** [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Learners are expected to: **<u>Knowledge</u>** • Define the terms: o Traits o Parents o Offspring o Hybridization o Reproduction o Flowering plants o Non-flowering plants o Living things o Herbivores o Carnivores o Selective breeding o Drought resistant	 Retrieved from: https://www.kidsacademy.mobi/printables/types-flowering-plants/answers/	Students did you know that science has been very helpful in improving agriculture and food production around the world? Here is just one example. The green tomatoes in the picture are able to resist diseases that would normally kill the plant. The red tomato is another variety which grows very quickly.  

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
○ Disease resistant • Outline the main features of a plant, and name the parts (ST 1 LS ECS 5). • Identify and name at least three characteristics of living things. (ST2 LS DC 4). • Discuss the importance of growth, development and reproduction in plants and animals (ST 4 LS SF 2). • Identify and describe the main features of different animals in their country (ST 1 LS ECS 9). • Give examples of hybridization for improved plants. • Identify and describe the main features of different animals in their country (ST 1 LS ECS 9). • Give examples for selective breeding for improved animals.	**What Function Do These Bird Bill Traits Have?**  Retrieved from: https://nhpbs.org/wild/birdcharacteristics.asp Students will notice that the bills of birds can look quite different. This is a trait of the bird. Ask students why varied birds have different bill shapes. **Teacher note:** See additional resources below for an explanation.	Scientists have been able to combine the characteristics or **traits** of **parent** plants to create **offspring** plants in a process called **hybridization.** The tomatoes below are the offspring of the green and red tomatoes above. But the offspring plants are now able to prevent disease and grow quickly. These are useful traits. All tomato pictures captured from: https://www.youtube.com/watch?v=GwjNhYGBEN4 (1:58 mins)  We know that plants and animals are constantly involved in **reproduction** so mixing of traits from parents can happen frequently both naturally (mixing of colored flowers in the wild) and artificially (using science experiments) This is a very important technique that scientists have developed. Around the world the best traits of plant species have combined in experiments on such food items like rice and corn. **Plant Review** In order to understand traits that plants might have, it is useful to review what we know about plants. There are different classifications of plants. The are **flowering plants** and **non-flowering plants.** Flowering plants include all the flowers around us including those plants that bear fruit. Some examples are trees, shrubs, herbs and climbers. Non-flowering plants use other ways to reproduce and they include mosses, ferns and cone bearing trees (coniferous trees). ***Teacher note:*** For overview see: https://www.youtube.com/watch?app=desktop&v=n5eoI9Pcoyg (3:38 mins) and https://www.youtube.com/watch?app=desktop&v=FbrjnHm-CnI (4:13 mins)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Skills • Observe pictures of parents and offspring and identify similar and different traits. • Interpret the text "Ugly Duckling." • Classify and give examples of flowering and non-flowering plants. • Compare pros and cons for modifying the genes in plants. • Identify and tabulate personal traits. • Investigate in a field trip the traits of plants and animals. • Compile pictures of parents • Classify plants according to certain features such as size, shape of leaves, , flowering and non-flowering (ST 1 LS ECS 6). • Classify animals according to their size, body	**Based on Their Traits, Match the Parents with Their Offspring Below.**  Retrieved from: www.turlediary.com **Can you Guess What Type of Dog Parents This Animal Came From?**  Retrieved from: https://www.dailypaws.com/living-with-pets/pet-compatibility/doodle-dog-breeds **Clue:** He is called a goldendoodle! **Ans:** (Golden Retriever and Poodle)	Plants have parts with distinct functions: • They have roots, whose function is to bring nutrients and water from the soil but also to hold the plant firmly in the ground. • They have stems that transport the water and minerals from the roots up to the leaves. • They have leaves that gather the energy from the sunshine and make food for the plant (photosynthesis) As plants develop, they can have different shapes of leaves such as elliptical, oval and linear. (see additional descriptions below). The leaf shape would be considered a trait of that plant. **Animals Have Traits Too!** Animals are **living thing**s so they breath, move, respond to stimuli, reproduce and grow. They are also dependent on their environment. Some animals eat meat (**carnivores**) and some eat plants (**herbivores**). Students, let us make a list of some of the animals in our country. Choose a favorite animal. What are their traits or characteristics? (*size, eye color, body shape, hair color, hair length, facial- characteristics like shape nose, ears etc.)* **Where do we see Traits Differing in Animals?** Read the story (http://hca.gilead.org.il/ugly_duc.html) of the Ugly Duckling or watch the video read aloud here: https://www.youtube.com/watch?v=TyrmcD8Yml0 (9:43mins)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
coverings, and the food they eat (ST 2 LS DC 2). **Attitudes/Values** • Appreciation that humans have a variety of traits and no person should feel marginalised because they are different. • Interest/Curiosity as to how plants and animal parents can produce a range of offspring. • Inquiry about the ways selective breeding and hybridization can help third world countries. • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges. • Participate actively in classroom discussions. • Critically consider whether we should use the technology we have developed to create more GMO foods.	What are the traits from the parents that are reflected in the offspring above?  **Golden Retriever** Retrieved from: https://en.wikipedia.org/wiki/Golden_Retriever  **Poodle** Retrieved from: https://www.thesprucepets.com/poodle-dog-breed-profile-1117988 **Selective Breeding of Horses** While certain dog parents are combined mostly for looks, can students identify reasons why certain horse parents would be selected? • Speed (racing) • Strength (working)	 Engage a discussion with the students based on the following questions: Why did the other ducks not like the Ugly Duckling? (*He did not look like them, he had different traits and they considered him ugly because he was different*) Should we dislike someone if he/she doesn't look like us? Why? (*No, we all can have different traits.)* Why did the Ugly duckling seem so odd? (*Their traits were quite different from their parents)* Why was the Ugly Duckling not able to fit into the group with the other siblings? (*His feathers beak and feet were different from the others and he was bigger as well.)* Why was it able to fit into the group of swans? (*As he grew his traits looked more like swans, white feathers, orange beak and feet, long neck, etc.)* Was the egg from which he came, laid by the mother duck? *By some mistake, a swan's egg ended up in the duck mother's nest. He was actually a baby swan.*)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

- Smart & agile (horses for herding animals)
- Food (horse meat is commonly eaten in Europe)

What are your Traits?

An Inventory of My Traits – Survey

What combination of these traits do you have? Complete the survey to find out.

1.	I have detached earlobes	☐ Yes	☐ No
2.	I can roll my tongue	☐ Yes	☐ No
3.	I have dimples	☐ Yes	☐ No
4.	I am right-handed	☐ Yes	☐ No
5.	I have freckles	☐ Yes	☐ No
6.	I have naturally curly hair	☐ Yes	☐ No
7.	I have a cleft chin	☐ Yes	☐ No
8.	I have allergies	☐ Yes	☐ No
9.	I cross my left thumb over my right when I clasp my hands together	☐ Yes	☐ No
10.	I can see the colors red and green (I am not color blind)	☐ Yes	☐ No
11.	The hairline on my forehead is straight.	☐ Yes	☐ No
12.	I am a:	☐ Male	☐ Female

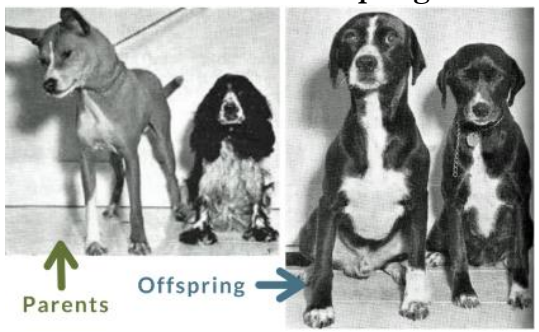
An Inventory of My Traits – Data Table

How many people in your group have each trait?
Fill in the data table below by counting the number of people who marked "yes" and the number of people who marked "no" for each trait.

TRAIT	YES	NO
Detached earlobes		
Tongue rolling		
Dimples		
Right-handed		
Freckles		
Naturally curly hair		
Cleft chin		
Allergies		
Cross left thumb over right		
See the colors red and green		
Have a straight hairline		

Have students observe the pictures of the Ugly Duckling and the other ducks and compare the traits. Then have students observe pictures with the Ugly Duckling and the swans and compare the traits.

Can You See the Traits in the Offspring?



Retrieved from: https://nationalcanineresearchcouncil.com/visual-breed-identification/

The father of these dogs may have been black in color?

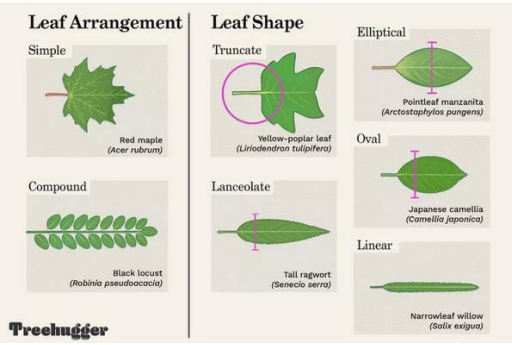
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Inventory worksheets retrieved from: https://dlewerenz.weebly.com/uploads/1/1/8/9/11899377/science_heredity_lesson_5thgrade.pdf **Extended activity** **World Problems: A Debate on Solutions** Scientists now have the capability to create rice and corn that have traits of **drought** and **disease resistance**. These experiments involve changing the building blocks of these foods at the smallest level, something called the **genes.** Genetically modified organisms (GMOs) can be defined as organisms (e.g., plants or animals) in which the genes have been altered in a way that does not occur naturally through normal parenting. The Cons: Some people in the public believe that manipulating these genes is very dangerous. They are primarily worried about the long-term effects of these changes. Will the improved corn/rice cause us problems in our diet? Will it affect animals that eat GMOs also? The Pros Some people believe that creating these new crops will help the developing world and especially those faced with starvation due to poor crop yields when there is lack of water or a rise in plant diseases.	 **Field Trip** Take students on a field trip to an animal farm and/or vegetable farm. Let students observe the groups of animals and vegetable plants on the farm. Then compare the traits of the animals and/or plants. ***Teacher note:*** *Highlight the similarities and differences among the offspring, parent and siblings. Focus discussions on similar and different traits between offspring and parent and sibling and that differences exist between organisms of the same group.* **Breeding for Special Purposes** When farmers want stronger horses, they will select parent horses that are the biggest and most muscular. These will become the parents of baby horses. This is called **selective breeding.** Other examples where desirable traits are achieved by breeding: • Cows that give more milk • Donkeys that can walk longer distances • Dogs that are less aggressive • Sheep that produce more wool • Animals that can survive on less water and in hotter climates

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Students can write a one-page response paper after researching opinions on the internet and speaking with local elders about indigenous perspectives.	**What are Your Traits?** Even though you may have brothers or sisters from the same parents and bear some similarities in your traits it is possible, quite naturally, that you will have some different traits that have been passed down from your parents. Have students bring in a picture of a parent(s)and have peers identify similarities and differences. Game: mix up the parental pictures and see if the class can separate out who is the parent of each child based on similar traits. ***Extended Activity***: Inventory of traits - see assessment column

Additional Resources and Materials

10 most interesting cross-bred species (see: https://www.youtube.com/watch?v=ylQz7ytMQMU (10:55 mins)
Selective breeding: https://www.youtube.com/watch?v=ad4yB63tryI (2:36 mins)
Artificial selection & Selective Breeding: https://www.youtube.com/watch?v=zHMqkS60jAg (4:13 mins)

Additional Useful Content Knowledge for the Teacher:



Retrieved from: https://www.treehugger.com/id-trees-using-leaf-shape-venation-1343511

Bird Bills are Different- Why? See: : https://nhpbs.org/wild/birdcharacteristics.asp
Birds' bills are adapted for the food they eat. Cardinals have strong, conical bills that help them crack open seeds. Hummingbirds have long, thin bills that help them collect nectar. Hawks and falcons have strong, hooked bills that help them tear into their prey. Pelicans have large pouches of skin on their lower bill that can hold fish. Ducks, swans, and geese have flat bills that help them filter food from the water. Woodpeckers have strong, pointed

bills that help them drill holes into trees and extract insects. Looking at a bird's bill can often tell you a lot about what and how the bird eats, where it lives, and even how it behaves!

Opportunities for Subject Integration:

Language Arts: New vocabulary
Books about difference and attitude towards difference:
Cole, Elizabeth (2021) Our Diversity Makes Us Stronger. E Cole Publishing
Perry, LaTashia (2016) Skin Like Mine. G Publishing
Social Studies: Celebrating difference in traits/ethics of modifying traits/ battling world hunger with GMOs
Technology: Accessing internet resources for research
Mathematics: tabulating trait data
Health: The impact of genetically modified food products on our overall health.

Strategies that Support the Curriculum and Assessment Framework

Elements of the Essential Education Competencies that are addressed

An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	Ethical decisions around whether the science and technology of GMO products should be pursued.
Developed Critical Thinking and Ethical Communication Competencies	Distinguishing useful traits in plants and animals and deciding whether GMO solutions serve the greater good.
Developed Well-being Competencies	Health concerns for animals that ingest GMO products.
Developed Knowledge and Entrepreneurial Competencies	Agricultural advances in drought and disease resistant crops has long-range impacts for working farmers.

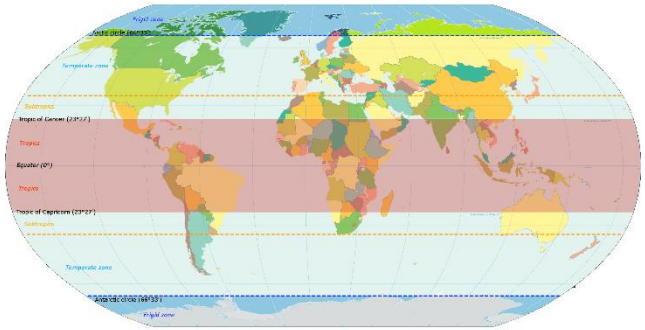
Elements from Local Culture, Technology, TVET, Environment that are integrated:

The traits of local plants and animals should be highlighted in this study.
Impacts of genetically modified plants on our welfare and diet is important for students to consider.

Items of Inspiration: It is important to have students consider the social implications of having a role in controlling traits for human purpose.

Science Grade 3

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Inheritance and Variation of Traits: Life Cycles and Traits Studies of inheritance help students to understand the patterns we see relating parents and offspring in plants and animals. Fundamentally, genetics helps to explain what makes individuals unique and how attributes can be passed down between families of living things.
Essential Learning Outcomes: (ELO 3): Use evidence to support the explanation that traits can be influenced by the environment**.** [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants that are grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

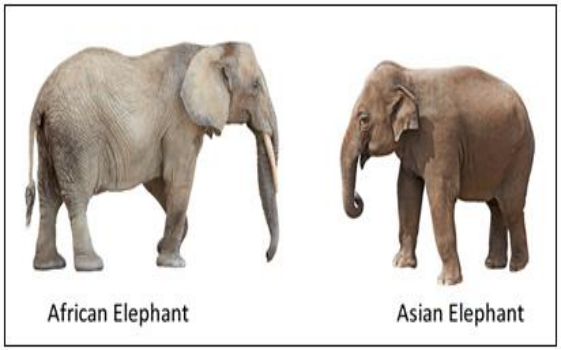
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Learners are expected to: **<u>Knowledge</u>** • Define the terms: o Climate Zone o Temperate zone o Polar zone o Tropical zone o Environment o Traits o Genes o Photosynthesis o Energy transformation o Evaporation • Demonstrate they understand that plants and	**Examples of Environmental Factors** Ask students to identify three environmental factors that may affect traits in animals? (*predators & prey/ availability of food /temperature/ landscape & exercise/ shelter/ weather*) **Where do they likely live?** Which of the following cows would be better suited for a temperate country such as Scotland, brown or white? Give a reason for your choice.	**Animals and Climate Zones** The world is divided into zones that have different temperatures during the year.  Zone map Retrieved from: https://upload.wikimedia.org/wikipedia/commons/1/1e/Latitude_zones.png

animals in different earth zones may look different because of temperature variations as they get further from the equator.

- Compare animals in different environmental conditions.
- Outline how soils are made from a variety of rocks (ST 3 ESS ER 3).
- Describe and demonstrate appropriate ways of feeding and caring for pets (ST 2 LS ECS 1).
- Describe the physical features of the parts of a plant, relating these features to their function (ST 3 LS SF 1).
- Discuss the importance of growth, development and reproduction in plants and animals (ST 4 LS SF 2).
- Explain the role of the sun as the main provider of heat and light on earth (ST 3 PS EN 2).

Highland Cow on the left is better suited for a cooler climate with such a heavy fur coat.
Retrieved from: https://kilts-n-stuff.com/highland-coo/

Ask students why they think these elephants may look different.
(African deserts are hotter than Asian deserts and so the African elephant is usually larger, wrinkled and has larger ears to release more body heat)



Students, look at these pairs of pictures. They are similar species of animals in different parts of the world where the temperature is different (**climate zones**). These pictures show that temperature can certainly affects the traits of animals; in this case color.

The bear on the left lives in a **temperate zone** and the one on the right lives in **polar zone**.

Retrieved from: https://www.quora.com/Where-do-brown-bears-black-bears-and-polar-bears-live

The winter (left) coat of the water deer is substantially thicker and typically paler than the short, brick-red summer pelage (right).

The colors of winter and summer coats of these deer change because of temperature variation in the same climate.
Retrieved from:
https://www.wildlifeonline.me.uk/animals/article/water-deer-fur-moulting

- Discuss simple examples of energy transformation (ST 3 PS EN 8).

Skills

- Observe pictures of living things and hypothesize how the environment in which they live may impact their traits.
- Measure water levels of evaporation.
- Tabulate water level data for evaporation.
- Graph the rate of evaporation.
- Calculate an evaporation rate for bright sunshine location.
- Classify animals according to size, body coverings, and food they eat (ST 2 LS DC 2).
- Classify soils as sand, clay and loam (ST 3 ESS ER 6).
- Investigate which soils retains water or drains quickest (ST 4 ESS ER 4).

Retrieved from: https://factanimal.com/african-bush-elephant/

Research- How Do Things Live Here?

The picture below is of a desert. You can tell that it is very dry.

Retrieved from https://smartclass4kids.com/animal-adaptations/
Students should do some research to determine how the following living things have traits that allow them to live in the desert climate. Be prepared to report back to your classmates on your findings.

Camel
Cactus
Lizard
Black Throated Sparrow

Teacher notes in additional materials below.

Design an Animal
Can you design a make-believe animal that could live in the following environment?

These twins were brought up separately in tropical and temperate zones. You can see that their skin color is slightly different.

Food Sources and Animal Growth
The amount and quality of food in an animal's environment (living surroundings) affects their **traits** (characteristics).

It is important to feed our pet animals so they can grow to be healthy. This picture shows a dog on the left that was poorly fed and how much better he thrived when he was fed good food regularly (same dog on the right).
Retrieved from:
https://blog.theanimalrescuesite.greatergood.com/mauka-dog-transformation/

A building block of our bodies that comes from our parents are called **genes**. These genes affect our growth and can sometimes make us susceptible to changes

- Compare the rate of evaporation of water under specific conditions (ST 4 ESS ER 7).

Attitudes/Values

- Appreciation for the diversity of living things.
- Collaboration & Cooperation with peers.
- Stewardship/Respect for Living Things.
- When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges.
- Participate actively in classroom discussions.
- Identify and appreciate the importance of caring for plants and animals and their environment (ST 2 LS ECS 4).

1. Rocky shale cover ground on steep hills.
2. No trees but very tall thin shrubs with berries.
3. Very hot climate except at night when it cools down.
4. Very little rainfall and only small mountain streams as a water source.
5. Only small rodents for prey.
6. Large predators that are meat eaters (carnivores) live nearby.
7. Only tiny hillside caves for shelter.

Task and Rubric

- Draw a picture of your animal and name it: 5 points
- Draw a picture of your animal's habitat: 5 points
- Describe how your animal's traits allow them to live in the environment defined by 1-7 above. 7 points

Short Writing/Drawing Exercise.

On a single page draw a picture of a pet you or a friend may have. Write some short sentences about how you manage their environment in order to best take care of a pet.

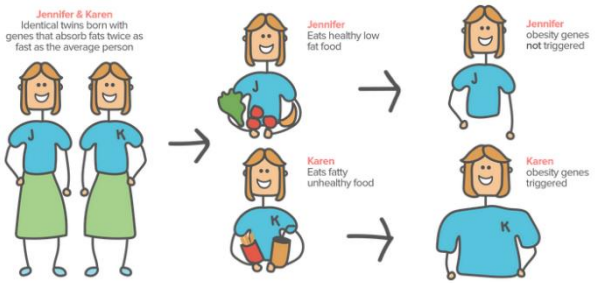
Can You Guess the Animal?- Three Poem Riddles

Retrieved from**:** https://www.storynory.com/animal-riddle-rhymes/

Poem 1

I am a clever African, my memory's very long,
I like it living in my herd, I'm beautiful and strong,

depending on our environment. The example below suggests that a difference in diet (fat versus non-fat) can affect two otherwise identical twins as they grow.



Jamaica and elevation

Retrieved from: https://www.khanacademy.org/test-prep/mcat/behavior/behavior-and-genetics/a/genes-environment-and-behavior

Plants are Affected by Their Environment

The sun is a source of light on earth but also energy. Using a process called **photosynthesis**, plants absorb sunlight using their leaves to help create food for the plant to grow. As we study more science, we will come to understand the details of how that happens, but it is a good example of **energy transformation.**

What are signs that our plants are not getting enough sun? (Retrieved verbatim from: https://apottedlifeblog.com/low-light-4-signs-your-plant-isnt-getting-enough-sun/

***Leaf Color*:** Most plants have rich green leaves, or colors that appear vibrant when healthy. These glorious hues that make plants so aesthetically pleasing are from the amount of chlorophyll within their leaf cells. Without sun, plants can't function at full capacity and won't be able to

	I like the leaves on tops of trees, they're clean and very sweet, I like fresh grass untrampled on, I do not care for meat. My trunk is very special, it is a sort of nose, I use it for so many things, it's like a garden hose. I shower with it, I eat and swim, though heavy as a bus I roll in mud for suncream, which you could do with us. When walking, we go single file, we haven't hands to hold Our mothers hold us with their tail, the young led by the old Now dear child, you've listened, just tell me, what's my name. If you don't know, don't worry, I'll tell you all the same! (*elephant)* ***Poem 2*** My mother laid a clutch of eggs, I had to leave my shell She left me when I came outside, I looked so wriggly well, I'm really very handsome, I look like one long tail, and my mouth opens really wide, I'd nearly eat a whale!	photosynthesize. Over time, the leaves will lose their vibrancy and pale, eventually growing yellow and weak. They'll easily fall from your plant if nudged. ***Stem Height*:** As the primary source of energy, sunlight drives a plant's ability to grow tall and strong. Plants living in a low light situation, especially those that need bright and direct light, may experience stunted growth. A plant without an adequate light source can grow lanky, with spindly stems and leaves that are widely spaced. If you've noticed that your plant doesn't seem to be growing anymore, it may be due to a lack of light. ***Leaf Size*:** All plants have leaf sizes unique to their particular breed and current level of growth. However, if your plant isn't receiving the proper amount of sunlight and nutrients, the leaves may stop growing at a smaller size than normal. They may also feel much thinner and softer, even after they've reached maturity. If they also have brown edges, this is a sign of stress, often due to low light. ***Plant Tilt*:** If it appears as though your plant is straining toward a source of sunlight, it probably is. The cells in plants on the sun side will grow shorter and sturdier, while they'll grow long and spindly in the shade. This creates a plant that "leans" toward light. If your plant is tilting dramatically toward a window, it's a clear sign that your plant needs more sunshine. ***Plants also need water*** in their environment to grow. The water that falls to the ground surrounding a plant gets absorbed by the soil and the roots of the plant move the water up the stem to promote plant growth. Among other things, two factors may affect how much water the plant eventually gets in order to grow.

I'm fond of scrumptious mice and frogs, They're just the size for me, and when I've had one for my lunch, I don't need one for tea!

I mustn't get too fat you know, Nor scrawny, weak or thin
I have to stay the perfect size, my hole to slither in

I like it there, it's nice and safe, from birds with nasty claws, I'd rather stay alive you know, not end up in their maws!

Now child, you have listened, just tell me, what's my name.
If you don't know, don't worry
I'll tell you all the same!
(a snake)

Poem 3

My teeth are in my stomach, my goodness fancy that
so do be careful, won't you? or my tum will eat your hat.

I could be white or yellow, I've cousins who are blue
but put me in the cooking pot and I'll turn red for you.

I've loads of legs, 5 pairs of them, a runner I'll never be
my claws could pinch you very hard, at the bottom of the sea.

My shell is like a hard tough rind, inside, I'm soft you know

The bright sun in the plant's environment, may heat up the liquid water on top of the ground such that it has enough energy to become water vapor. We know that this process is called **evaporation** and it would prevent how much water the plant received.

Experiment: We can measure the rate or speed of evaporation in bright sun and determine how much that may affect our plants.

1. Measure exactly 20 mls of water into a cup.
2. Set the cup in the bright sun for 1 day.
3. Pour the water into a measuring cylinder and tabulate how much water is remaining after evaporation.
4. Return the water to the cup and once again, leave the cup in the bright sun for 1 day.
5. Repeat this process for 4 days completing your data table as below and then plotting a graph of water volume (mL)ordinate versus time (day) abscissa.
6. Draw your best straight line through the points on your graph. Find the rise between two end points and divide it by the run between the same two points. Use this approach to calculate the rate of evaporation _____(ml/day).

Day >	Start	1	2	3	4
Vol (mL)	20				

Were you surprised how much evaporation may have robbed your plant of water?

	I have to take it off, alas, there is no room to grow. I change it sometimes when I'm big, more often when I'm small I want to live for 50 years, and reach 3 long feet tall Now child, you have listened, just tell me, what's my name. If you don't know, don't worry, I'll tell you all the same! *(a lobster)*	**How much water does the soil absorb**? We know that there are three main types of soil: sand, silt and loam. These soils are created over very long periods of time from the grinding of rocks and weathering processes. Smaller rock particles are mixed with living matter such as dead plants to form layers of soil. As a result of the different rocks and living matter and the environmental conditions in any one location, soils can have different composition and properties. **Teacher note**: Set up a **demonstration using local soil types** and a filter funnel. Pour 20 mL of water through each of the soil types. Ask the students to identify which soil seems to allow the water to pass through the fastest. (*sand*). Students you can see that a sandy soil will not hold water very long. This is a problem for some plants because they can't get the water through the roots to the stem quickly enough to nourish the plant. The environment of the plant is very important in terms of its ability to grow; poor soil will have an effect on the plant's ability to grow.

Additional Resources and Materials

(Additional material and resources that are not included in the Inclusive Learning and/or Inclusive Assessment Strategies that may be useful for lesson planning)

Additional Useful Content Knowledge for the Teacher:

Camel Traits:

Humps to store fat which they can break down into water and energy when food and water is scarce.
Two rows of long eyelashes and thick eyebrows help them to keep out sand and desert sun.
Narrow nostrils and hairy ears also help them to keep out sand.
Thick and tough lips help them to pick at dry and thorny desert plants.
Broad and flat feet, so they don't sink in the sand and walk easily.
They can go for a week or more without water. They can drink up to 32 gallons (46 liters) of water in one go.

Long legs protect them from sand heat.
Rarely sweat. Change their body temperature to avoid water loss through sweating.
They are well hidden. Their body colour helps them to blend into their environment.

Cactus

Cacti are perhaps the best-known desert plants. They have thick stems that store water with a protective covering that keeps the stored water inside. They also have sparse leaves that minimize evaporation. Some cactus species can go for two years without water.

Lizards

While some animals have developed ways of extracting water from the food they eat, or reducing water lost through evaporation, desert dwelling lizards don't drink water at all; they absorb it through their skin.

Black Throated Sparrow

Birds, like all animals, perish without water. Desert birds, however, make the most of very little. They tuck into the shade in the heat of the day, so they won't lose water in panting. They have extremely efficient kidneys, so they excrete almost no liquid. And they obtain moisture from foods, like nectar and fruit as well as insects and other prey. Even when eating primarily seeds, Black-throated Sparrows are able to extract enough water from this dry food that they may never need to take a drink.

Opportunities for Subject Integration:
Language Arts: New vocabulary/Research/Creative writing/Poetry
Mathematics: Measuring and recording data/plotting graphs/computing slope
Social Studies: Protection of the environment

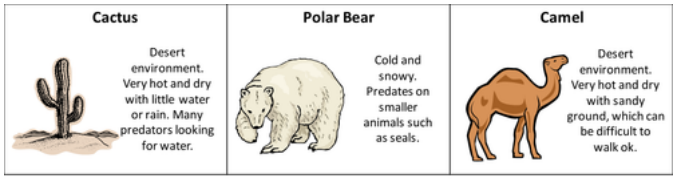
Strategies that Support the Curriculum and Assessment Framework
Elements of the Essential Education Competencies that are addressed:

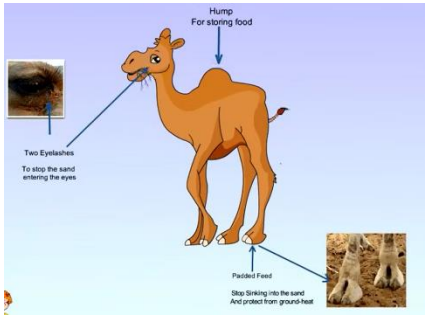
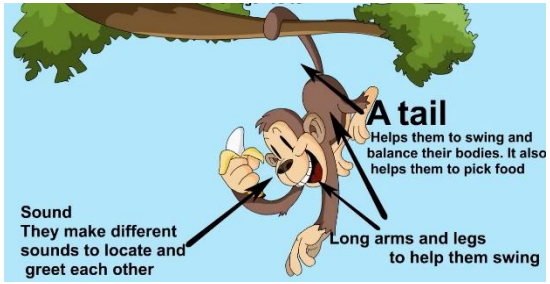
An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	Protecting community
Developed Critical Thinking and Ethical Communication Competencies	Investigating traits that allow for stable living in a specific environment
Developed Well-being Competencies	Care of the environment for human well-being
Developed Knowledge and Entrepreneurial Competencies	

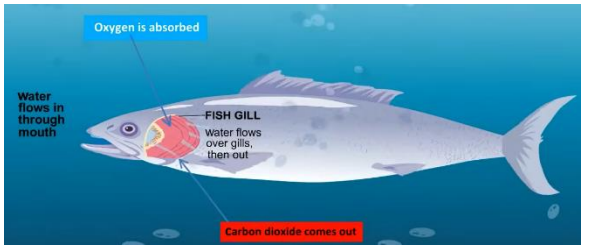
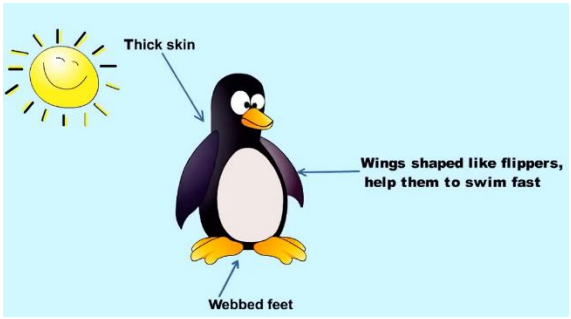
Elements from Local Culture, Technology, TVET, Environment that are integrated:
Items of Inspiration (teaching tips, inspirational passages, connections to educational research):

Science Grade 3

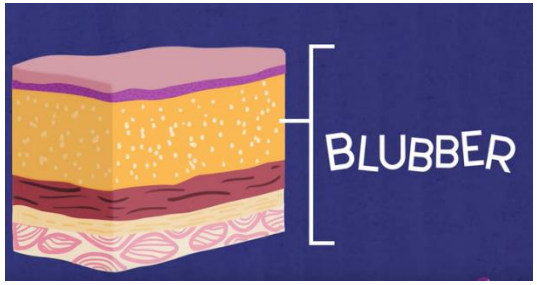
Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Inheritance and Variation of Traits: Life Cycles and Traits Studies of inheritance help students to understand the patterns we see relating parents and offspring in plants and animals. Fundamentally, genetics helps to explain what makes individuals unique and how attributes can be passed down between families of living things.
Essential Learning Outcomes: (ELO 4): Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Learners are expected to: **<u>Knowledge</u>** • Define the terms: o Habitat o Adaptation o Desert o Forest o Aquatic o Polar o Savannah o Camouflage o Spines o Manchineel tree	 Write the name of the correct organism next to its adaptation below: **Adaptation** / **Organism Name** Hump where fat and water can be stored where there isn't any available in the environment. Thick fur to keep the organism warm. Long roots which can grow deep in the ground to get at water below. Covered in pointy projections called needles to protect from predators. Strong teeth and claws. Long eyelashes to protect the eyes from sandstorms. Long hollow stem which is a great store of water. Specially shaped toes for walking in sand.	Students, do you ever wonder how penguins who live in the south pole are able to dive and swim in very cold water? It is because their bodies have adapted to their environment. Today we are going to investigate not just penguins, but also a host of animals and plants that have made amazing adaptations in order to survive. Animals live in a variety of home locations we call **habitats.** Many have adapted to better survive in the conditions that exist there. Have students watch these videos to learn more about adaptation. Teacher provides questions before the video is watched.

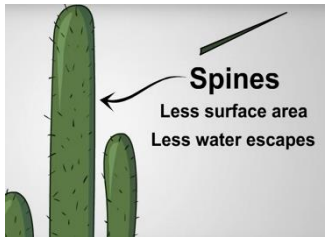
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
○ Predator ○ Prey ○ Reproduction ○ Offspring • Demonstrate they understand that adaptations help living things to survive. • Give examples of animals that have adapted. • Give examples of plants that have adapted. • Give reasons why living things might adapt given their environment. • Identify some features of organisms that allow them to survive in their homes /habitat (ST 1 LS ECS 4) • Identify and describe the main features of different animals found in their country (ST 1 LS ECS 9). • Identify and describe natural defenses that local animals use to help them survive (spines, camouflage etc.) (ST 1 LS ECS 12.)	Retrieved from: https://static1.squarespace.com **Why do you think this adaptation was necessary?** Divide students into research groups to do some research so they can respond to the following 1. Why does a crocodile have eyes high on its head? *(So that it can see above the water.)* 2. Why does a polar bear have thick fur and layers of fat? *(To keep it warm in the snow and able to swim in very cold water.)* 3. Why does an elephant have big ears? *(To help keep it cool in hot sunshine)* 4. Why does a shark have a white belly. (*Fish that are prey underneath the shark may not see it as the background sunshine shining on the water would camouflage the shark.)* **Why do you think they call this lizard chameleon?** Picture 1 on a branch: Picture 2 seconds later 	***Teacher note***: If you do not have access to technology, you may use the captured pictures to engage a discussion of adaptations. **Video 1** https://www.youtube.com/watch?v=LB8nLZmxN_M (adaptation) 6:19 mins Questions for students to consider as they watch: What adaptations has the camel made to survive in its **desert** habitat?  What adaptations has the monkey made to better survive in its **forest** habitat?  How have fish adapted to **aquatic** (under water) habitats?

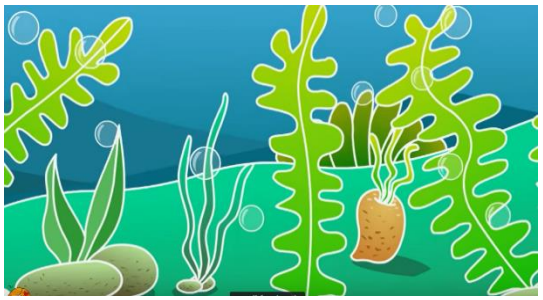
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Identify and name at least three characteristics of living things (ST 2 LS DC 4). • Explain how some features of organisms enable their survival in habitats (ST 2 LS ECS 5). • Discuss the importance of growth, development and reproduction in plants and animals (ST 4 LS SF 2). **Skills** • Observe carefully pictures of animals and hypothesize how their adaptations have helped with their survival. • Compare habitats and suggest how the conditions shape the adaptations of living things. • Rationalize the appropriateness of animals' body shapes that fit their daily needs. (e.g. birds' beaks) • Research adaptations living things in your own country.	 Retrieved from: https://www.youtube.com/watch?v=ioblgpA5eTo (3:01 mins) How might this adaptation be useful for survival? (*hiding from predators/ hunting for prey)* **Adaptations That Assist Birds: A Beak Experiment** Birds have a range of beak types, all for different purposes that fit their habitat and living condition. To understand the importance of matching a beak to the life survival of a bird, students will experiment with different simulated bird "beaks" to determine which beak is best for each food item. Students will use a toothpick, net, tweezers, spoon, scissors, and clothes pin to pick up various objects. The objects can be gummy worms, seeds, string, uncooked macaroni, grass, etc. Students will determine which beak works best for each food and why. **Adaptations Project** Students will be asked to do research on at least three living things (plants or animals) in their country that have clear adaptations to the Caribbean habitat. Students have a choice of a poster or PowerPoint ® to include the following:	 How have penguins adapted to **polar** (at the south pole) habitats?  Video 2: https://www.youtube.com/watch?v=fRX2JtKFUzk (adaptation) 2:20 mins Question for students to consider as they watch: What adaptations has the giraffe made to better survive in its **savannah** (grassland scattered with trees) habitat?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Communicate research findings through posters and digital expressions. • Distinguish definitions of predator and prey. **<u>Attitudes/Values</u>** • Appreciation of the diversity of habitats and the importance of humans protecting them. • Interest/Curiosity to investigate adaptations in living things. • Collaboration & Cooperation in research and communication of findings. • Stewardship/Respect for Living Things. • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges. • Participate actively in classroom discussions.	➢ Picture depicting clearly the living thing and its adaptation: 5 marks ➢ Description of the habitat: 5 marks ➢ Description of why the adaptation was necessary or helpful to the living thing. necessity of the adaptation: 5 marks **Plants That Adapt for Protection** Plants may have barbs, spines, thorns, irritating sap, poisonous fruit etc. to protect themselves against being destroyed by animals. Have students identify examples in their community of plants that have these properties, adapted for protection. **Plants That Adapt as Predators** Certain plants have adapted parts so they may actually attract, trap and digest insects. Have students do research on the Venus Fly Trap. Video resource here: https://www.youtube.com/watch?v=O7eQKSf0LmY (2:50 mins) **Reproduction and Local Bird Species** Many birds will have bright colors and exhibit dramatic behaviors in order to attract female counterparts to create offspring. Have students make a poster of all the colorful birds in their region. The teacher can designate a bird to each group to research for pictures and typical habitat. As an extended activity, students may search the internet for videos (to share in class) of courting behaviours of Caribbean birds.	 ➢ Long neck for eating off of tall trees.  ➢ Long, tough tongue to protect against thorns >  ➢ Spotted coat to hide it in the trees. When an animal has an outer body covering that hides it from possible predators, we say that they have **camouflage.** Many animals have adapted in their appearance by blending into the background. https://www.youtube.com/watch?v=YOIRci0CKzg (**camouflage**) 4:00 mins

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Demonstrate respect for plants and animals (ST 4 LS DC 2).	Example Frigate Bird. See: https://www.youtube.com/watch?v=dhX8TI1bcy4 (4:55 mins)   Adapted inflatable chest.  Many males trying to attract a mate.  Female Frigate bird looking for a good mate/nesting site	Students look at these examples from the video:      **Adaptation of Blubber Keeps Animals Warm: An Experiment to Demonstrate the Effect** Animals in the North and South Poles (e.g. penguins, seals, whales, walrus) have a layer of fat just beneath their skin that helps them keep warm! 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Adaptive Behaviors in Animals Around the world, animals are approaching humans more confidently. The improper disposal of garbage has many animals leaving their forest habits and venturing close to dumps and family homes. When surprised or alarmed these animals can be dangerous. As a class, the students could design an initiative to keep animals safely away from homes by managing garbage disposal in their communities. Example:  Retrieved from: https://youtu.be/iJoRl26eYrc	Experiment retrieved from: https://www.youtube.com/watch?v=_DQGAcqhkGs We can demonstrate how that fat can affect the heat transfer from our bodies to cooler places. We use sweaters and extra socks to keep our body heat; animals have blubber! Materials: • 2 bowls of ice water • 2 freezer bags • 3 cups of shortening 1. Place the shortening inside one of the freezer bags. 2. Put your hand inside the other empty freezer bag and force your covered hand inside the fat-filled first freezer bag.  3. Move the fat around so that it nicely covers your entire protected hand. 4. At the same time, thrust your fat covered hand in one bowl of ice water while simultaneously putting your bare hand in the other bowl of ice water.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		 Retrieved from: https://www.youtube.com/watch?v=_DQGAcqhkGs Students that try this, one after the other, will find a huge difference in what they feel on their hands. The fat covered hand will insulate them from the cold ice water the same way blubber insulates penguins from the cold outside temperatures. **Plants also Adapt** The following video gives examples of how plants adapt. Ask students to take note of these as they watch. https://www.youtube.com/watch?v=Mbj_WQ76F1Q (adaptation in plants) 7:02 mins These captures from the video can be used by the teacher.  Plants with leaves tend to lose water by evaporation. Cacti minimize this loss of water by having spines rather than leaves.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Cacti also have: ➢ a thick stem to prevent water loss. ➢ a waxy coating on the stem to help in the storage of water. ➢ A long and deep root system to gather water in lower parts of the soil. Plants in bodies of water have flexible stems to accommodate movement of water.  Water lilies have air space in their stems so that they are able to float on top of water.  Retrieved from: https://pixabay.com/illustrations/generated-water-lily-flower-plants-7574456/

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Plants in rainforests often have very large leaves to collect as much sunlight as possible.  Retrieved from: https://www.freepik.com Some plants have poisonous flowers or fruit to protect them from animals that may harm them. A good example is the **Manchineel tree**.  Retrieved from: https://www.britannica.com/plant/manchineel ***Interesting fact***: Manchineel trees are poisonous to birds but not Central and South America's striped iguana, which actually eats and lives among these trees. **Adaptations of Predator and Prey** Some predators adapt to better catch their prey. Have students guess how these predators have adapted?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Scorpion: (*sleeps during the day and roams at night nocturnal)* Cheetah: (*strong legs, very fast*) Octopus: (*changes colour to sneak up on prey*) Prey have adapted to avoid being eaten by would be predators. Students, can you guess how these prey have adapted? Tortoise: (*hides in its shell*) Gazelle: (*very fast runners*) Porcupine: (*has barbed spines that inflict pain when an animal touches*) Skunk: (*sprays a foul chemical on the attacking animal)* Venomous snake: *(has poison in its fangs that can kill a predator)* **Adaptations that Ensure Offspring**. Ask students why they think male birds are often more colorful than their female counterpart? (when male birds compete for a mate so they can have offspring the brightest bird may attract the female. Birds have adapted color and showmanship to gain the female mate's attention. This adaptation guarantees offspring and therefore survival. 

Additional Resources and Materials

Blubber Experiment: https://www.youtube.com/watch?v=_DQGAcqhkGs (2:55 mins)/ https://www.youtube.com/watch?v=92cAgXcabaE&t=177s (5:20 mins)

Camouflage as adaptation: https://www.youtube.com/watch?v=3TNv3t8Xl-4 (7:31 mins)/ https://www.youtube.com/watch?v=kGZX1_Zy-74 (5:14 mins)

Book Series Animal Adaptations: https://www.amazon.com/What-You-Animal-Parts-Book/dp/1338559052/ref=sr_1_5?crid=2R45QWG0V438X&keywords=what+if+you+had+-scholastic&qid=1704134209&sprefix=what+if+you+had+-scholastic%2Caps%2C88&sr=8-5

Adaptation Online Game: https://pbskids.org/wildkratts/games/avivas-powersuit-maker

Additional Useful Content Knowledge for the Teacher:

https://creativeclassroomcore.com/top-5-ways-to-teach-all-about-animal-adaptations/

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwimq4yE7ryDAxX1v4kEHTj-AwYQFnoECCsQAQ&url=https%3A%2F%2Fwww.thinktrees.org%2Fwp-content%2Fuploads%2F2019%2F07%2FPlant-Adaptations.pdf&usg=AOvVaw0mZ2dqwp2Ruq0Ttg-CfIQJ&opi=89978449

Opportunities for Subject Integration:

Language Arts:

- Read alouds on adaptations
  - https://www.youtube.com/watch?v=Xpn4s_zsfns (10:52 mins)
  - https://www.youtube.com/watch?v=tWV0SEnI7gc (9:33 mins)
  - https://www.youtube.com/watch?v=lJB28zSsbc0 (10:02 mins)
  - https://www.youtube.com/watch?v=5JRRS3rGMoU (9:30 mins)
- Research adaptations'
- Communicate research findings
- New vocabulary

Social Studies:

- Protecting habitats by understanding adaptations of animals/plants

Strategies that Support the Curriculum and Assessment Framework

Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework. It will be used to guide the writing but will not appear in the curriculum guides.

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	Protecting habitats
Developed Critical Thinking and Ethical Communication Competencies	Hypothesizing rational for adaptations
Developed Well-being Competencies	Protecting Health of animals based on respecting adaptations
Developed Knowledge and Entrepreneurial Competencies	

Elements from Local Culture, Technology, TVET, Environment that are integrated:

Mimosa pudica, commonly referred to as "sensitive plant" or "touch-me-not" has an adaption where is closes its leaves when touched. This is an adaption to protect it from herbivores. Children often play with this plant touching and waiting for it to reopen. They make this into a game.

There are an abundance of online simulations, games, interactive websites around the topic of adaptations.

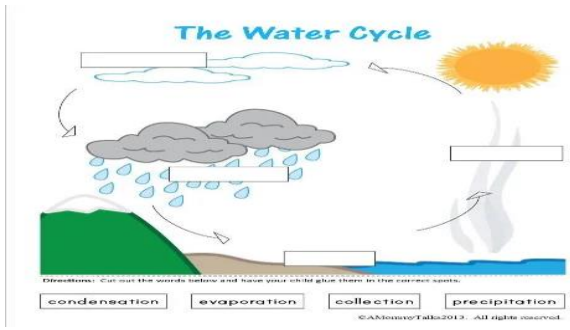
Items of Inspiration (teaching tips, inspirational passages, connections to educational research):

Science Grade 3

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Weather and Climate As surface and water temperatures rise, human, animal and plant life respond. Scientific studies document these responses. In doing so, science builds a foundation for understanding how our lives are impacted by climate change and what we can do to slow or reverse changes.
Essential Learning Outcomes: ELO-1 **Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.** [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document

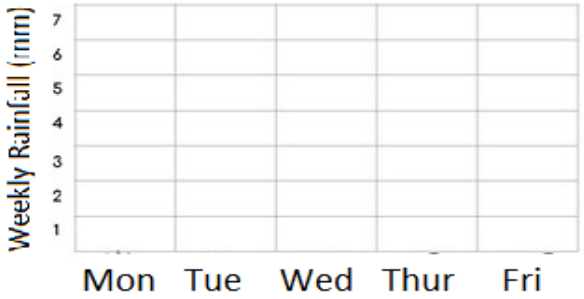
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

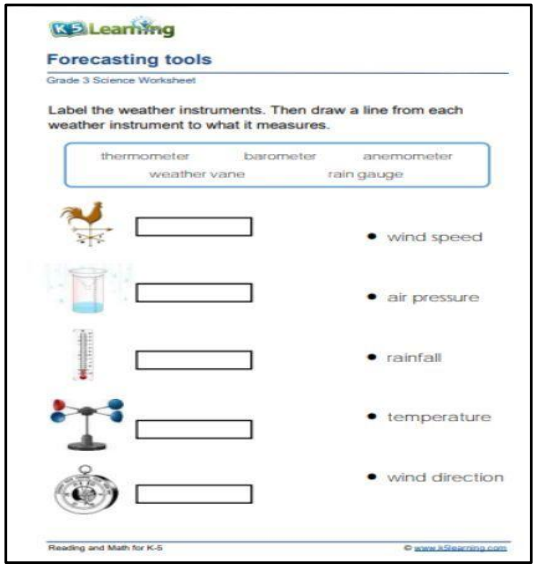
Learners are expected to:
 	
<u>Knowledge</u>
 	
● Define the terms:
  ○ Weather
  ○ Weather forecasting
  ○ meteorologist/ meteorology
	Review of the Water cycle
	
	Have students label the water cycle diagram below as a review.
		Importance of Weather Knowledge
		
		Teacher-led Discussion
		
		When you hear the word "weather" students, what does it mean to you? (*sunny, rainy, cloudy, windy etc.*)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
○ temperature ○ precipitation ○ wind direction ○ clouds ○ moisture/humidity ○ climate ○ atmosphere • Demonstrate an understanding of the formation of clouds. • Review and explain the components and processes involved in the water cycle. • Distinguish between weather and climate. • Identify and describe weather patterns at a particular time at a given time. • Identify instruments used to measure the elements of weather. • Demonstrate an understanding of how to use a) thermometer to measure the degree of hotness and coldness	 **Worksheet retrieved from:** https://ateachingmommy.com/water-cycle-free-printable/ **Terminology Review; Read Aloud Book** The following Read-aloud book introduces many weather words. It could be used as an introduction or a review of the lesson's terminology. Before the video begins, promote active listening by having them focus on the following terms and concepts as they watch the video. The teacher may want to put these questions on the chalkboard. Ask students to write down some new weather words they saw in the video. See: Weather Words by Gail Gibbons - Weather Read Aloud - https://www.youtube.com/watch?v=wVU31D2EmEE (7:53 min)	Students, have you ever heard the words "**weather forecasting**". It means to predict or make a good guess at what the weather might be in the future. The people who do this job of forecasting weather are called **Meteorologists.** Key questions to ask: 1) Why is important in our community to pay attention to weather data and weather forecasting/predictions? (*prepare for good weather- clothing, picnics; prepare for bad weather- storms, rainy season, hurricanes etc.*) 2) Which occupations in our community are often most reliant on good forecasting of weather? (*fishers, farmers, drivers, tour guides, pilots*) See more examples here: https://www.youtube.com/watch?v=LHINAlqxD6M (5:26 mins) **Review of the Water Cycle** Weather depends primarily on the water cycle. In grade 2 you learned about how water on earth is in a cycle. Some steps we should review:

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
b) anemometer to measure wind speed. c) rain gauge to measure the amount of rainfall. d) windvane to measure wind direction. **<u>Skills</u>** ● Identify types of weather conditions by examining weather charts. (ST 3 ESS EW 10) ● Investigate and report from data collected about the weather over a period, using simple graphs. (ST 4 ESS EW 7) ● Conduct a simple experiment to find out if the weather affects evaporation in natural settings. (ST 3 ESS ER 8) ● Communicate effectively results of weather experiments.	1. What weather vocabulary did you hear in the video? (*Sunny, rainy, humidity, temperature, air pressure, moisture, wind, dew, water vapor, cumulous clouds, sirius clouds, stratus clouds*) *2.* What types of weather was seen? (*rainy, cloudy, windy, stormy)* *3.* What is a definition of the word weather? (*condition of the atmosphere at any given time)* 4. What is the difference between weather and climate? (*weather refers to short-term changes in the atmosphere, climate refers to atmospheric changes over longer periods of time)* **Comprehension of Terminology** Place the following words in the proper blank in the sentences below. **Precipitation/sun/condensation/evaporation/clouds** 1. When water changes into water vapor and moves into the air, it is called ____. 2. When water vapor condenses in the atmosphere, it forms _____. 3. What happens after the clouds fill up with water vapor and become very heavy? 4. Energy for the water cycle on Earth comes from _____.	1) The liquid water molecules in lakes, ponds and rivers get enough heat energy from the sun that they begin to move further apart and become water in the gas form we call water vapor. This process is called **evaporation**. We say that the **air pressure from the weight of the atmosphere above the water,** affects the evaporation process. High pressure systems slow evaporation because water molecules can not easily jump into the air, whereas low air pressure allows the heat-energized molecules to jump into a vapor (gas) state quite easily. **Air pressure** is a result of the molecular collisions of the atmospheric gases above us and is measured with a **barometer.** 2) The water in gas form (vapor) rises into the sky, and as it cools in the higher atmosphere it loses energy, particles get close again and the water as gas (vapor) turns back to water as a liquid. We call that process **condensation.** 3) The liquid water molecules gather in clouds until they become so heavy, they fall to the earth again as rain. We call that process **precipitation**. 4) When the air is heavy with moisture, we say that it is **humid.**

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Analyze a table and bar graph and make predictions based on the average temperature, wind speed and precipitation in a particular area. **<u>Attitudes/Values</u>** • To work respectfully with others in exploring and investigating the weather. • Demonstrate a concern for weather conservation as well as protection of our clean water sources. • Describe the weather patterns that affect the activities of people and the effects they can have on our daily lives. Eg flooding, hurricanes, dehydration, sporting activities, drought. • Develop a curiosity of how air, temperature, moisture, precipitation, wind speed and direction make up the weather in a particular place and time. • Based on an understanding of the water cycle, show concern	5. What is the change of a gas to a liquid called? **Create a Journal That Tracks Weather and Creates Data Tables and/or Graphs** (such as histograms) Assign students to create a journal about their observations of the different weather patterns observed for a week using drawings and descriptions of the weather. They should also include (*temperature, wind direction, rainfall data)* ***Encourage them to use new words they have learned.*** **KEY** Sunny Windy Rainy Cloudy  **Mon** | **Tues** | **Wed** | **Thurs** | **Fri** | | | | | **Graphing Rainfall Data** **(***may be undertaken best during the rainy season?)*	**Measuring Data Related to the Weather** In order to **forecast** or measure the impacts of weather, we often use special devices to measure wind direction, rainfall quantities and temperature. These measurements help to give us a picture of the usual weather in our region. This is called **the climate.** Pupils will go to the following websites following instructions on how to make and use the various instruments to measure different weather conditions and explain how it is used. **Construction of Weather Instruments** ➢ How To Make a Rain Gauge Summer STEM Project: https://www.youtube.com/watch?v=Rh18GMwwV4M (2:58 mins) 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
for the protection of water resources, the effects of pollution and climate change. ● Work cooperatively with peers. ● Participate in classroom discussions. ● When conducting practical and group work., display sensitivity and offer assistance to peers who may have physical or learning challenges	Ask students to measure and record in a data table, the rainfall in their school yard using a homemade rain gauge. ***Each day they should empty the gauge so that it monitors the daily rainfall rather than the accumulated rain.*** At the end of the week, students use the data collected to plot a bar graph like the one shown below.  Answer the following questions using the information plotted on the graph. 1. On which day did they measure the most rainfall? 2. On which day did they measure the least rainfall? 3. What was the average rainfall for the week?	  ➢ How to make an anemometer (wind speed meter) https://www.youtube.com/watch?v=Af0LB3abBsk&t=23s (2:14 mins)  ➢ Make a Thermometer - STEM Activity https://www.youtube.com/watch?v=rtsq-l0AxbY (1:54 mins) **Materials:** • Clear drinking straw • Permanent markers • Ruler • Small bottle • Rubbing alcohol • Food coloring • Modeling clay • Dropper 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	4. If you left the water in the rain gauge through the week, how might evaporation in the sunlight change your data? (*loss of water on the sunniest days affects the correct daily amount*) **Matching the Forecasting Tool to the Desired Information** Worksheet below retrieved rom: Grade 3: Match The Tools With The Correct Names Worksheet (worksheetzone.org)  	**Field Trip /visit to Local Weather Station** • Field trip to the weather station to observe the different weather instruments that are used. • Pupils browse or look at the National Weather website of their island to learn how the meteorologist forecasts the weather. **How Do We Forecast Based on Cloud Types?** Clouds have many overlapping categories but if we focus on three we can begin to forecast weather. **Cumulous-** *puffy, wispy vertical movement > fair weather* 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Extended Learning: Evaporation Evaporation rates impact the water cycle and therefore weather. The liquid water molecules require energy to become water gas molecules (vapor). Answer the following true/false questions about this system. **True or False:** 1. Most evaporation took place on the hottest day. (*T*) 2. The least evaporation happened on the day with the lowest temperature (*T*). 3. The weather does not affect how fast water evaporates. (*F*) 4. High atmospheric pressure days make evaporation easier (F) 5. Low atmospheric pressure days often result in rainy weather. (*T*) **Preparing for Bad Weather Events** When we get a forecast of bad weather approaching our region, what do you see in these pictures below that we could prepare for? 	**Cirrus**- ***high*** *clouds > fair weather*  **Stratus-** ***low*** *clouds- contain water/ice > poor rainy weather*  **Cloud pictures retrieved from:** https://www.instructables.com/id/Predicting-Weather-with-Clouds/ **Setting Up Our Own Weather Station** After building their own weather measuring devices, the teacher should supply the students with a classroom chart table where each day (over a 1 month period) students measure and record the outside temperature, the wind direction (from which direction does it originate) and the rainfall.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

(*flood breaks-temporary sea walls, boats, protection against erosion, trees for windbreak, strong construction and water-tight roofing*)

Constructing a Warning Poster

Hold classroom discussions about safety during different weather conditions. Encourage students to share their experiences, questions, and ideas on how to stay safe during storms, extreme heat, cold weather, etc.

In groups have students prepare an information poster suggesting preparations.

It may take the form similar to the example below:

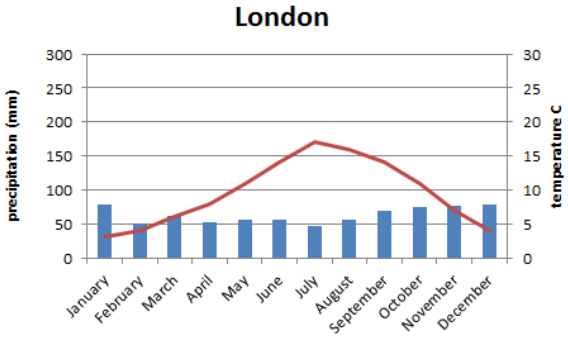
Day	Temp (deg C)	Wind Direction (from)	Rainfall (inches or cms)
Monday			
Tuesday			
Wednesday			

Interpreting Weather Data

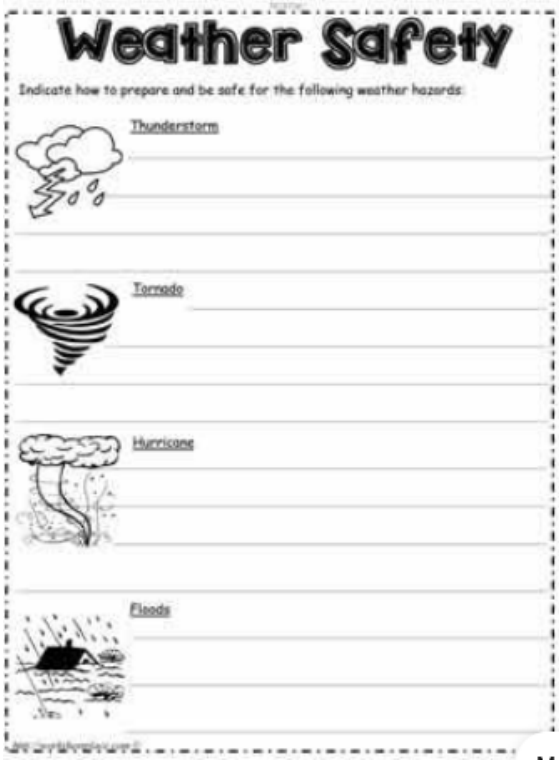
Activity One: Planning a Holiday

Tell students they are planning a holiday to London, England. Present to them, the weather graph below and pose the following questions:

a) If you were wanting to go to London at the warmest time of year, what would be a good month to choose? (*July*)
b) If you were hoping to see snow in London, what months would give the best combination of temperature and precipitation? (*December/January: lowest temperature and highest precipitation*)



Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies



Retrieved from:

https://www.pinterest.com/pin/606860118534168950/

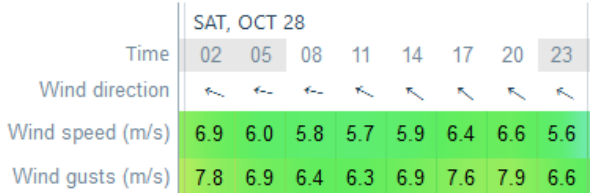
Data retrieved from:
https://mceegeogblog.wordpress.com/2012/11/30/london-climate-graph/

Activity Two: Precipitation Data

Give Students the Precipitation Table for Lima, Peru. below and ask the following questions:

Month	Avg Precipitation (mm)
July	1
Aug	1.5
Sept	0.7
Oct	0.2
Nov	0.1
Dec	0.2
Jan	0.8
Feb	0.4
Mar	0.4
Apr	0.1
May	0.3
June	0.7

a) What is the total rainfall for the year in Lima, Peru? (*6.4 mm*)
b) What are the driest two months in Lima? (*Nov/Apr*)
c) What is the average of the wettest three months in Lima? (1.0 + 1.5+ 0.8)/3= 1.1mm

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Data retrieved from: https://www.lima.climatemps.com/precipitation.php Activity Three: Wind in the Caribbean Provide the following table to students regarding the wind in Saint Lucia for a particular day (where the time in the table is a 24 hour clock- i.e. 02= 2AM & 23= 11PM)  a) What was the average wind speed for the day? (*6.11 m/s*) **b)** What direction did the wind blow from most of the day as represented in the table? (*from the south east)* **c)** In terms of wind gusts, what time of the day would a sailor need to be most careful? (*20 hrs or 8 pm*) Data retrieved from: https://windy.app/forecast2/spot/488863/St+Lucia

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Where Did the Rain Water Go? Students we know that on many Caribbean islands rain water is collected for use in the home. Philip had put a plastic bottle out in his front yard and noticed the first day it collected 2 mL of rain water. The second day his bottle had water up to the 5 mL mark. How much rain fell the second day? (5 mL- 2 mL = *3 mL*) On the third day it was bright and sunny and he noticed, at the end of the day, the bottle had water measuring up to the 3.5 mL mark. Where did the water go? (*it got enough heat energy from the sun to leap into the sky as water vapor (gas)* How much water had Philip lost? (*5mL – 3.5 mL = 1.5 mL)* If Philip wants to keep all the water he collects, how can he prevent it from evaporating? (*place the bottle in a shady spot where it doesn't get hot.*) ***Planning Our Lives Around Weat*her Forecasting:** Advantages and Disadvantages of weather conditions

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Teachers should have a discussion with students around the following questions: a) Why is rainy weather good or bad for us? (Good-*Washing and cooking*) (Bad- *Excess rainfall causes flooding, landslides, transportation services e.g., bikers, open vehicles*) b) What are some of the activities we can and cannot do during the rainy weather? (*planting crops, going to the beach*) c) How do we prepare for rainy weather? (*Umbrellas, coats, clear drains to prevent flooding, repair roofs, collect water in barrels and drums*) d) How do we harvest rainwater for drinking and for irrigation? (*barrels, eavestroughs*) **Severe Weather Conditions** Pupils are presented with these questions to answer as they watch the following Read Aloud on Severe Weather: https://www.youtube.com/watch?v=MBn-Sdqu66A (3:33 mins)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		1.What is severe weather? (*when calm weather turns violent*) 2. What type of severe weather was seen in the video? (*thunder, lightning, tornado, flood, hurricane, blizzard)* 3. What damage can a tornado cause? (*It can rip apart houses and move trees.)* 4. What damage can a hurricane cause? (*It can damage houses and power lines.*) 5. How can flooding affect us? (*It covers the roads, fill up basements and houses.*) 6. What is a blizzard? (*A severe snow storm, with strong blowing wind.*) **Teacher-Student Discussion:** 1) How do we prepare for severe weather

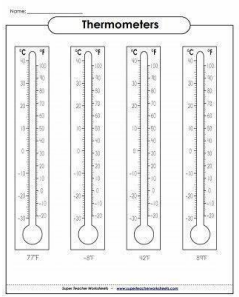
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		conditions**?** 2) Why is it important that we are prepared for extreme weather conditions? (*We need to prepare, so that people and animals can be safe.*) 3) How can we prepare for a hurricane? (*By moving to a safe area, listening to the weather report, collecting food, water, medicines, first aid kit etc*)

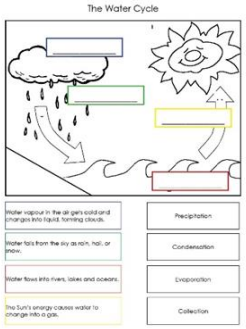
Additional Resources and Materials

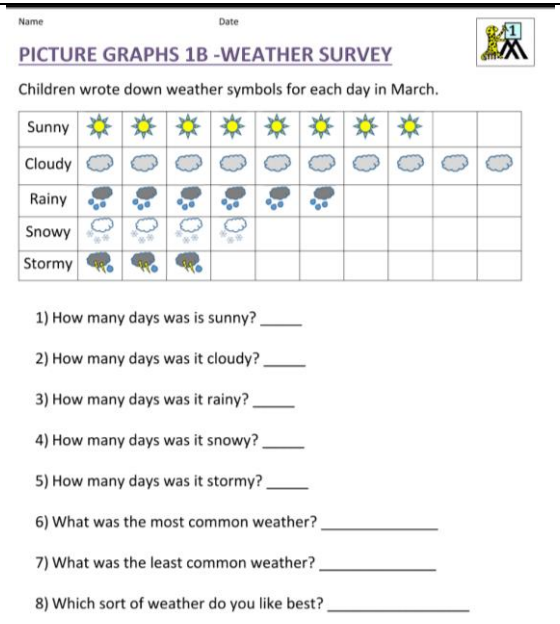
(Additional material and resources that are not included in the Inclusive Learning and/or Inclusive Assessment Strategies that may be useful for lesson planning)

https://images.app.goo.gl/La5ht184rPc2KXy66

https://www.k5learning.com/worksheets/science/grade-2-weather-instruments.pdf







https://th.bing.com/th/id/OIP.MvF8WB_3s1wJa2At3BL5LQAAAA?pid=ImgDet&rs=1

https://th.bing.com/th/id/R.6dd53d915d83bbef23bbfc023abc9da5?rik=8KIA4r6ivIoQXg&pid=ImgRaw&r=0

https://th.bing.com/th/id/OIP.3qxUDuKZXJ1mmTyWCAPSkgAAAA?pid=ImgDet&rs=1

https://cdn.slidesharecdn.com/ss_thumbnails/03how-do-clouds-form-170505174754-thumbnail-4.jpg?cb=1494006506

https://thumbs.dreamstime.com/z/weather-versus-climate-vector-illustration-educational-differences-diagram-nature-measurement-scheme-temperature-days-162882783.jpg

Weather Vocabulary

-Students will complete the weather journal below. Record the daily weather condition using drawings and answer the questions.

Encourage pupils to express their feelings about the weather.

https://www.teacherspayteachers.com/browse/free?search=weather%20journal

https://www.math-salamanders.com/image-files/free-bar-graph-worksheets-understanding-picture-graphs-1b.gif

Additional Useful Content Knowledge for the Teacher: (*any additional knowledge that the writers believe would be helpful for the teacher such as reading material at a lower or higher grade level, links to curriculum documents for other grades)*

Pupils create a model of the water cycle using the instructions below.Make a Miniature Water Cycle Model | STEM Acti vity (sciencebuddies.org)

Teacher print poster for each pupil

https://thumbs.dreamstime.com/z/weather-versus-climate-vector-illustration-educational-differences-diagram-nature-measurement-scheme-temperature-days-162882783.jpg

Opportunities for Subject Integration: *(Additional ideas about how the inclusive learning strategies might be adapted and/or applied to include other subjects in the curriculum)*

Elements that are integrated across subjects:

- **Mathematics:** Use simple bar graphs to show the amount of rainfall over a certain period of time .
  Use a bar graph to show average temperature over a period of time.

  Use graphs to record their observations of weather conditions.

- **Language Arts:** Vocabulary, Reading comprehension (poem/stories) on weather and weather patterns.
  Listen to weather reports, record and share information.

- **Social- Science:** The importance of the daily study of weather

  Recognizing and discussing weather conditions in different parts of the island.

- **HFLE:** Use emotions to show different weather conditions.

- **Elements from Local Culture, Technology, TVET, Environment that are integrated:**

Strategies that Support the Curriculum and Assessment Framework

Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework It will be used to guide the writing but will not appear in the curriculum guides.

Elements of the Essential Education Competencies that are addressed:

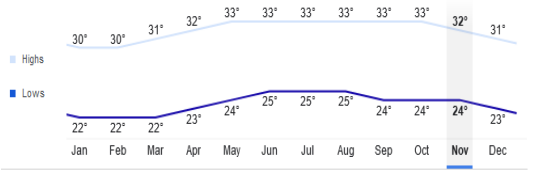
An educated person in the OECS will demonstrate they have:	**Where might this competency be promoted/developed in this learning outcome and associated lessons?**
Developed Citizenship Competencies	Appreciate the work of meteorologists in the study of weather.
Developed Critical Thinking and Ethical Communication Competencies	Recording, predicting and analyzing weather patterns.
Developed Well-being Competencies	Assisting others to prepare for adverse weather patterns.
Developed Knowledge and Entrepreneurial Competencies	Use and understand the instruments used by meteorologists in gathering information on different weather patterns.

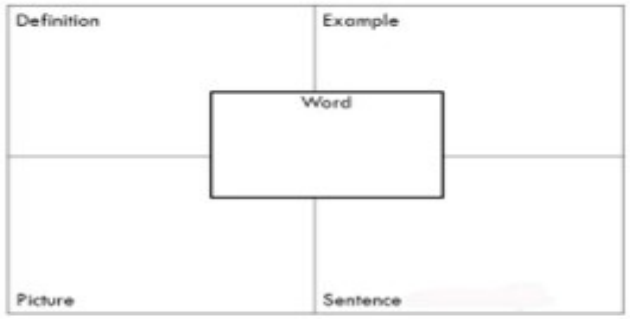
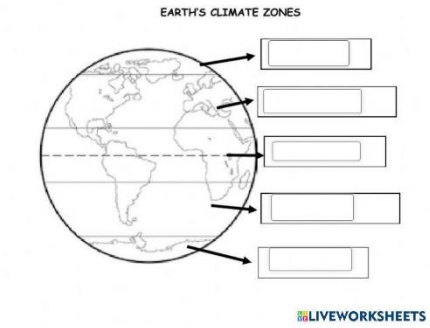
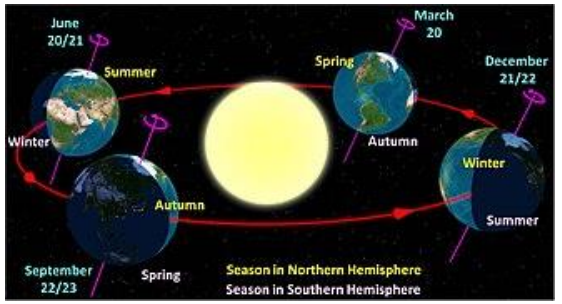
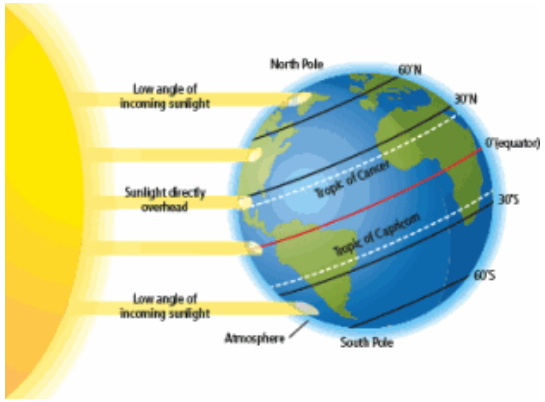
Items of Inspiration (teaching tips, inspirational passages, connections to educational research)

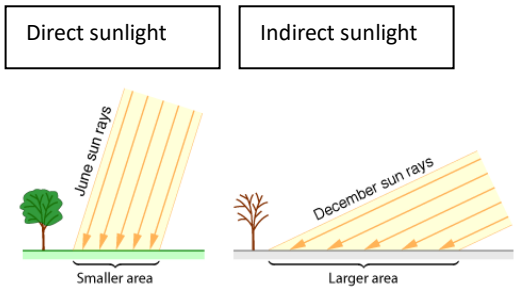
Science Grade 3

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it
Strand (Topic): Weather and Climate As surface and water temperatures rise, human, animal and plant life respond. Scientific studies document these responses. In doing so, science builds a foundation for understanding how our lives are impacted by climate change and what we can do to slow or reverse changes.
Essential Learning Outcomes: (ELO-2) Obtain and combine information to describe climates in different regions of the world.
Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

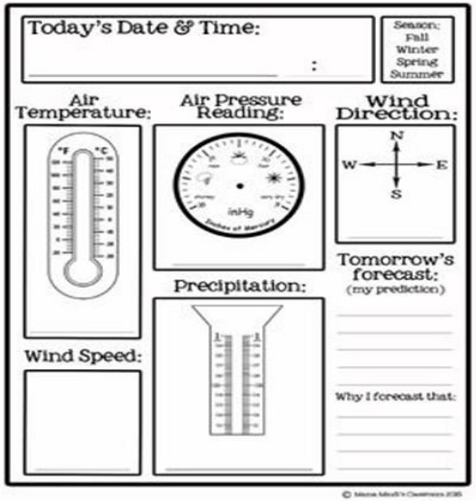
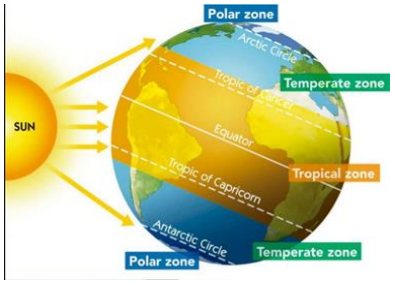
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
Learners are expected to: **<u>Knowledge</u>** ● Define the terms: o Equator o Season o Tilt o Rotate o Orbit o Northern Hemisphere o Sothern Hemisphere o Direct sunlight o Indirect sunlight	**Introductory Questions** True or false? a) The earth circles the sun in 365 days. (T) b) The difference in seasons in the North and South hemispheres is caused by the distance from the earth to the sun during those seasons. (F) c) The equatorial countries get nearly the same heat energy from the sun year-round. (T) d) The tilt of the earth as it rotates around the sun causes the sun's heat rays to be direct in some	**Introductory Discussion** *Why is the daily outside temperature so consistent in the Caribbean?* Students, you live in a part of the world near the **equator** (the imaginary line that divides evenly the earth between the south/north poles), that has very consistent temperatures throughout the year. Example: Dominica temperatures

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
○ Climatic zones ▪ polar/frigid ▪ temperate ▪ tropical/torrid ○ North /South pole ○ Climate ○ Weather ○ Temperature ○ Rainfall ○ Pressure ○ Wind Speed ○ Humidity ○ Greenhouse effect ○ Global warming ○ Carbon dioxide ● Identify and name the sun, earth and the moon as parts of the solar system. (ST 1 ESS SS 2) ● Explain, what is weather. (ST ESS EW 1) ● Describe how temperature affects weather (ST ESS EW 8) ● Explain the role of the sun as the main provider of heat and light on the earth. (ST 3 PS EN 2) ● Identify and discuss some of the unintended consequences of	parts of the earth while indirect for others, thus causing temperature differences. (T) e) Climate is a measure of average weather data over a period of time. (T) **Review of Water Cycle** Have students draw a picture and explain how the water cycle of evaporation and condensation lead to humidity in the air. ***Challenge question*** Students, look at the picture of the sun shining at the earth on a tilt**.** Why does Australia have summer temperatures when Canada has winter temperatures**.** **(***When the southern hemisphere is pointing more directly at the sun, the northern hemisphere is getting indirect rays from the sun.***)** **Frayer Square-**add weather and/or climate to the center	 You may have friends or relatives or seen movies that depict temperatures in the north and south that have a much bigger range. In fact, that range may be so large that they experience very cold temperatures and snowfall! My question for you is why does that happen? It is a common misconception that in the summer we are closer to the sun than the winter so distance isn't the reason for temperature change over the seasons. Look at this picture of the earth as it faces the sun. What we notice right away is that **the earth rotates on an axis that is tilted (24 hours per rotation-one day).** That means that as the earth **orbits** around the sun (once per year), that the sun's energy is approaching different places on the earth at a different angle.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
using fuels for transport and production of materials for commerce. (e.g. pollution). (ST 3 PS EN 5) • Sustainable use of resources would help to minimize pollution and destruction of the environment. (ST 3 STSE 1) • Describe and discuss how burning can cause air pollution. (ST 6 ESS ER 4) • Define the terms: rotate, revolve, planet, star, satellite.(ST 3 ESS SS 2) • Explain how the tilt of the earth on its rotational axis can cause the sun's rays to be direct and indirect for different parts of the earth and therefore lead to temperature changes on the surface (seasonal changes) • Demonstrate an understanding that the earth is divided into three major climatic zones. • Discuss the characteristics of each type of climate.	**Frayer Model (Four Square)** Reinforcing Vocabulary  **Label the Climatic Zones**  **Retrieved from:** **https://www.liveworksheets.com/w/en/social-studies/1162764**	 Retrieved from: https://en.wikipedia.org/wiki/Earth%27s_orbit  Retrieved from: https://www.bing.com/images/search?view=detailV2&ccid= Imagine you had a torch (flashlight) and you decided to shine it on a table at different angles; it can make circles or ovals (try it!). Below is a

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
. • Compare the different types of climates. • Identify the plants and animals that can be found in each climatic zone. • Explain how people adapt to live in the different climatic zones. • Explain in simplified terms the process of global warming. **Skills** • Observe different types of weather --rainy, sunny, cloudy windy. (ST 2 ESS EW 1) • Use a thermometer to measure temperature, explaining how the device works. (ST 3 ESS EW 9) • Identify types of weather conditions by examining weather charts. (ST 3 ESS EW 10)	Complete the table using the phrases below *Short term, observed daily, long term, changes often, observed over time, changes within months or year.* Weather | Climate **Characteristics of Climate Zones** Activity 1 Identify the climate zone for each description. Zone | Description This climate zone is so cold that most precipitation is frozen. This climate zone is hot in summer and fall and warm in winter. Winters are cold and summers are hot here. People in this zone see both rain and snow during the year. Summers are cool or cold in this zone. Parts of this zone have heavy rains; other parts have dry and rainy seasons. ence/9482 a collage	picture of the sun's rays hitting the earth at different angles. In this picture from the **Northern hemisphere** (the half of the earth above the equator), you can see that the energy of the sun is spread out much more in December so people at that location would get less heat energy at any one spot compared to someone in June of that year where the light energy is more concentrated and shines more directly on that location.  Retrieved from: http://science8sc.weebly.com/direct-vs-indirect-rays.html 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Compare direct and indirect light using a flashlight (torch) to show how the sun's energy can be spread out if it shines on the earth at an angle. • Interpret models of the earth and sun and how they interact in the universe. (daily rotation, yearly orbit, earth's axis & tilt) • Predict weather patterns. (ST 2 ESS EW 4) • Analyse weather events. • Use the weather cycle to explain how/why humidity occurs. • Design and construct a project to learn how we can reduce climate change. **Attitudes/Values**	Guided by the teacher, students engage in an online interactive labelling activities of the climate zones. https://www..com/w/en/social-science/1649618 **https://wordwall.net/resource/31522862/climate-zones-1** **Animals in Different Climates** Retrieved from: **https://wordwall.net/resource/893234/geography/climate-zones** **Activity 2** **Circle the correct answer.** 1.This animal is found in the frigid zone. (polar bear, agouti) 2. This animal is found in tropical / torrid zones. (penguins, snakes) 3. Why is the torrid/ tropic zone the hottest? (The sun's rays on this zone are direct.)	Retrieved from: https://physics.weber.edu/schroeder/ua/SunAndSeasons.html But, if you look back at our first picture, you will see that sun **shines directly on the equator** (circle) the entire year, so we get all the energy all the time. Anybody the lives in the **Southern Hemisphere** (the half of the earth below the equator) or the **Northern Hemisphere** (above the equator) will experience periods of the year where the sun's light is **direct** and **indirect** (on an angle). This means less heat energy when the light is indirect and therefore colder temperatures! **The Climatic Zones** Ask students what they may have seen in books or in the media about different weather patterns (climates) in the world outside the Caribbean. List their observations associated with different climates on the board as a mind map of prior knowledge. Now students, we are going to watch two videos that help us put climates in categories. Video #1:

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Develop appreciation for Science by recognising how climate affects our daily lives. • Willingly participate in activity to identify the climate of different regions of the world. • Recognise the effects of climate change in a region of the world and take the necessary actions to reduce the effects of climate change. • When undertaking classroom activities, display sensitivity to and offer assistance to peers who may have physical or learning challenges. • Participate actively in classroom discussions. • Consider the dilemma of abundant fossil fuel resources and the damage burning these will inflict to our environment.	**Recording and Reporting the Weather** Students should collect the daily weather data using a template as shown below and then report the weather to the school over the intercom or in a school newspaper.  Retrieved from: https://i.pinimg.com/originals/4c/a8/c9/4ca8c918a9fd67a50784e86cf22b6eba.jpg **Sharing Weather Data-Pen pals** Write a letter to your friend who lives in another climatic zone or region, inviting him or her to collect weather data such as temperature, rainfall and wind speed. Create a data table or chart and use a graph to show how different or similar the climate data is. As a class project, you could collect data from penpals all	As you watch the following video **https://www.youtube.com/watch?v=C1cUEXmDXgc (9:23 mins)** I want you to pay particular attention so that you can answer the following question s when it is finished. *1)*What are the three major types of climate zones mentioned in the video ? (*polar/ frigid, temperate and tropical)* 2) Which climate zone is very cold? (*Polar zone*) 3) Why is this region of the earth very cold at certain times of the year? (*the sun's rays are indirect because of the tilt of the earth so less heat energy reaches the pole*) The teacher can project or draw the following picture to reinforce the concepts. 

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	over the region and the world to do comparisons. **Creative Writing/Creative Arts** Assessment #1 Students are posed the task of drawing/labeling a picture of a climate that includes the words, weather, rain, heat, humidity, wind, and pressure. The teacher will look for indications that the words are used in the correct context. (*comprehension measure*) *Rubric* All words included 5 points Understanding of words evident 5 points Clarity of picture 5 points Assessment #2 Task students to create a postcard to depict the different climates around the world. N.B Learners could choose one climatic condition to display on their postcard. Include country, climatic zone and people/animals. *Rubric* Evidence of climate in picture 5 points Possible country labelled 2 points Climate Zone properly labelled 3 points	Retrieved from: https://www.bing.com/images/search?view=detailV2&ccid=4XdgcBv7&id=7651997D098DEA793C0DBE485C690BF1651199AB&thi Video #2 As you watch the following video (https://www.youtube.com/watch?v=Kp7ZhvJXrMc 11.31 (mins.**)** I want you to pay particular attention so that you might be able to answer the following questions: 4) What type of clothing do scientists and explorers wear when they visit the Polar Climate? (*warm snow suits)* 5) What type of animals can be found in the polar climate? (*polar bears, reindeers, penguins, killer whales etc.*) 6) What type of fruits are in the temperate zone? *(apples, strawberries, peaches, tomatoes etc*)

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Assessment #3 Using the free programme "Bloom" (see: https://bloomlibrary.org/landing have students work together collecting online pictures to create a book and story about travel to different temperate zones, clothing, food, weather etc. **Debate on Climate Change** Students will be asked to develop arguments for pro/con around climate change as a result of fossil fuel use. The central questions: ➢ New discovery of oil reserves in the Caribbean and neighboring South America could bring prosperity in the form of jobs and cheaper energy to fuel vehicles and power production. ➢ Burning fossil fuels contributes to the production of carbon dioxide which in turn seals the heat of the sun into our atmosphere. This global warming affects surface temperatures and water temperatures so could have detrimental effects on the ecosystems. ➢ The teacher should use the following table to assess participation of students in this discussion.	7) What type of animals can be found in the tropical climate? (*rabbits, snakes, lions, tigers, gorillas, monkeys etc.)* 8)What type of clothing do people wear in the temperate zone? (*thick clothing in the winter and light clothing in the summer*.) **Weather and Climate** Ask students how weather and climate are different? ***Climate*** is the average temperature and rainfall of an area over time whereas weather is the current conditions. **Weather Report** Tell students that they should imagine that they were travel agents and were therefore responsible for giving clients accurate information about climate in various parts of the world. This requires that they learn about climate and why we see different temperature/climate zones. Have students observe the following pictures of different climates.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

Group checklist

	Yes	No	Comments
1. Did everybody participate?			
2. Did anybody feel left out?			
3. Were all members contributing?			
4. Did one person dominate discussions, or cut others off?			
5. Was there any argument? How was it resolved?			
6. Did everybody know what they had to do?			
7. Are you satisfied with the work you have done (so far)?			

Retrieved from::

https://www.semanticscholar.org/paper/Managing-Small-Group-Learning.-Reid/0abd4ba230de054b3016ce1eb10569f22dff278a/figure/4

Visitors to Other Climates

Play a game called "Pack my Bag". Children describe to their peers what clothing they would pack in a suitcase to visit another part of the world. Their peers have to guess which climatic zone they are likely to be going to.

Can you name a region or part of the world with the climate seen in any of these pictures? (

1st picture.- North pole (Canada/Russia/ Iceland)

2nd picture (Switzerland/France)

3rd picture.-(Tonga, Caribbean)

Have students do research and for each picture identify:

a)The likely temperature in June.
b) The clothing typically worn in June.
c)The animals that thrive in these climates.

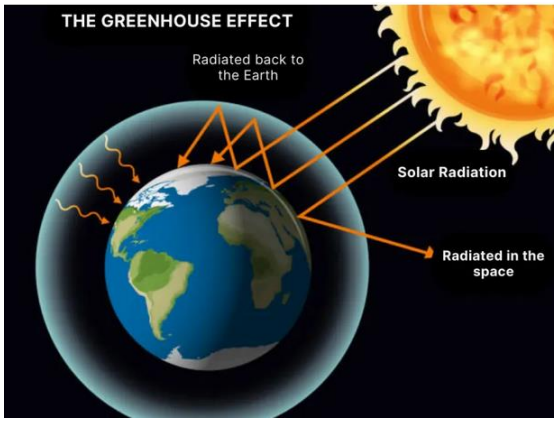
Weather Reporting (Review of Instruments)

Listen to a weather report on television or the radio or read a report in the newspaper. What type of information do they usually give us?

Temperature- measured with a thermometer.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Protection Against the Sun's Rays In certain climates near the equator, the sun's rays are direct and intense. It is very important that we protect our bodies against too much sun! Our skin and eyes can be particularly susceptible. Have students do research (books and internet)and answer the following questions: 1) What danger is the sun to our skin? 2) What danger is the sun to our eyes? 3) How can we protect our skin? 4) How can we protect our eyes?	*Rainfall*- measured with a rain gauge (volume in mL) *Pressure*-measured with a barometer) ➢ Low pressure means evaporation happens easily and condensation later forms clouds that can drop rain) ***Extended learning***: when pressure is low and temperatures are high, there is a lot of water evaporating and it places significant water in the air. In these instances, we would say there is high **humidity**. These days can be quite uncomfortable in the Caribbean! ➢ High pressure means that water molecules do not have enough energy to form water vapor. Evaporation from lakes and rivers is less likely and therefore rainfall from condensation-is less likely-good weather! *Wind speed and direction*- anemometer **Weather Events: Example: Dominica** Pose the following questions that students should answer as they watch the following video about a weather event in Dominica. **https://www.youtube.com/watch?v=0lXaELMiN7s (Mins 6:55)** 1. What was the first thing that caught

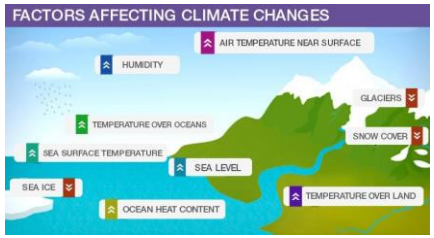
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		your attention? 2. Where did this weather event take place? 3. What type of weather condition was it? 4. What types of damages did you see? 5. How did you feel about the people 6. What did they have to go through? 7. Could they have prevented the damages? 8. How would you help the people? **Climate change and global warming** There is evidence that the earth overall has higher temperatures. This has been referred to as "global warming" and is caused by something called the greenhouse effect. (The **greenhouse effect** is defined as when the Earth's atmosphere becomes thick with **gases** and substances which trap the sun's radiation, as it reflects off the earth and back upwards. making the Earth warmer). One of the greenhouse gases is **Carbon dioxide**, a gas produced when we burn fuels in our stoves or cars. Everyday functions of the body like digesting your food, moving your muscles or even just thinking, need oxygen. When these processes happen, a gas called carbon dioxide is produced as a waste product. The job of your lungs is to provide your body with oxygen and to get rid of the waste gas, carbon dioxide. There are also gases such as water vapor, methane and ozone that trap the heat from the sun.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Notice in the picture how the radiant heat from the sun is reflected by gases down to the surface. This increase in surface temperature can kill plants and animals.  Retrieved from: https://sigmaearth.com/effective-ways-to-manage-the-greenhouse-effect/ **Using a Simulation to Show Surface Temperature** Use the following simulation to show children what happens in this process by increasing the clouds and watching what happens to the reflected energy from the sun. See: https://phet.colorado.edu/en/simulation/legacy/greenhouse

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Discuss with students what citizens can do to prevent global warming. (e.g. *burn less fossil fuels, produce less gas/ smoke from burning in cars and factories*)

Additional Resources and Materials

[The Inspired Classroom: Clouds Pt 2](#) **Clouds by altitude flapbook**



Retrieved from: https://cdn1.byjus.com/biology/2018/04/23102819/Factors-Affecting-Climate-Changes.jpg

Climate Zones of the Earth | Weather and Climate | Types of Climate Zones

https://www.liveworksheets.com/w/en/social-science/679383

https://www.studyassistant.org/wp-content/uploads/2022/11/Climate-Zone-2.pdf

https://www.k5learning.com/worksheets/science/grade-3-biomes-c.pd

Cardboards, maps, crayons, markers, globe, flashlight, scientific journals, library book, internet access, newspapers, television and radio to listen

to weather forecasts, Styrofoam balls, strings, paste, map of the world/ globe, etc.

Weather story book

https://www.youtube.com/watch?v=kj3T19kKPig

8:11 mins)

Weather story book

https://www.youtube.com/watch?v=ba9Jot0wix0

(4:33 mins)

Types of climate

https://www.youtube.com/watch?v=iA23Sm-HI4I **(5:15 mins)**

Additional Useful Content Knowledge for the Teacher: (

• Weather is the state/ appearance of the atmosphere in a particular location over a short period of time.

• Climate is the average weather of a place over a long period of time. Climate is influenced by temperature, precipitation, humidity and pressure.

• Climate can be used to predict what the weather will be in a given location during a particular season, but short-term observations of weather cannot be used to draw conclusions about climate.

• The major factors that affect climate are: Latitude, Altitude (height of region), Terrain/Topography, Oceans and water bodies and Earth's tilt.

• Different regions of the Earth have different climates. These regions are called climatic zones/regions.

• Latitude affects climate by influencing the intensity of the sun in a region. The angle and duration of the sun's energy determine surface temperature so that higher latitudes receive less heat, but lower latitudes closer to the equator receive significantly more heat.

• Based on latitude, the Earth is divided into three general climate zones: arctic zones, tropic zones and temperate zones. The arctic zones tend to be snow and ice - covered year-round though they often receive no more precipitation than deserts. The tropic zone, on both sides of the equator, receives the most sunlight and generally experiences warm weather and seasonal rainfall. The temperate zone, between the arctic and tropical zones, has the most diversity of weather.

The climatic zones:

- Polar - very cold and dry all year

- Temperate - cold winters and mild summers

- Tropical/ Torrid/Hot Zone - hot and wet all year

Opportunities for Subject Integration:

• Language Arts: Writing - learners write letters describing the climate of the location in which they live. Reading – read the letters written

for the class.

• Mathematics: Graphs- representing weather conditions of locations investigated on bar graphs, pictographs, pie charts etc.

• Expressive Arts: Creativity- designing post cards, storybooks, anchor charts, maps etc.

• Social studies: Place- determining the weather and climate of a place. Identifying how climate affects the activities of people living in a particular place. Protecting our climate by reducing the causes of global warming.

• TVET: Homes and clothing are designed for people in the various zones to live comfortably.

Strategies that Support the Curriculum and Assessment Framework

Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework. It will be used to guide the writing but will not appear in the curriculum guides.

Elements of the Essential Education Competencies that are addressed:	
An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?
Developed Citizenship Competencies	Protecting the environment against global warming.
Developed Critical Thinking and Ethical Communication Competencies	Accounting for the differences in climate on the earth.
Developed Well-being Competencies	Protection from the sun's rays and also pollution.
Developed Knowledge and Entrepreneurial Competencies	How to portray climates that might be inviting for travellers.

Elements from Local Culture, Technology, TVET, Environment that are integrated:

On holidays with sunny weather, families usually go the beach or participate in river "limes".
Salting and drying of meats and fishes is a popular food preservation method that relies on the sun.
Coconut oil and cocoa industries are heavily reliant of sunny days for the drying of the crops as part of the processing.

Items of Inspiration (teaching tips, inspirational passages, connections to educational research):

Science Grade 3

Introduction to the Subject: The study of science encompasses knowledge, processes and values. Scientifically literate persons will foster an attitude of caring not only for themselves, but as responsible citizens, for the world around them. Their decision making will be enhanced by a systematic study of the structure and behavior of the physical and natural world through observation and experiment. In learning science, students benefit from leveraging and evaluating available technological tools to study and therefore understand the world and their relationship to it

Strand (Topics):

Weather and Climate

As surface and water temperatures rise, human, animal and plant life respond. Scientific studies document these responses. In doing so, science builds a foundation for understanding how our lives are impacted by climate change and what we can do to slow or reverse changes.

Engineering

A foundation in engineering design encourages students to formulate a wide range of solutions to problems that arise from everyday phenomena. This helps them to develop critical thinking skills which will prepare them for the many careers that invoke problem solving strategies.

Essential Learning Outcomes: (ELO 3 Weather /ELO 1 Engineering)

Weather: Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

[Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]

Engineering: Define a simple design problem reflecting a need or a want that includes specified criteria for success and

constraints on materials, time, or cost.

Grade Level Expectations: Refer to grade level expectations at the beginning of this curriculum document.

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<tr><th>Specific Curriculum Outcomes</th><th>Inclusive Assessment Strategies</th><th>Inclusive Learning Strategies</th></tr>
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Learners are expected to:

<u>Knowledge</u>

- Define the terms:
  - weather events
  - hurricane
  - typhoon
  - tornado
  - drought
  - erosion
  - landslides
  - land-borne floods
  - sea-borne floods
  - tsunami
  - pitch roof vs. flat roof
  - gable roof vs. hip roof
  - levee

- Discuss how the various weather patterns affect their activities, the type of clothes they wear, and ways of dealing with various weather types. (ST 1 ESS EW 4)
- Explain a problem in their own words and solutions related to the problem. (ST 1 TE UT 3)
- Define the term environmental destruction and investigate the factors that cause and prevent this destruction. (ST 2 LS ECS 24)

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Present students with a *Cause* and *Effect* table to complete

Fill in the effects, example:

Cause	Effects
High Temperatures	
High winds	
Heavy rain	
Lack of rain	

Design Prediction

A family is moving to the Caribbean where there is potential for hurricanes. What type of house would you suggest that they build. Concentrate on advising them on roof design.

Design Challenge

Engineers design solutions to solve real problems.

You are going to do an experiment to decide how to best plug a hole in the retaining wall that protects your house from the overflowing brook beside your property.

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What are Weather Events in the Caribbean?

Students, I read in the newspaper the other day that "weather events" have caused millions of dollars of damage in the from of "**environmental destruction**" in the Caribbean. If we break down the words environmental destruction, it must mean that somehow our environment (the world around us) is destroyed or changed in some way.. We are going to look at ways that can happen. What do you suppose they meant by the terms "weather event"?

When we think of normal weather patterns that contribute to our climate they include rain, wind, and temperature. But an event means something more drastic or surprising.

When winds are more than usual, what do we call them? (*storms, hurricanes, typhoons, tornados*)

Typhoon definition: a tropical storm in the region of the Indian or western Pacific oceans.

Tornado definition: a mobile formation of rotating winds having the appearance of a

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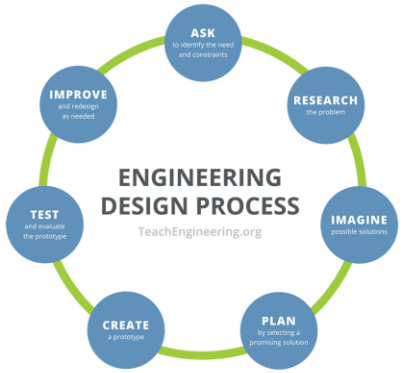
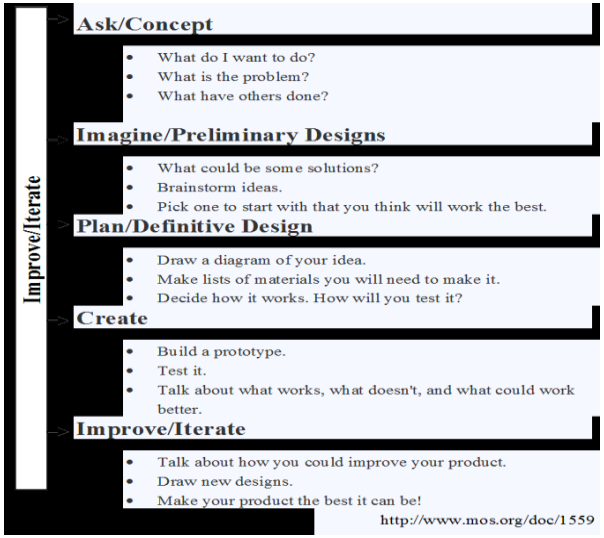
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies

• Develop simple technological designs in keeping with particular challenges in their environment (ST 2 TE TM 2)
 	
• Explain a problem in their own words and solutions related to the problem. (ST 2 TE TM 5)
 	
• Explain in their own words, how the effects of the wind may be useful and harmful. (ST 3 ESS EW 4)
 	
• Plan and execute appropriate research using technological methodology, to solve environmental challenges. (ST 4 TE TM 1/ ST 4 TE NT 1)
 	
• Knowledge acquired and products developed in the search for solutions to human problems and challenges affect everyday life, the society and the environment. (ST 4 STSE 1)
 	
• Explain the difference between weather and climate. (ST 5 ESS EW 1)
 	
• Use problem solving, technological processes and resources to find solutions to human wants and needs. (ST 5 TE TM 1)
 	
• Demonstrate an understanding of the term weather event and identify how
	To model this real-world problem, you will need the following items.
	
	• two Styrofoam cups
	• a liter container of water
	• sample blocking agents
	  ○ a sheet of paper towel
	  ○ a piece of kitchen sponge
	  ○ a piece of polyester fill or fabric
	• a measuring cylinder or graduated cup
	• a timer
	
	Procedure
	
	1) use a pencil to poke a hole in the bottom of one of the Styrofoam cups.
	2) place a small piece of paper towel over the hole on the inside of the cup.
	3) place this cup with the hole inside the cup without a hole.
	4) have your friend time 30 seconds while you ½ fill the inside cup with water.
	5) withdraw the inside cup from the outside cup and measure how much water went through the paper towel-blocked hole in 30 seconds.
	6) Repeat steps 1-5 with the kitchen sponge and then the polyester fill/fabric.
	7) Make a data table of material and volume to compare which of your three samples was most effective at blocking the hole. i.e., the least amount of water went through to the second Styrofoam cup
		funnel-shaped cloud and advancing beneath a large storm system.
		
		When our rainfall is more than usual what do we often see? (*overflow of rivers & streams, flooding*)
		
		When our rainfall is less than usual we may experience something called **drought** where the extreme lack of rain can cause crops to die**.**
		
		With more wind and rain we also often see higher tides and erosion near water.
		
		These could all be called **weather events** because they involve effects that go beyond the usual weather patterns in our communities.
		
		Recognizing the Problem Created by Weather Events
		
		Students, because we experience weather events in the Caribbean as a semi-regular occurrence, we can actually prepare to limit the damage caused.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
severe weather impacts people's lives and occupations. • Describe how people can modify their homes and other structures in the community to reduce the impact of weather events. • Describe how different materials can be used to prevent damage from weather events (roof design and materials. **<u>Skills</u>** • Interpret from pictures, the different types of weather events and the problems these events cause for humans. • Predict possible solutions to weather event problems. • Infer the best design and materials for roofing of homes and other buildings. • Collect data on the impact of flooding on rivers and floodplains. • Conduct an experiment that simulates testing by engineers (hole in a retaining wall)	Engineers would use a range of materials to attempt the very same experiment on a retaining wall that protected our homes from flooding! To solve problems, they use the design loop.  The teacher may choose to do other challenges and using the worksheet below as a planner for the design process. 	I want to show you some pictures and ask you to brainstorm how we might prevent some of the damage that is implied in the picture. (*seawalls, diverting water, reinforcing river banks, drain pipes)* Picture 1: Erosion on the Beach  Retrieved from: https://www.globalresiliencepartnership.org/laborie-saint-lucia-a-caribbean-fishing-village-navigating-the-turbulent-waves-of-a-changing-climate/ Picture 2: Flooding Due to River Overflows 

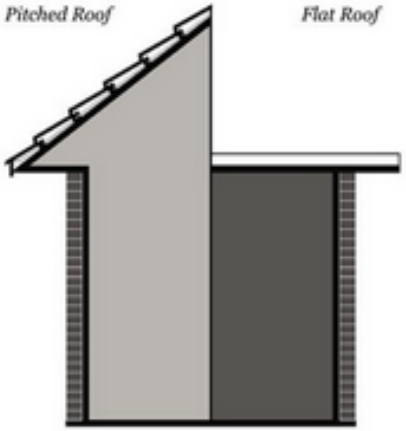
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
• Plan and design solutions to reduce the impact of severe weather in the community. **<u>Attitudes/Values</u>** • Participate in community support when weather events pose hazards to citizens. • When conducting practical and group work, display sensitivity and offer assistance to peers who may have physical or learning challenges. • Work respectfully with others to share ideas and materials for solution designs to combat the impact of severe weather. • Actively participate in classroom discussions.	Retrieved from: https://www.teachengineering.org/lessons/view/umo_challenges_lesson01 **Recognizing Weather Hazards from Weather Events** **Weather hazards** Grade 3 Science Worksheet swirling snow destruction dangerous temperature powerful lightning precipitation floods A weather hazard is _____ weather that can hurt people. Severe thunderstorms bring _____ and heavy rain. They can cause flash _____. Tornados are strong, _____ winds. Hurricanes are the largest, most _____ storms. Their wind, rain, and waves can cause flooding and _____. Blizzards bring so much _____ that homes can be buried. A heat wave is when the _____ is higher than usual for two or more days. Drought occurs when there is not enough _____. Which kind of severe weather occurs where you live? _____ _____ How do people where you live prepare for it? _____ _____ Retrieved from: https://www.k5learning.com/worksheets/science/grade-3-weather-hazards-b.pdf	Retrieved from: https://www.iwnsvg.com/2016/11/29/houses-destroyed-as-rains-trigger-floods-across-st-vincent/ Picture 3: Landslide  Retrieved from: https://caribbean.loopnews.com/content/dominica-persons-affected-floods-and-landslides-be-relocated Picture 4: Drought 

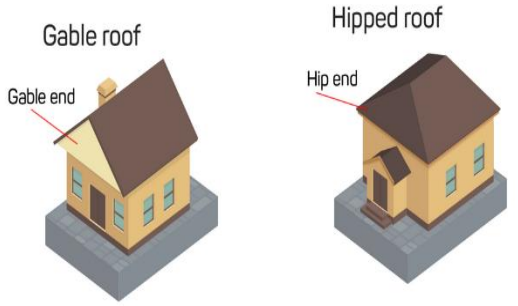
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
	Problems in Your Community-Extended Project 1) Due to excessive rainfall in your community, the nearby waterways overflow and flood the community, destroying homes, farms and animals. Design and construct a structure that will protect the community from floods. Students work in groups and use the engineering design approach to propose a solution to the problem. 2) Tall buildings in the community have been hit by lightening and are at risk of catching fire. Investigate the use of lightening rods as a way of protecting those buildings. Students work in groups and use the engineering design approach to propose a solution to the problem. 3) The beach has suffered significant erosion due to the tidal surge accompanying recent storms. The loss of beach front is detrimental to homeowners and the tourist industry as well. Students work in groups and use the engineering design approach to propose a solution to the problem.	Retrieved from: https://knowledge.unccd.int/sites/default/files/country_profile_documents/1%2520FINAL_NDP_Grenada.pdf **Who do these weather events affect in our communities?** Ask children to respond to the prompts: Road conditions- *drivers in the communities* Fields affected by landslides or drought- *farmers* Beaches affected by tidal erosion- *tourism* Buildings impacted by winds- *homeowners & businesses* **Weather Hazards** A weather hazard is a problem caused by an unexpected weather event. Divide the students into small groups. Give each group to do research and answer two questions. 1) What causes the weather hazard and 2) How do communities try to prepare for these weather hazards?

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Landslides The term landslide includes slides, falls, and flows of unconsolidated materials. Landslides can be triggered by earthquakes, volcanic eruptions, soil saturated by heavy rains or groundwater rise, and river undercutting. Earthquake shaking of saturated soils creates particularly dangerous conditions. If the teacher has internet access, they may show the following video. https://www.youtube.com/watch?v=THyt_Irnk1Q (11:23 mins) ***Flooding*** Two types of flooding can be distinguished: (1) **land-borne floods**, or river flooding caused by excessive run-off brought on by heavy rains, and (2) **sea-borne floods**, or coastal flooding, caused by storm surges, often exacerbated by storm run-off from the upper watershed. **Tsunamis** are a special type of sea-borne flood that are often caused by earthquakes that rapidly change the sea level through movement of the ocean floor.

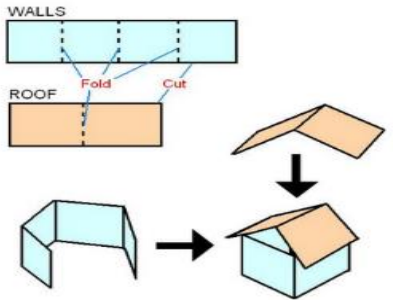
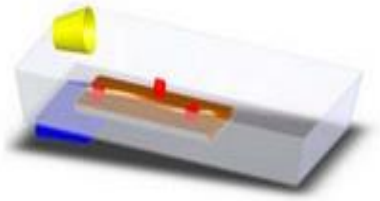
Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		If the teacher has internet access, they may show the following video. https://www.youtube.com/watch?v=6Z725peAOzI **(8:09 mins)** ***Hurricanes*** Hurricanes are tropical depressions which develop into severe storms characterized by winds directed inward in a spiraling pattern toward the center. They are generated over warm ocean water at low latitudes and are particularly dangerous due to their destructive potential, large zone of influence, spontaneous generation, and erratic movement. If the teacher has internet access, they may show the following video. https://www.youtube.com/watch?v=sKvjWTBQMpE **(8:32 mins)** **Drought** Extreme lack of rain in nay country causes the soil to dry up and the plants to get insufficient water to grow. The plants then usually wilt and die. Sometimes farmers will attempt to keep their plants alive by using **irrigation systems.** These are artificial ways of

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		transporting water from one place to another place where it is needed. If the teacher has internet access, they may show the following video. https://www.youtube.com/watch?v=k_avUa_schk (1:49 mins) **Weather Events in Other Parts of the World** Ask students to view the following picture and predict the problems that are likely to arise from excessive snowfall.  Retrieved from: https://www.outlookindia.com/international/thick-blanket-of-snow-covers-parts-of-england-photos-269190 ➢ slippery roads for walking or driving, ➢ poor visibility for walking or driving.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		➢ heavy power lines break & cut electricity. ➢ dangerous travel for emergency vehicles ➢ cold weather & danger of frost bite **Best Designs for a Roof: Teacher-led Discussion** Students, I want to show you two designs for a roof on a home.  Retrieved from: https://www.brickworks.com.au/articles/home/nine-advantages-pitched-roofs-have-over-flat-roofs/ If it rains very hard, which roof do you think would be least likely to leak? *(the pitch roof would be better because the water would run off whereas the*

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		flat roof may even hold water for a long time and therefore could leak through) When you look at these two pictures of the Gable roof and the Hipped roof. Which of these two do you think would be better for resisting the wind in a hurricane? (*the gable roof allows the wind to blow from the end and cause damage whereas the hipped roof pushes the wind to the top with no exposed ends*)  Retrieved from: https://www.iko.com/na/document-library/ A roof can be made from several different types of materials. If you could choose between a shingled roof (tiles, wood shingles, or asphalt shingles) or a metal roof, which do you think would provide the most protection against a hurricane? And Why? (*all types of shingles would be susceptible to the wind*

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		lifting the shingle from the edge. The metal roof has fewer exposed surfaces and would therefore resist the wind better.) Teacher note: if you have any samples of shingles, you might bring them to class to show students)  Retrieved from: https://alphabuilt.com/residential/roofing-materials/ **Floodplain Activity Teacher Demonstration** Adapted from: https://www.teachengineering.org/activities/view/cub_natdis_lesson07_activity1 In this activity the teacher will demonstrate with a model the impact of water flow in a narrowing river. The activity is meant to demonstrate two things:

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		1) the flow rate in the river has an impact primarily at the point of the narrowing and, 2) a wall or levee can help to prevent overflow at the narrowing and thus protect against damaging of homes. The students will begin by making 6-10 models of houses that will be placed on the floodplain of the river using the template below.   Figure 5. Activity set up, ready for testing.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		The teacher will make a model of the floodplain using an aluminium pan (with the end removed) covered with plasticine as shown below. The entire model can be placed in a plastic tub (as above) to collect water as it runs out the bottom of the model. A narrowing of a river.  The students will place 6 constructed houses on the riverbank. With the upper end of the tray leaning on a book, the teacher will pour water carefully down the river from the top of the tray. *Trial 1:* Pour a half cup of water slowly through the narrow section riverbed model. Have students record their observations and the number of damaged houses as their data for the trial. Have them remove any damaged houses. This trial shows that with a modest amount of water, it flows through the narrow river section without overflowing the riverbed.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		Trial 2: Clean up any excess water in the tub. Replace any damaged houses with new ones placed on the same position, as marked on the clay floodplain. Have students pour one cup of water through the rivers bed quickly. Have students record their observations and the number of damaged houses as their data for the trial. Have them remove any damaged houses. This trial demonstrates water overflowing at the narrow point of the river when there is an increase in water flow. *Trial 3:* Clean up any excess water in the tub. Replace any damaged houses with new ones placed in the same position, as marked on the clay. Have the students on the team build clay **levees** (piece of raised clay or small clay walls) around the narrow portion of their river. Again, pour one cup of water quickly through the river, as in Trial 2. Have students record their observations of what happened this time and the number of houses damaged. This trial shows that the river overflows on the downstream side of the levees. ➢ This activity can be differentiated by having students create similar models and do trials themselves. ➢ This activity can be extended by experimenting with different types of rivers as shown below.

Specific Curriculum Outcomes	Inclusive Assessment Strategies	Inclusive Learning Strategies
		  See trial descriptions here: https://www.teachengineering.org/activities/view/cub_natdis_lesson07_activity1

Additional Resources and Materials

Use of multisensory activities and materials to assist all learners Spray bottle (to test designs), scissors (several to share), Markers (enough to share), Large, shallow plastic storage container or other basins (optional), Assorted roofing materials: 1 roll paper towels, leaves, Fabric scraps, aluminum foil squares, 3" x 3", straws, popsicle sticks/other suitable material, Other materials of your choosing, Several rolls of tape, Cardboard, newspaper, charts of weather patterns, pictures of weather patterns.

Additional Useful Content Knowledge for the Teacher: (*any additional knowledge that the writers believe would be helpful for the teacher such as reading material at a lower or higher grade level, links to curriculum documents for other grades)*

Severe weather is any destructive weather phenomenon. The term is usually used to refer to severe thunderstorms and related storms, such as tornadoes, hail, and downbursts. Unlike normal weather, severe weather does not happen as much. Most severe weather, like hurricanes and severe thunderstorms, happen in the summer. Winter storms are also kinds of severe weather, and these happen in the winter. Severe weather affects our daily activities and the environment.

https://www.google.dm/books/edition/Weather_Patterns/Zn1mDwAAQBAJ?hl=en&gbpv=1&dq=weather+patterns+and+their+effects&printsec=frontcover

https://en.islcollective.com/english-esl-worksheets/weather-conditions-crossword/9672

Opportunities for Subject Integration: *(Additional ideas about how the inclusive learning strategies might be adapted and/or applied to include other subjects in the curriculum)*

Literacy: Vocabulary – building word list and decoding new words relating to weather, listening to peers as they share information about design solutions, speaking, reading passage about weather hazard,

• Mathematics: Geometry – shapes of materials for the construction of models, angles – arranging materials at different angles to complete designs; Measurement – measuring materials at required lengths for the construction of models.

• Social Studies: Weather and climate – the impact of weather on our daily activities and the environment.

• TVET: Creativity in designing solutions to combat the impact of severe weather. Awareness of solution designs in other parts of the country and the world. For example, replanting trees in the environment to act as windbreaks, building single story houses in hurricane areas.

Strategies that Support the Curriculum and Assessment Framework *Note: This section is intended to assist writers as they check the curriculum to the Curriculum and Assessment Framework It will be used to guide the writing but will not appear in the curriculum guides.*

To ensure all children achieve high standards

• *To provide feedback to parents/carers*

• *To identify areas where improvement is needed*

• *To monitor attainment against national targets*

• *To demonstrate effectiveness of teaching*

• *To improve teacher practice*

• *To support continuous professional development*

• *To promote good citizenship*

• *To encourage self reflection*

Elements of the Essential Education Competencies that are addressed:

An educated person in the OECS will demonstrate they have:	Where might this competency be promoted/developed in this learning outcome and associated lessons?

Developed Citizenship Competencies	Being helpful as a citizen when natural disasters linked to weather occur.
Developed Critical Thinking and Ethical Communication Competencies	Interpreting from pictures the nature of weather event and its impacts
Developed Well-being Competencies	Being vigilant and careful when weather events may cause risks in the community
Developed Knowledge and Entrepreneurial Competencies	Understanding the engineering process serves design thinking and problem solving careers

Elements from Local Culture, Technology, TVET, Environment that are integrated:

There are companies within our the region that sell prefabricated homes that are hurricane proof.

links: https://www.drmprefab.com/zine/economy-news/hurricane-impact-in-the-caribbean-and-hurricane-proof-homes

https://www.topsiderhomes.com/bahamas-and-caribbean-home-building.php

Items of Inspiration (teaching tips, inspirational passages, connections to educational research):