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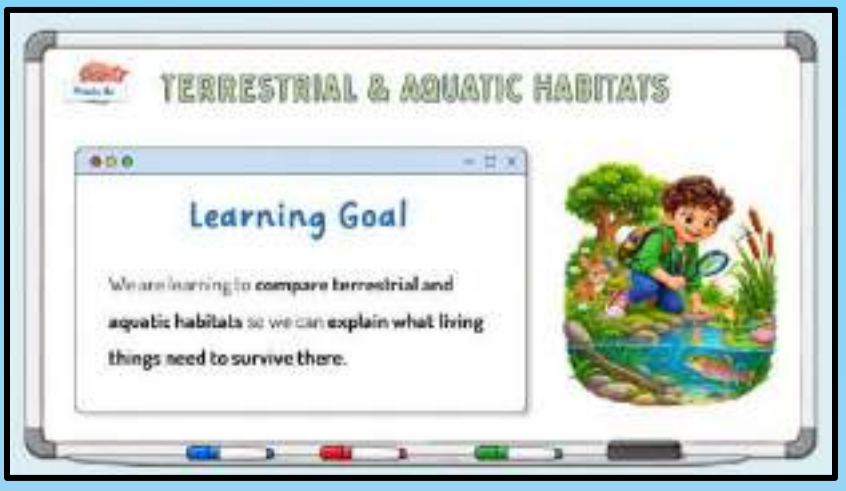
Ontario Science Curriculum

Habitats & Communities– Grade 4

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!





Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!



Ontario Science Curriculum

Habitats & Communities– Grade 4



Ontario Science Curriculum

Habitats & Communities– Grade 4



Workbook Preview

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Grade 4 Science – 2022 Curriculum

Habitats and Communities

	Curriculum Expectations	Pages
B1.1	assess positive and negative impacts of human activities on habitats and communities, while taking different perspectives into account	148-150, 152-165
B1.2	analyse the impact of the depletion or extinction of a species on its habitat and community, and describe possible actions to prevent such depletions or extinctions	146-147, 151-153, 157-161
B2.1	describe habitats as areas that provide organisms, including	9-15, 26, 29-30, 2-88, 6
B2.2		29-30, 0-82, 9
B2.3	decomposers	102
B2.4	demonstrate an understanding of a food web as the interconnection of multiple food chains in a natural community	103-105, 107-130
B2.5	describe how animals are categorized according to their diet, and categorize various animals as carnivores, herbivores, or omnivores	131-134
B2.6	describe structural adaptations of a variety of plants and animals and how these adaptations allow the organisms to survive in specific habitats	40-50, 54-61, 63-73, 77-81, 83-85, 89-96, 146-147
B2.7	explain why all habitats have limits to the number of plants and animals they can support	137-145

Preview of 100 pages from this product that contains 240 pages total.

Grade 4 Science Unit

Strand A - STEM Investigation and Communication Skills

	Curriculum Expectations	Pages
A1.1	use a scientific research process and associated skills to conduct investigations	16-17, 24-25, 31-33
A1.2	use a scientific experimentation process and associated skills to conduct investigations	16-17, 27-28, 62
A1.3	use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems	18-20, 31-33, 62, 135-136
A1.4	follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials	16-20, 27-28, 31-33, 135-136
A1.5	communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes	16-20, 27-28, 135-136
A2.1	write and execute code in investigations and when modelling concepts, with a focus on producing different types of output for a variety of purposes	21-23, 36-38, 51-53, 106
A2.2	identify and describe impacts of coding and of emerging technologies on everyday life, including skilled trades	21-23, 39
A3.1	describe practical applications of science and technology concepts in their home and community, and how these applications address real-world problems	24-25
A3.2	investigate how science and technology can be used with other subject areas to address real-world problems	24-25, 34-35
A3.3	analyse contributions to science and technology from various communities	24-25, 35

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HABITATS AND COMMUNITIES



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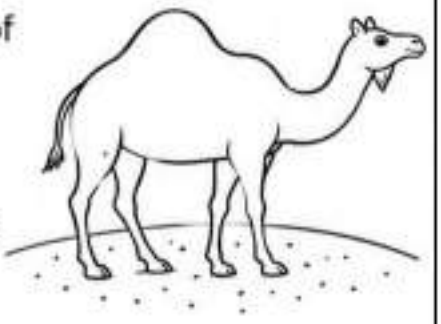
Name: _____ 9

Curriculum Connection
B2.1

Terrestrial and Aquatic Habitats

What is a Habitat?

A **habitat** is the place where an organism or a community of organisms live. An **organism** is a single plant or animal. Therefore, you are an organism.



A **sp** is a group of organisms. Yes, humans are a species, a single organism.

Co is a group of different species that live in the same area (habitat). This you in a community with other humans, other animal species like dog quirr as plants.

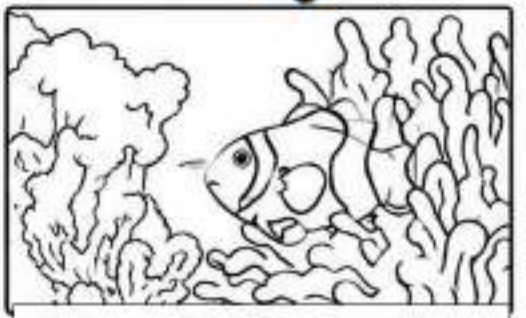
Habitats provid needs e organisms that live there. For example, humans live in ar ere w and where water can be found. No humans live in Antarctica becaus abitat rctica does not give the basic needs humans need to survive.

PREVIEW

Two Main Types of Habitats

1) Terrestrial Habitats

Terrestrial means land, which means that a **terrestrial habitat** s on land as opposed to in water. There are 4 main habitats within the te al category of habitats. They are forests, deserts, grasslands, and mountains.



Saltwater Habitat – Coral Reef

2) Aquatic Habitats

Aquatic habitats are places organisms live in water. There are 2 main types of aquatic habitats – freshwater and saltwater habitats. Freshwater habitats include lakes, rivers, and wetlands. Saltwater habitats include oceans, seas, and estuaries.

Name: _____ 10

Curriculum Connection
B2.1

Definitions

What do each of the terms below mean?

Organism	
Species	
Community	
Habitat	

PREVIEW

Questions

Answer the questions below using evi[illegible]om the

1) Can any organism live in any habitat? Explain.

2) What is the difference between a freshwater and saltwater habitat? Give examples of both.

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Curriculum Connection
B2.1, B2.2

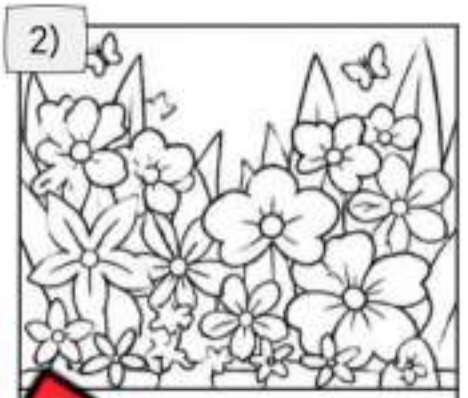
Organism, Species, Community, Habitat

Label Is the picture an example of an organism, species, community or habitat?

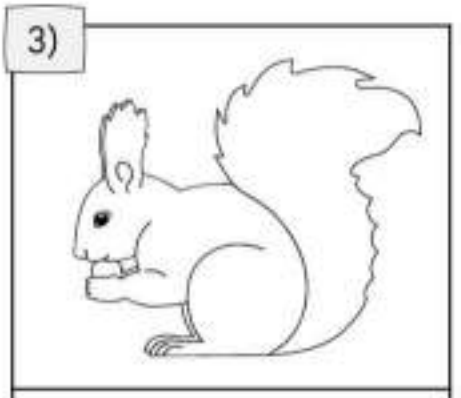
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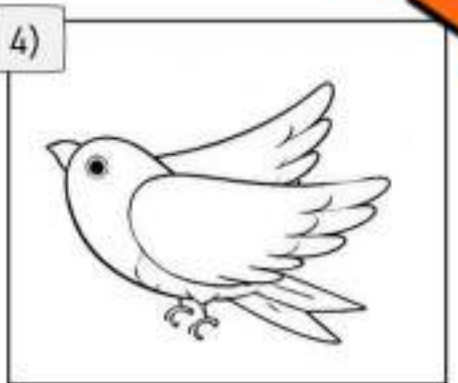
2)



3)



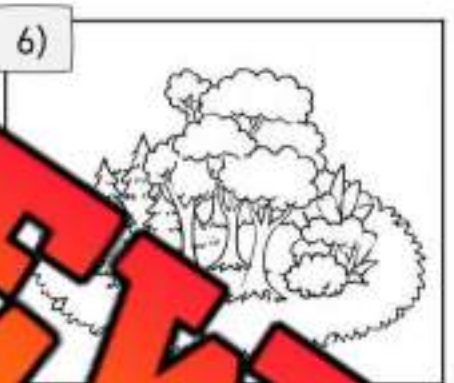
4)



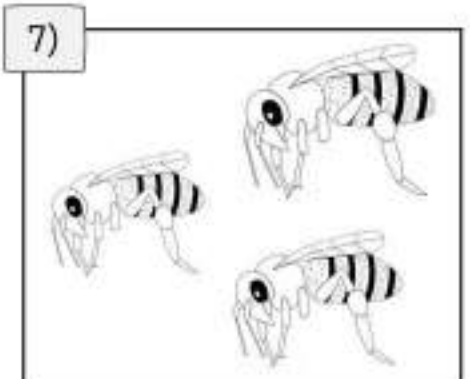
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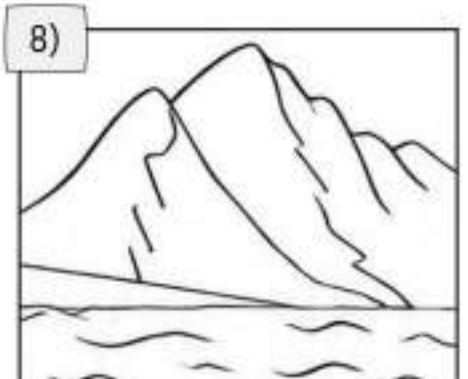
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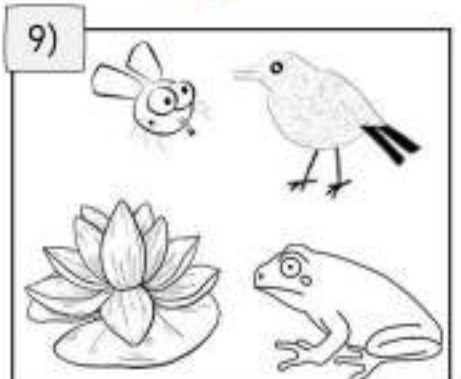
7)



8)



9)



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Name: _____ 14

Curriculum Connection
B2.1, B2.2

Tracking Animals – Animal Tracks

Tracking Animals – Animal Tracks



Humans aren't the only ones who leave evidence of their actions as they move around. Just like we can analyze the footprints of humans, we can also track animals based on the animal tracks they leave in th[illegible]und. An **animal track** is an imprint left in the soil, snow, mu[illegible]r ground surface by an animal walking across it. An[illegible]are[illegible]by hunters to track their prey and by naturalists to identify animals [illegible]a give[illegible]

If the an[illegible]s a cle[illegible] the species of the animal can be determined based on the combi[illegible]n of [illegible]features of the feet. Some features we can look for in an animal trac[illegible]

- Width/length – A fox print is much s[illegible]han a [illegible]rint
- Number of Toes – Bears have five toes, whil[illegible]es a[illegible]ave four
- Nails – Canines tend to leave a nail print while felines don't since they can retract their nails.
- Depth – The heavier the animal, the deeper the print will be. A moose track will be deeper than a deer track.
- Webbing – Webbing is usually found on animals that swim a lot in the water
- Stride and Straddle – The stride length can set animals apart. A stride is measured from the heel of one print to the heel of the next print on the same side. Straddle is the width of the steps taken. It is measured from the outside of the right track to the outside of the left track.

PREVIEW



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Name: _____ 15

Curriculum Connection
B2.1, B2.2

True or False

Is the statement true or false?

1) Hunters and naturalists track animals using their prints/tracks.	True	False
2) A track is an impression left in the ground by an animal.	True	False
3) Straddle is a measurement of the stride length of an animal.	True	False
4) Tracks are left in snow, soil, mud, or other ground surface.	True	False
5) A deer ... leave a deeper impression in the ground than a moose.	True	False

Visualiz...

...u were picturing while you were reading. Explain the picture.

Questions

Use information from the text to sup... ...ans...

1) What is an animal track? Why are animal tracks evidence of anim...

2) How can hunters and naturalists figure out which animal left a track? What do they look for in the track?

PREVIEW

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Name: _____ 16

Curriculum Connection
A1.1, A1.2, A1.4, A1.5

Research – Animal Tracks

Research Learn more about different animal tracks.

Find examples of each of the animal track features that we see in the environment. Describe the feature, name an animal that has the feature, and draw a picture of the tracks. The first one is an example that is done for you.

Feature	What does the feature mean	Animal Name	Picture of the Track
Large Track	[illegible] is wide [illegible] long.	Bear	
Small Track			
Nails			

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Name: _____ 17

Curriculum Connection
A1.1, A1.2, A1.4, A1.5

Research | Learn more about different animal tracks

Feature	What does the feature mean	Animal Name	Picture of the Track
Depth (deep impress			
Webbing			
Long Stride			

PREVIEW

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Name: _____ 18

Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Animal Tracks

Research Question How are animal tracks different from each other?

When animals walk, they create tracks in the ground that are unique to that animal community. We can track animals if we know their tracks/footprint.

Material What do we need?

- ✓
- ✓ Parchm
- ✓ Toothpicks
- ✓ Animal tracks guide o r ov guide



Lion Print

Method How do we complete the experi

1) Use the "Animal Tracks Guide" or take time to res the favourite animals.
2) Draw the tracks on the back of this page
3) Take a small piece of clay and roll it into ball
4) Flatten the ball into a cookie shape. Make one cookie for each track you want to make.
5) Place the flattened clay on a piece of parchment paper
6) Use your finger and toothpick to create the animal tracks
7) Set the tracks aside so they can dry

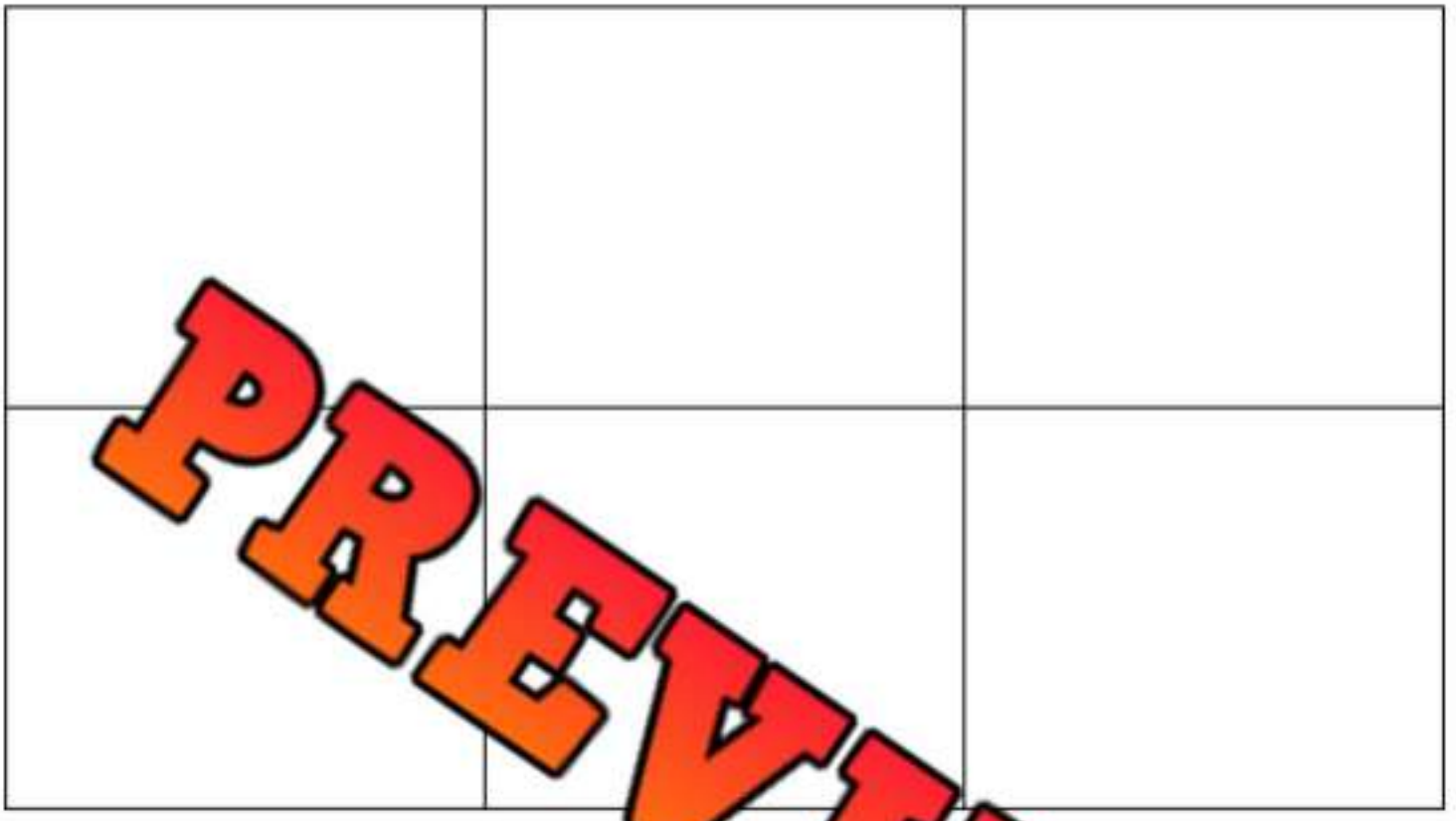
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Name: _____ 19

Curriculum Connection
A1.3, A1.4, A1.5

Plan Draw some animal prints you want to make.



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Research Answer the questions be

1) Why is it helpful for scientists to be able to track a... Ho... this help them understand a species' community?

2) Make a connection – What animal tracks do you see in your neighbourhood?

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Name: _____ 20

Curriculum Connection
A1.3, A1.4, A1.5

Animal Tracks Guide



Frog



Leopard



Rhino



Swan



Hippo





Turtle



Badger



Hedgehog



Llama



Gecko



Sparrow



Dog



Kangaroo



Fox



Deer



Beaver



Lion



Zebra

PREVIEW

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Curriculum Connection
B2.1, B2.2

Survival Needs

What do organisms need to survive?

In order for any organism to survive, it needs certain things. Think about what you need to survive? All living organisms (plants and animals) need 5 basic things: **sunlight, water, air, food (nutrients),** and a habitat with the ideal **temperature**.



Water

Water is [illegible] and animals alike, however, the amount of water organisms require varies from organism to organism. For example, a frog needs much more water than a cactus.

Air

Air is made from several gases. The two most important are oxygen and carbon dioxide. Without oxygen, animals will die. Without carbon dioxide, plants will not survive.



Food & Nutrients

All living organisms need energy to function. Energy allows organisms to grow, reproduce, move, and to work.

Temperature

The temperature has to be just right for each organism to survive. Certain plants will not survive in colder or warmer temperatures. Some animals migrate from colder temperatures during the winter to warmer temperatures just to survive.

Sunlight

All living organisms need sunlight because it provides us with the source of all energy. It also provides heat for plants and animals.

PREVIEW

Name: _____ 30

Curriculum Connection
B2.1, B2.2

Making Connections

What does this reading remind you of in your life?

True or

whether the statement is true or false.

1) Sunlight is by species.	True	False
2) Both plants and als to survive.	True	False
3) The amount of a need nt d on the species.	True	False
4) All living organisms need a habita de perature.	True	False
5) Sunlight is only necessary so that ganisms stay m.	True	False

Questions

Answer the questions below using from xt.

1) What are the 5 basic survival needs? Why are they importan

2) Do all living things need the exact same amount of these needs? Explain using an example.

PREVIEW

Name: _____ 31

Curriculum Connection
A1.1, A1.3, A1.4

Experiment – Designing a Zoo Enclosure

Research Question What do animals need to survive?

You work at a zoo and need to choose an animal to buy to bring to the zoo. You'll need to understand what that animal needs in their enclosure to survive.

Materia hat do we need for our activity?

1) Clay
2) A box – sh or o box
3) Pipe cleaners
4) Toothpicks or wooden els
5) Straws
6) Construction paper



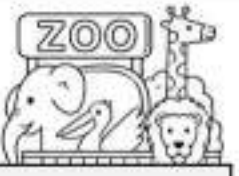
PREVIEW

Method How do we complete the experimen

1) Decide which animal you want to buy for your zoo.
2) Research what the animal needs to survive.
3) Write down things on the question page that you want to include in your enclosure.
4) Draw a plan of your zoo enclosure.
5) Complete the checklist to make sure the animal has everything it needs.
6) Begin making the model of your zoo enclosure.
7) Complete the extension activity – math connection.

Name: _____ 32

Curriculum Connection
A1.1, A1.3, A1.4



Planning Answer the questions below.

1) What does your animal need to survive?

2) What will you put in yo[illegible] animal can survive?

3) What could you put in the enclosure so that the animal has fun?

PREVIEW

Name: _____ 33

Curriculum Connection
A1.1, A1.3, A1.4

STEAM – Designing a Zoo Enclosure

Draw Draw a plan of your enclosure from a bird's eye view.



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Name: _____ 34

Curriculum Connection
A3.2

STEM – Designing a Zoo Enclosure

Materials are not free! How many materials did you use? Find out how much your enclosure cost to make.

Math Answer the questions below.

Material	Cost
Pipe Cleaners	$1 each
Cardboard Boxes	$5 each
Clay	$4 for one piece
Toothpicks	$0.50 each
Wooden Dowels	$2 each
Straws	$0.75 each
Pieces of Paper	$1 each

How many of each material did you use? Write the number below.

Material	Number Used	
Pipe Cleaners		
Cardboard Boxes		
Clay		
Toothpicks		
Wooden Dowels		
Straws		
Pieces of Paper		
Total Cost		

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Name: _____ 35

Curriculum Connection
A3.2, A3.3

Zoo Enclosure – Real World Problem

Lions are carnivores. They only eat meat. Also, lions are predators. They hunt and stalk their prey.

Think Look at the picture and answer the questions.



1) Is it fair to lions to have humans behind glass in their enclosure?

2) Do you think the glass is strong?

glass thick or thin?

4) do nd not bricks or stee

5) How do you think the lions feel in this picture?

_____

_____

_____

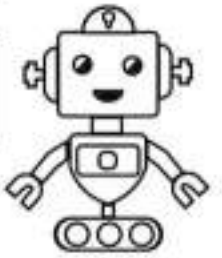
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Name: _____ 36

Curriculum Connection
A2.1

STEM – Working at the Zoo - Coding

EVA is a robot that works at the zoo. The staff needs your help to program her to get her work done. Write commands for EVA to do.



Zoo Use this map to write code on the next page.



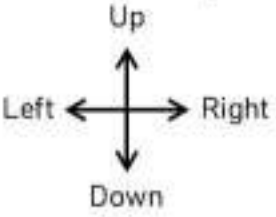
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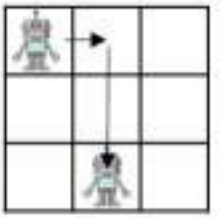
Curriculum Connection
A2.1

STEM – Working at the Zoo - Coding



Commands – Use the example below to learn the code.

Move 1 right
Move 2 down



Directions Tell EVA where to go to get her work done.

PREVIEW

1) EVA n heck on the bears and then feed the snakes.

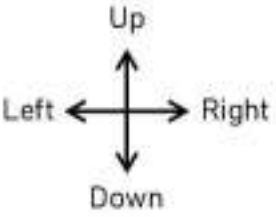
2) EVA needs to make more popcorn hen fe s.

3) EVA needs to get a drink, ride an elephant, and get bamboo for th da.

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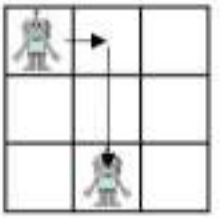
Name: _____ 38

Curriculum Connection
A2.1



Commands – Use the example below to learn the code.

Move 1 right
Move 2 down



Directions Tell EVA where to go to get her work done.

4) EVA ne to play with the giraffes, feed the lions and sharks, and then clean the bathr

5) EVA needs to check on the gorillas, sharks, b ys, s pandas, and then get a drink. Write as few lines of codes to get a wor

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Name: _____ 39

Curriculum Connection
A2.2

STEM – Working at the Zoo - Coding



Coding | How does coding help zoos?

1) How does having a robot like EVA help the workers at the zoo?

2) Time[illegible]oos to keep track of when animals need to be fed. Codes are use[illegible]go off at different times.

If your [illegible] mo[illegible]eys, lions, and otters, what times would you feed them?

Monkeys	
Lions	
Otters	

3) For some animals, they can press [illegible]tton to [illegible]d or water.
The code to work the machine would be:

If animal presses button
then open door to food

How would using a code like this help zoo workers?

4) When you buy tickets to the zoo, you can now buy them online. Write what the code could be below.

PREVIEW

Name: _____ 40

Curriculum Connection
B2.6

Adapting Species

What Does Adapting Mean?

Plants and animals are designed to live and thrive in their habitat. They have **adapted**, which means their bodies have changed to allow them to survive in the conditions they live in.

Over [illegible] species will change so they have characteristics that help them survive. Evolution [illegible]y that explains how animals adapt. **Evolution** is the process by which differ[illegible]ng [illegible]lop and change into more advanced versions that allow them to survive [illegible]he con[illegible] live in.



Charles Darwin

In 1859, Charles Darw[illegible] [illegible]f evolution. He believed that [illegible] wo[illegible] natural selection. **Natural selection** is th[illegible] where certain individuals of a species a[illegible]etter at surviving than others and will therefore, surviv[illegible] have more children (reproduce).

When they have children, their children are like the[illegible]s. F[illegible]ample, rabbits live all over and have dark or white fur. In places where there is a lo[illegible] would be an advantage as the rabbits could hide from predators easier. W[illegible]e white rabbits surviving in places with heavy snowfall, more white furred rabbits have babies and their babies will also have white fur. Eventually all the rabbits living in a cold place will have white fur as they are the ones who survive.

Survival of the Fittest

The phrase **survival of the fittest** refers to the animals who are best able to survive in their environment. The white furred rabbits are the fittest bunnies for an environment that receives heavy snowfall.

The white furred rabbit has adapted to its habitat. Its adaptation is its white fur.

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Curriculum Connection
B2.6

True or False

Circle whether the statement is true or false.

1) Adapting to an environment means animals change so they can survive.	True	False
2) Not all plants and animals can survive in all environments.	True	False
3) A white furred rabbit will survive best in desert environments.	True	False
4) Charles [illegible]win came up with his theory of evolution in 1859.	True	False
5) All ani[illegible]pecies are the same (all rabbits are the same).	True	False

Question[illegible]

Wh[illegible]s do you have after reading the information?

1)	
2)	

Questions

Use information from the text to supp[illegible]ans

1) How do animals adapt to be able to survive in their environm[illegible]t?

2) What does natural selection and survival of the fittest mean?

PREVIEW

Curriculum Connection
B2.6

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____
Circle the word that fits on the blank.

1) ___ means the best adapted.	Reproduce
	Survival of the Fittest
2) Species develop helpful ___ over time.	Environment
	Characteristics
3) Charles Darwin created the ___ theory.	Evolution
	Adaptation
6) Animals ___ by having more children.	Reproduce
	Hibernate
5) Evolution happens through ___.	Natural Selection
	Environment

Name: _____
Circle the word that fits on the blank.

1) ___ means the best adapted.	Reproduce
	Survival of the Fittest
2) Species develop helpful ___ over time.	Environment
	Characteristics
3) Charles Darwin created the ___ theory.	Evolution
	Adaptation
6) Animals ___ by having more children.	Reproduce
	Hibernate
5) Evolution happens through ___.	Natural Selection
	Environment

Name: _____
Circle the word that fits on the blank.

1) ___ means the best adapted.	Reproduce
	Survival of the Fittest
2) Species develop helpful ___ over time.	Environment
	Characteristics
3) Charles Darwin created the ___ theory.	Evolution
	Adaptation
6) Animals ___ by having more children.	Reproduce
	Hibernate
5) Evolution happens through ___.	Natural Selection
	Environment

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Curriculum Connection
B2.6

Memory Game: Habitat Components

Objective — What are we learning about?

To help students learn and understand different ecological terms and concepts by matching terms with their correct definitions and discussing their importance in the context of animal habitats.

Materia — What will you need for the activity?

- Memory g… pro…d) with the terms on one set and …efiniti… …ther set.
- A flat surface like a … the fl… out the cards.



PREVIEW

Instructions — How will you complete the a…

1) Divide the class into groups of 3 or 4. Give eac… set …mory Game cards. (Provided)
2) Have each group lay all the cards face down in a grid on a… …or.
3) The students take turns flipping over two cards at a time, trying …nd a matching term and its definition.
4) If a student finds a match, they remove those cards from the grid and keep them.
5) If the cards do not match, they are turned back over, and the next student takes a turn.
6) The game continues until all the cards have been matched.
7) After the game, review the terms and definitions with the class.
8) Engage the class in a discussion about animal habitats.

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Curriculum Connection
B2.6

Cards | List of habitat components, including their definitions.

Components of Habitat	Definition
Habitat	The natural environment where an organism lives.
Physical Adaptation	Changes to an organism's physical structure that help it survive in its environment.
Behavioural Adaptation	Changes in the way an organism acts to help survive
Traditional Knowledge	Ancient wisdom passed down through generations that helps to understand and manage the natural world.
Technological Development	The use of tools and techniques to solve problems, including those used in studying habitats.

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Curriculum Connection
B2.6

Cards | List of habitat components, including their definitions.

Components of Habitat	Definition
Population	A group of individuals of the same species living in the same area.
Community	Different populations of organisms living together in the same environment.
Food Chain	A sequence showing who eats what in a habitat, transferring energy from one organism to another.
Food Web	A complex network of food chains where most organisms eat or are eaten by more than one species.
Organism	Any individual living thing.

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Curriculum Connection
B2.6

Cards | List of habitat components, including their definitions.

Components of Habitat	Definition
Producer	An organism, usually a plant, that can make its own food through photosynthesis.
…ner	An organism that eats other organisms to get energy.
Herbivore	An a…l that eats …ts.
Omnivore	An animal that e… both plants and animals.
Carnivore	An animal that eats other animals.

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Curriculum Connection
B2.6

Cards | List of habitat components, including their definitions.

Components of Habitat	Definition
Predator	An animal that hunts and eats other animals for food.
	An animal that is hunted and eaten by predators.
Scavenger	an hat feeds on d o organisms.
Endangerment	The state in w a species is at risk of becoming extinct.
Extinction	The permanent disappearance of a species from Earth.

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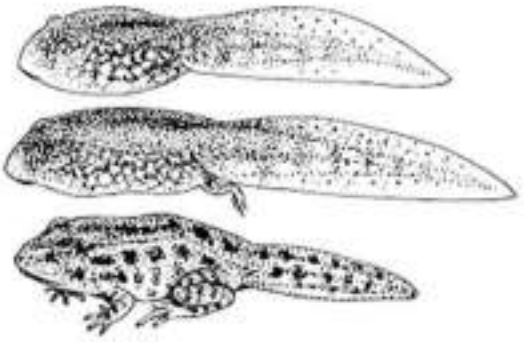
Name: _____ 49

Curriculum Connection
B2.6

Adaptations of Young Animals

Animal Adaptations

While an animal grows during its life cycle, it needs to be able to survive in its environment. The good news is that animals have adapted to survive in their environment. **Adapted** means that their bodies have changed over time to make sure they can survive in the enviro t they are in.



Exam a

Tadpol

A tadpole has e t can in the water. It has a tail that all em t les can grow their tails longer if fe a lot o rs near them. This allows them to swim faster and look bigger.

Tadpoles also have a body that is d to cu gh the water. These adaptations have allowed tadpoles to survive in th abita ater.

Frog

A frog adapts to its new life on land and in the water. If a fr nds land, they will have very strong legs. They need strong legs to jump so th predators or catch prey. Some frogs that swim a lot have webbed feet. Th ws them to swim faster and longer. Frogs have adapted to be able to survive in both environments.



They have lungs that allow them to breathe through their skin. They cannot breathe underwater, but they can hold their breath for 4-7 hours!

Frogs have changed colour over time as well. Frogs that live near ponds are green with dark spots. Some frogs are brighter green, depending on the habitat they live in. This allows them to blend in with their surroundings.

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Curriculum Connection
B2.6

True or False

Circle whether the statement is true or false.

1) An animal adaptation means the animal changed so it can survive.	True	False
2) Tadpoles are good at living in the water.	True	False
3) Frogs are better at living under water than on land.	True	False
4) Frogs need strong legs to jump on land.	True	False
5) A tadpo[illegible] square body that makes it hard to cut through water.	True	False

Visuali[illegible]

[illegible] were picturing while you were reading. Explain the picture.



Questions

Use information from the text to suppo[illegible]

1) Why is a tadpole good at living in the water? How can it change t[illegible] better?

2) Why are frogs good at living on land and in the water?

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Curriculum Connection
B2.6

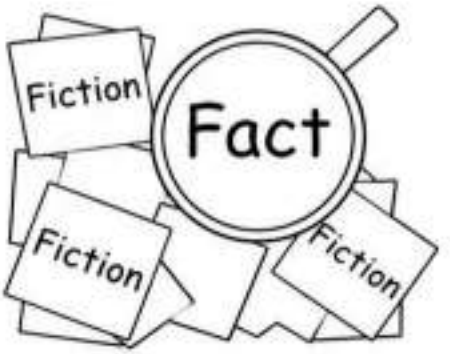
Fact or Fiction: The Adaptation Challenge

Objective What are we learning about?

To help students clarify misconceptions and solidify students' understanding of plant and animal adaptations.

Materials What will you need for the activity?

- [illegible] out animal or plant adaptations [illegible] a myth or a fact
- A 'Fact' sign and [illegible] distinguish the two sides of the room
- Designated areas in the classroom for the 'Fact' and 'Fiction' signs, allowing enough space for students to move to either side



Instructions How will you complete the activity?

1) Your teacher will read statements. Pay close attention as each statement is shared.
2) Consider carefully whether you think the statement is true or false.
3) If you decide the statement is true, walk to the 'Fact' side of the room.
4) If your guess is that it's not true, move to the 'Fiction' side of the room.
5) Stay on your chosen side and listen attentively for the correct answer to be revealed.
6) When the right answer is announced, return to your seat, ready for the next round.
7) Have fun getting up and moving!

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B2.6

Fact or Fiction Read the statements to the class.

#	Statement	Fact or Fiction
1	All spiders spin webs.	Fiction
2	A camel's hump stores water.	Fiction
3	Polar bears have black skin under their white fur to absorb more heat.	Fact
4	Owls can turn their heads almost all the way around.	Fact
5	Snakes hear through their tongues.	Fiction
6	Some frogs freeze with breathing.	Fact
7	Bats are blind.	Fiction
8	Sharks have an unlimited number of teeth.	Fact
9	Dolphins sleep with one eye open.	Fact
10	All bears hibernate in the winter.	Fiction
11	A giraffe's neck is too short to reach the ground.	Fiction
12	Elephants are the only animals that can't jump.	Fact
13	Deer have no gall bladders.	Fact
14	Peacocks are poisonous if consumed.	Fiction
15	Kangaroos use their tails for balance.	Fact
16	Hummingbirds can fly backwards.	Fact
17	Wolves can change the course of a river.	Fiction
18	Octopuses have three hearts.	Fact
19	Frogs drink water through their skin.	Fact
20	Mice live for up to 10 years.	Fiction

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Curriculum Connection
B2.6

True or False

Is the statement true or false?

1) Bird wings and airplane wings are shaped differently.	True	False
2) Spider webs inspired the design of fishnets.	True	False
3) All technology is inspired by nature.	True	False
4) The shape of bird wings helps them to fly.	True	False
5) Mimicking nature helps make technology unsustainable.	True	False

Question

Answer the questions below.

1) How does the bird wing help airplanes?

2) Think if other animal that could inspire the invention of a technology.

PREVIEW

Making Connections

What does this reading remind you of in your life?

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Curriculum Connection
A2.1, A2.2

Code the Engineer

Engineers often get their best ideas by observing nature. Check out a sample engineering code below.

Engineering Code	Example:
Observe Nature	Observe: Bird wings
Find a Helpful Feature	Helpful Feature: Helps birds fly
[illegible] of a Human Problem	Problem: People want to fly
[illegible] Technology	New Technology: Airplane

PREVIEW

Instruction: [illegible] engineering code by filling in the missing steps.

1)

Observe: [illegible]

Helpful Feature: _____

Problem: People need stronger nets.

New Technology: _____

2)

Observe: Shark skin

[illegible]pful Feature: _____

[illegible]roble[illegible]mers want to move

New [illegible]ogy[illegible]

3)

Observe: Burr plant

Helpful Feature: _____

Problem: People need something that sticks and unsticks easily.

New Technology: _____

4)

Observe: Kingfi[illegible] beak

Helpful Feature: _____

Problem: Move trains faster for less air resistance.

New Technology: _____

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Curriculum Connection
B2.6

Blog Post: Exploring Ontario's Habitats

Exploring Ontario's Habitats

Date: April 10, 2026 Author: By: Emma Johnston *3-minute read*

Ontario is home to many different habitats that support a wide variety of plants and animals. From forests and wetlands to the Great Lakes, these habitats provide food, water, and shelter for living things.

Forests: Ontario forests are filled with maple, pine, spruce, and birch trees. These forests provide homes for animals such as black bears, white-tailed deer, moose, squirrels, and many kinds of birds.

Wetlands: Ontario wetlands help clean water, reduce flooding, and provide important habitats for frogs, turtles, beavers, muskrats, and many insects. Wetlands are some of the most productive ecosystems in Ontario.

Great Lakes: Ontario borders four of the Great Lakes. These freshwater habitats are home to fish such as lake trout, walleye, and yellow perch, while many birds use the lakes and wetlands for nesting and migration.

These habitats are important because they support biodiversity and provide homes for thousands of species across Ontario.

Till next time,
Emma Johnston

PREVIEW

Comments:



Smith Charli – April 11, 2026

Great article, Emma! I think it's important to remember that protecting forests, wetlands, and lakes also protects the animals that depend on them. We should all do our part by respecting nature and keeping habitats clean.

Like Reply 1 day ago



Isabelle Stones - April 12, 2026

I agree, Smith! Ontario has many amazing habitats, and each one supports different plants and animals. Learning about these habitats helps us understand why conservation is so important for the future.

Like Reply 2 hrs ago

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Curriculum Connection
B2.6

True or False

Is the statement true or false?

1) Ontario has forests, wetlands, and Great Lakes habitats.	True	False
2) Black bears and moose can be found in Ontario's forests.	True	False
3) Wetlands make flooding worse by speeding up water flow.	True	False
4) Ontario borders four of the five Great Lakes.	True	False
5) Protecting habitats helps support biodiversity.	True	False

Question

Answer the questions below.

1) Why are wetlands important in Ontario?

2) Name two trees that commonly grow in Ontario's forests.

PREVIEW

Define

What do the terms below mean?

Wetlands	
Biodiversity	
Conservation	

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Curriculum Connection
B2.1, B2.6

Desert Plants and Their Parts

Desert Plants

Deserts are hot, dry places with very little rain. But that doesn't mean they're empty! Many plants have adapted to survive in these harsh conditions. Let's explore some of them and understand how they do it!



Cacti: The Water Storage Experts

Cacti are the superstars of the desert. Here's how they are designed:

- Thick, Waxy Skin: They have a special skin that is thick and waxy. This helps prevent water loss. It's like having a built-in water bottle!
- Spines: The leaves of cacti have evolved into sharp spines. These spines provide shade and protect the cactus from animals looking for a water snack.
- Shallow but Wide Roots: They have shallow root systems. This means when it does rain, they can quickly soak up as much water as possible from a wide area.

Aloe Vera: The Soothing Survivor

Aloe Vera is another plant that thrives in the desert. Here's how it does it:



- Fleshy Leaves: Aloe Vera has thick leaves that store water. Inside these leaves is a gel that's not only beneficial for us, but also helps the plant survive when water is scarce.
- Root System: Just like cacti, Aloe Vera has a wide and shallow root system that quickly soaks up any available water.

Joshua Tree: The Slow and Steady Winner

The Joshua tree is a unique plant found in the desert. Here's how it manages to survive:

- Spiky Leaves: The leaves of Joshua trees are tough and spiky, which helps protect them from being eaten by desert animals.
- Deep Root System: Unlike cacti and Aloe Vera, Joshua trees have a deep root system, which allows them to reach water that's far below the desert surface.
- Slow Growth: Joshua trees grow very slowly and use very little energy, which means they don't need as much water to survive.

PREVIEW

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Curriculum Connection
B2.1, B2.6

Draw Draw the organism and label its parts that help it survive. Then explain why it can survive in its environment.

Cactus

[illegible]ara

Joshua Tree

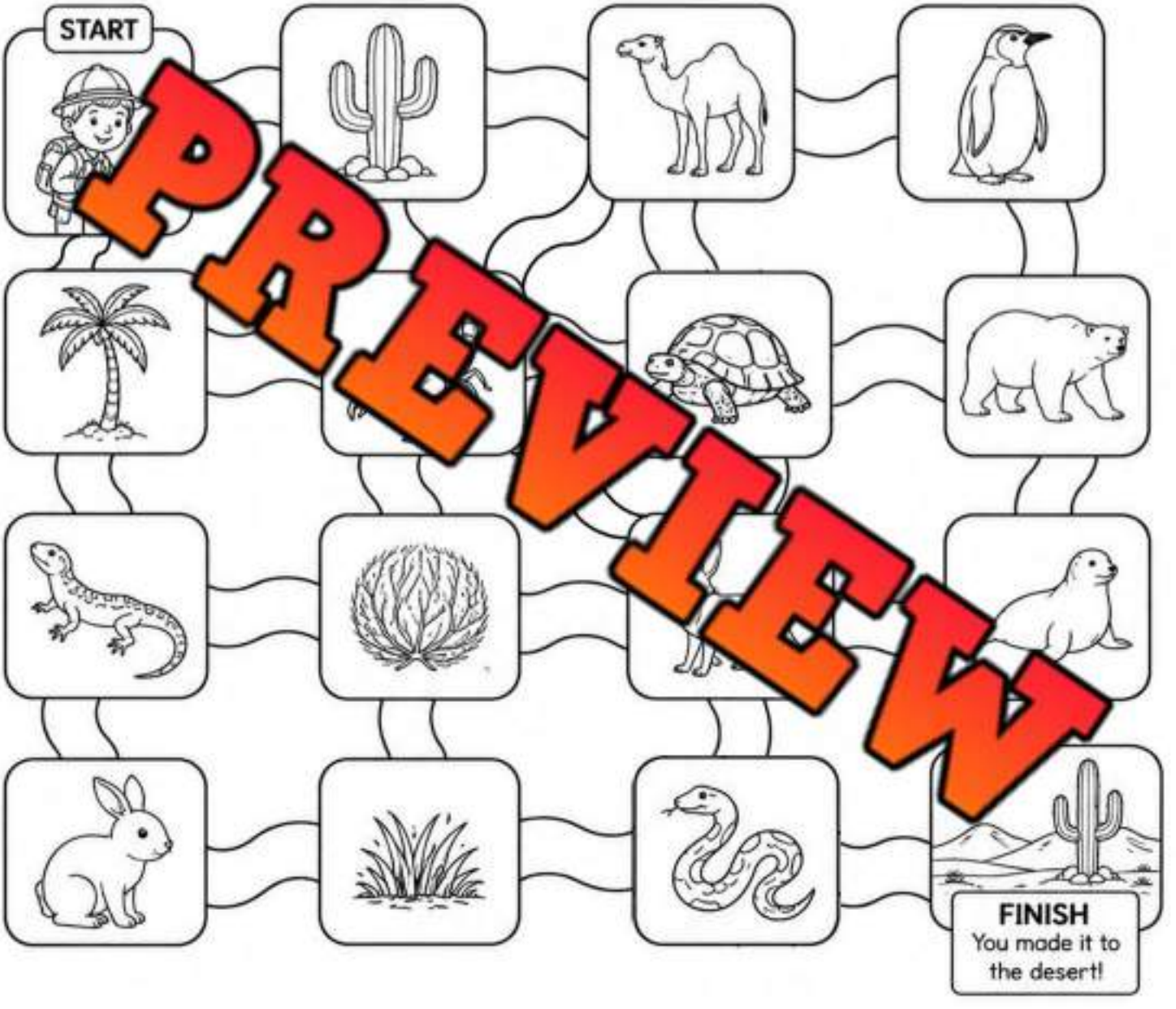
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Curriculum Connection
B2.1, B2.6

Habitat Detective Maze

Directions Help the habitat detective reach the desert by following the tunnel paths. Only travel through the plants and animals that live in the desert habitat. Do not go through plants or animals that belong to other habitats.



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Name two desert plants and animals you saw on the path.

Plants	Animals

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Curriculum Connection
B2.1, B2.2

Terrestrial Habitat - Forests

Forests

A **forest habitat** is a large area of land with many trees and brush that grow close together. Forests are habitats that are home to many different species of organisms. These organisms form a community that are constantly interacting with each other.

Fore[illegible]re great habitats for living things. Plants, animals, fungi, and bacteria all live in forests [illegible]g on where the forest is, they can offer many benefits for the plants and anima[illegible]. 80% of all land plants and animals live in forests!

Benefits [illegible]Living

1) Forests o[illegible]a[illegible]om th[illegible]ome forests are cooler because the Sun's heat energy cannot p[illegible]ate [illegible]ground.
2) They also provide she[illegible]y dif[illegible]mals that live in the trees. Animals need shelter to hide from predat[illegible]
3) Other forests are wet, like the Ama[illegible]nfores[illegible]th America. Rainforests provide water, which all organisms need. Man[illegible]rent [illegible]ms live in rainforests.

Types of Forest Habitats

There are three main types of forests. Each forest has its [illegible] characteristics because they exist in different climate regions.



1) **Tropical Forest** – Forests in hot temperatures around 19°C year-round. You'll find the most different plants and animals because almost any organism can survive in a tropical forest.
2) **Temperate Forest** – Forests that cycle through all four seasons. Most forests in the southern parts of Canada are temperate forests. Most trees are **deciduous**, meaning the trees will lose their leaves in the winter and many animals hibernate or migrate.
3) **Boreal Forest** – Forests that are in the northern parts of the world. They have cold temperatures all year and are full of deciduous and **coniferous trees**, meaning the trees do not lose their needle-shaped leaves.

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Curriculum Connection
B2.1, B2.2

Questions

Answer the questions below using evidence from the text.

1) What is a forest habitat? Why do most animals live in the forest?

2) Why ar forests different than others? Which forest has the most different plants a s?

PREVIEW

Making Connections

Wh es t ind you of?

True or False

Circle whether the statement is true or false.

1) The Boreal Forest has the most different plants and animals.	True	False
2) Around 80% of all organisms live in forests.	True	False
3) The Tropical Forest has conditions almost any organism can survive.	True	False
4) The Temperate Forest is the hottest forest.	True	False
5) Many animals living in the Temperate Forest hibernate or migrate.	True	False

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Curriculum Connection
B2.1

Types of Forest

Describe Which type of forest is the image below? Explain how you know.

1) Tropical Temperate Boreal



2) Tropical Temperate Boreal



3) Tropical Temperate Boreal



4) Tropical Temperate Boreal



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Curriculum Connection
B2.1, B2.6

Terrestrial Habitat - Grasslands

What are Grassland Habitats?



A **grassland habitat** is an area of land that is wide open, with mostly grasses and flowers and not many trees.

Grasslands do not get as much rain as forests, but they ge[illegible]ore rain than deserts. This is why some low growi[illegible]can survive, but very few tall trees can gr[illegible]tall trees, there are no forests in grassland habitats.

Exampl[illegible] Grass[illegible]ts

Grasslands are [illegible]ween[illegible]and forests. They are located all over the world but have different name[illegible]ndi[illegible]y are located.

- Prairies – In North A[illegible]ssland[illegible]led prairies. In Canada, the prairie grasslands are located in A[illegible] Sa[illegible]d Manitoba. The Prairies are great areas for farming because they are [illegible]have r[illegible]ts.
- Steppes – In Russia, Asia, and Ukraine, the step[illegible]gion [illegible]and grassy habitat. They also have no trees and tend to have sho[illegible]sses.
- Pampas – The grasslands in South America are cal[illegible]pampas. [illegible]ve flat lands with no trees and really tall grass, as tall as 3 metres!

PREVIEW

Characteristics of Grassland Habitats

Temperature	Depending on the latitude and season, temperatures can r[illegible]from 20 °C to 30 °C
Precipitation	Average rainfall, with amounts ranging from 25 cm to 100 cm
Plant Life	Various grasses including purple needlegrass, blue grama, buffalo grass, blue fescue, rather grass, and lemon grass.
Animals	Tiger, deer, lion, hyena, cheetah, zebra, bison, kangaroo, elephant
Adaptations	• Animals need speed because they can be seen from long distances • Camouflage because animals can be seen from long distances • Burrowing skills because animals cannot hide in trees • Plants need to be able to survive in windy conditions • Grasses have narrow leaves to minimize water loss

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Curriculum Connection
B2.1, B2.6

True or False Circle whether the statement is true or false.

1) There are no grasslands in Canada.	True	False
2) Grasslands are home to lions, tigers, and zebras.	True	False
3) Lions live in the prairie grasslands in Canada.	True	False
4) Prairie grasslands are good for farming.	True	False
5) Pampa[illegible] is very short.	True	False

Questi[illegible]**ns** do you have after reading the information?

1)	
2)	

Questions Use information from the text [illegible]

1) What is the climate (temperature and precipitation) like[illegible]

2) What adaptations do animals in grasslands have that help them survive?

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Curriculum Connection
B2.1, B2.6

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ | Mark

2 Truths and a Lie - Can you find the one that's not true?

	In Russia, Asia, and Ukraine, the steppe region is a dry and grassy habitat.
	The grasslands in South America are called the pampas. They also have no trees and tend to have short grasses.
	In North America, grasslands are called prairies. In Canada, they are located in Alberta, Saskatchewan, and Manitoba.

Name: _____ | Mark

2 Truths and a Lie - Can you find the one that's not true?

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Name: _____ | Mark

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	The grasslands in South America are called the pampas. They also have no trees and tend to have short grasses.
	In North America, grasslands are called prairies. In Canada, they are located in Alberta, Saskatchewan, and Manitoba.

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Curriculum Connection
B2.6

Plant and Animal Adaptations in Wetlands

Plant and Animal Adaptations in Wetlands

It isn't easy to survive in a wetland habitat. Wetlands have much different living conditions than we are used to. They are complex environments with different types of habitats, including on land and in the water.

Wetlands offer many options for food, which is why many plants and animals live there. To survive in a wetland, both plants and animals need to have adapted to protect themselves against predators.

Breathing

Wetlands offer completely different habitats for plants and animals – underwater and above. For plants to survive in water, they need oxygen to make their own food from photosynthesis. Many water plants have adapted with hollow stems that transport oxygen down to where it is needed. Other plants have special air spaces in their roots that allow oxygen in the water to enter the roots.

Animals like snails have developed gills that allow them to take in oxygen given off by water plants. This allows snails to breathe underwater because they can take oxygen and nutrients into their systems while breathing.



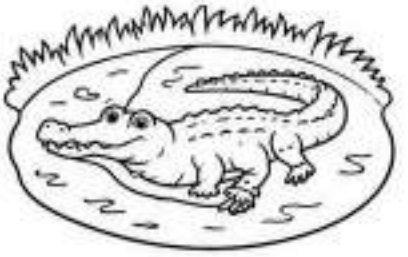
Surviving Underwater

Beavers are animals that live in water and on the ground. They have several adaptations that allow them to survive in the water. First, they have clear eyelids that protect their eyes and help them see underwater. These eyelids act like goggles underwater.

Second, they have valves in their nostrils and ears to keep the water out. Lastly, the beaver has large lungs that allow the animal to stay submerged for up to 15 minutes!

Moving in a Wetland

Wetland animals need to be able to travel on top and through the water easily to survive against predators. Many animals have adapted with webbed feet to allow them to swim faster and more efficiently. Another adaptation is a waterproof coat that keeps animals light and agile, even when wet.



Camouflage and Traps

The animals that live in wetlands need to camouflage themselves to protect themselves and to hunt for prey. Frogs for example, camouflage to match the colour of their surroundings. They will often submerge themselves in water plants and leave only their eyes poking out above the water to watch for food. Alligators are also camouflaged. They will dig through the clay or limestone beneath a body of water and then lie and wait in these traps for animals to come near.

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Curriculum Connection
B2.6

True or False

Circle whether the statement is true or false.

1) Animals need to adapt to their changing environment in order to survive.	True	False
2) Plants do not need to adapt because they can survive anywhere.	True	False
3) Animals adapt for protection from predators.	True	False
4) Examples of animal adaptations are webbed feet and camouflaged colour.	True	False
5) A beaver can hold its breath for up to 15 minutes.	True	False

Visualizing

you were picturing while you were reading. Explain the picture.

Questions

Use information from the text to support your answers.

1) How do animals adapt to life in a wetland?

2) How do plants adapt to life in a wetland?

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B2.1, B2.6

Activity: Habitat Exploration Walk

Objective

What are we learning about?

To help students observe and understand the different types of habitats in their local area and explore the various plants and animals that live in each habitat, highlighting the relationship and dependency between organisms and their habitats.

Materials

What will you need for the activity?

- [illegible] each student
- Pen[illegible] or pe[illegible]
- Magnifying[illegible]
- Local area [illegible]ailabl[illegible]
- Camera or sma[illegible]nes[illegible]es (optional)
- Binoculars (optiona[illegible]tchin[illegible]



Instructions

How will you compl[illegible]tivit[illegible]

1) Gather students and explain the purpose of [illegible]bitat [illegible]n Walk: to observe and understand how different organisms li[illegible]thriv[illegible]e[illegible]ific habitats.
2) Distribute notebooks or journals and pencils or pe[illegible] stude[illegible]note-taking and sketching.
3) If available, hand out magnifying glasses and binoculars t[illegible]exam[illegible]ns and plants closely.
4) Start the walk in a predetermined area known to have diverse habita[illegible] as a local park, forest, or nature reserve.
5) Instruct students to write down or sketch each plant and animal they observe.
6) Ask guiding questions to prompt observation and discussion: "What makes this habitat suitable for that plant/animal?" "How might this creature interact with its environment?"
7) Take photos if cameras are available, especially of plants and animals that might be harder to describe in words.
8) Gradually lead the group through various habitat areas, if possible, to provide a broad range of observations.
9) Conclude the walk with a discussion on what was observed, asking students to share interesting finds or surprises from their exploration.

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Curriculum Connection
B2.1, B2.6

Notebook | Habitat Exploration Observation Table

Date	Location of Observation	Habitat Type (e.g. forest, riverbank, field)

Org...	Draw the Organism	Description & Notes

PREVIEW

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Curriculum Connection
B2.1, B2.6

Reflection Answer the questions below.

1) What was the most interesting plant or animal you observed today? Why did it catch your attention?

2) How did the characteristics of the habitats we explored differ from each other?

3) Choose one organism you observed today. How does it depend on its habitat for survival?

4) What human actions might threaten the habitats we visited today?

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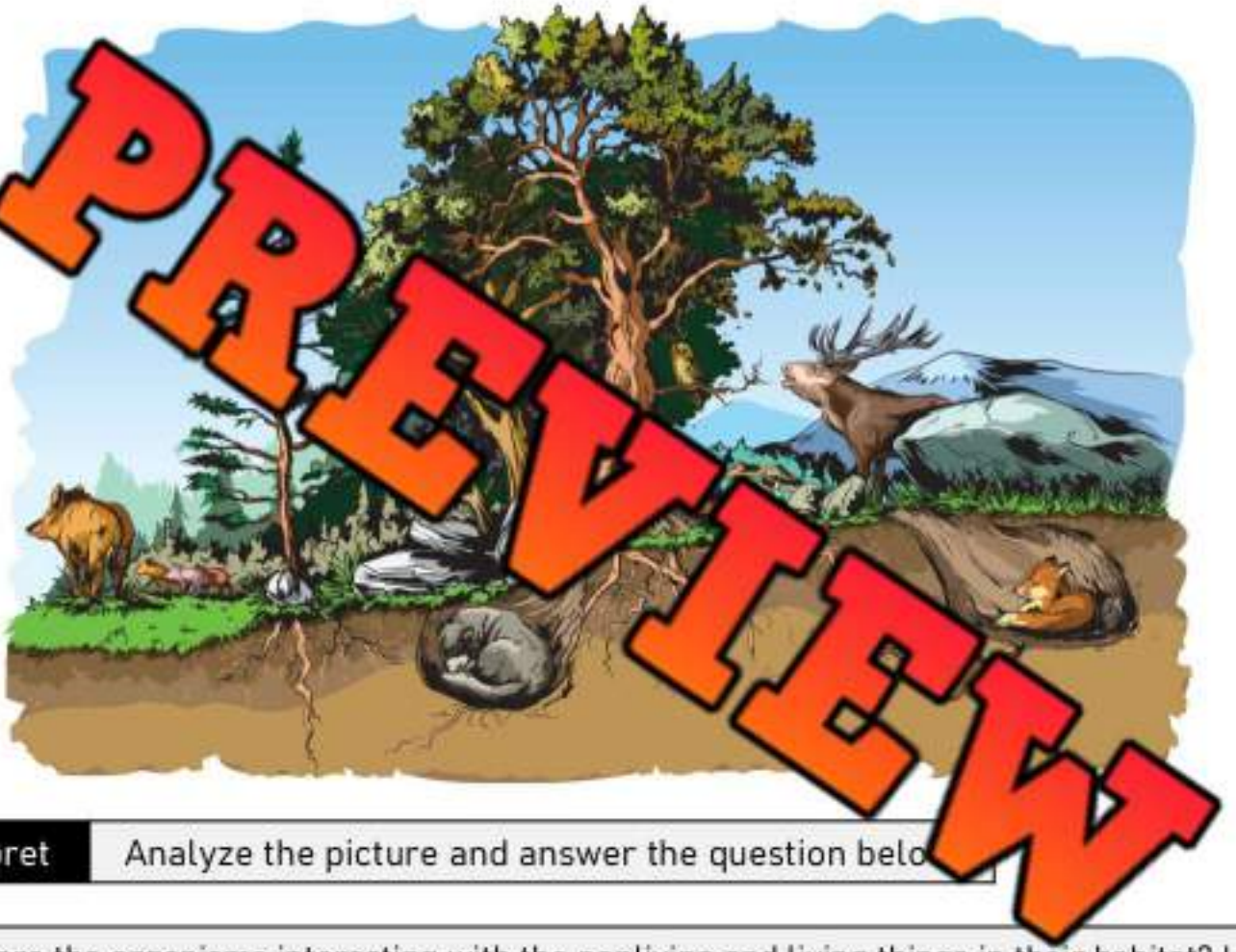
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Curriculum Connection
B2.2

Terrestrial Habitat

What is a Terrestrial Habitat?
A **terrestrial habitat** is a land-based community of organisms. The picture below shows a terrestrial habitat that is home to living and nonliving things. The living things interact with each other and the nonliving things to survive.



PREVIEW

Interpret Analyze the picture and answer the question belo

How are the organisms interacting with the nonliving and living things in their habitat? List 5 ways.
1)
2)
3)
4)
5)

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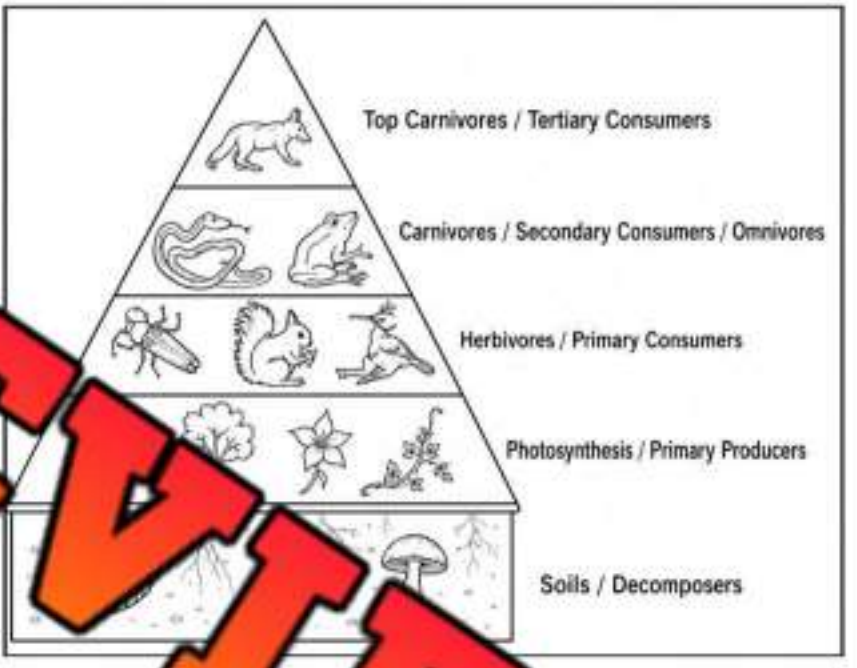
Curriculum Connection
B2.3

Food Chain - Producers and Consumers

Food Chain

Every living thing needs energy in order to survive. When we run, jump, swim, and do anything, we are using energy. We obtain the energy we need from the food we eat. All living things need energy, which means all plants and animals need energy.

Plants get energy from sunlight, w[illegible] and nutrients in a process ca[illegible]otosynthesis. Animals [illegible]rgy by eating plants [illegible] living things [illegible] energy [illegible]n the food web, we can [illegible]ch living thing ge[illegible] how [illegible] nutrients are pas[illegible]n cre[illegible] to creature.



Producers

Producers are the plants in our environment. They are called **producers** because they can produce their own food. They do this by using light energy from the sun, carbon [illegible]e fr[illegible] water from the soil. The process is called photosynthesis, and it lead[illegible]se/sug[illegible]he food they make to consume.

Consumers

Animals are called **consumers** because they cannot make their fo[illegible]. They need to consume (eat) plants and/or animals in order to get the energy [illegible]eed to survive.

Humans are consumers because we cannot produce our own food and therefore need to rely on plants and/or animals for energy. **Carnivores** are animals who eat only other animals. **Herbivores** are animals who eat only plants and **omnivores** are animals who eat both plants and animals.

Decomposers

Decomposers are bacteria and fungi that eat decaying matter in the form of dead plants and animals. They break down the decaying matter so that it turns into soil to be used by plants.

When they break down the dead plants and animals, they release nutrients and mineral salts that go into the soil. This makes the soil rich in nutrients for plants to grow.

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Curriculum Connection
B2.3

Questions Use information from the text to support your answer.

1) What is the difference between a producer and a consumer?

2) What is [illegible]mposer? Why do you think they are important?

3) What is the diffe[illegible]re, herbivore, and an omnivore?

PREVIEW

True or False Circle whether the statement is t[illegible]se.

1) Most humans are carnivores.		[illegible]alse
2) Examples of producers are humans and dogs.	[illegible]rue	False
3) Producers are plants who can make their own food.	True	False
4) Consumers are animals who cannot produce their own food.	True	False
5) An omnivore is at the top of the food chain.	True	False
6) Decomposers provide nutrients for soil.	True	False
7) Plants produce their own food via a process called photosynthesis.	True	False

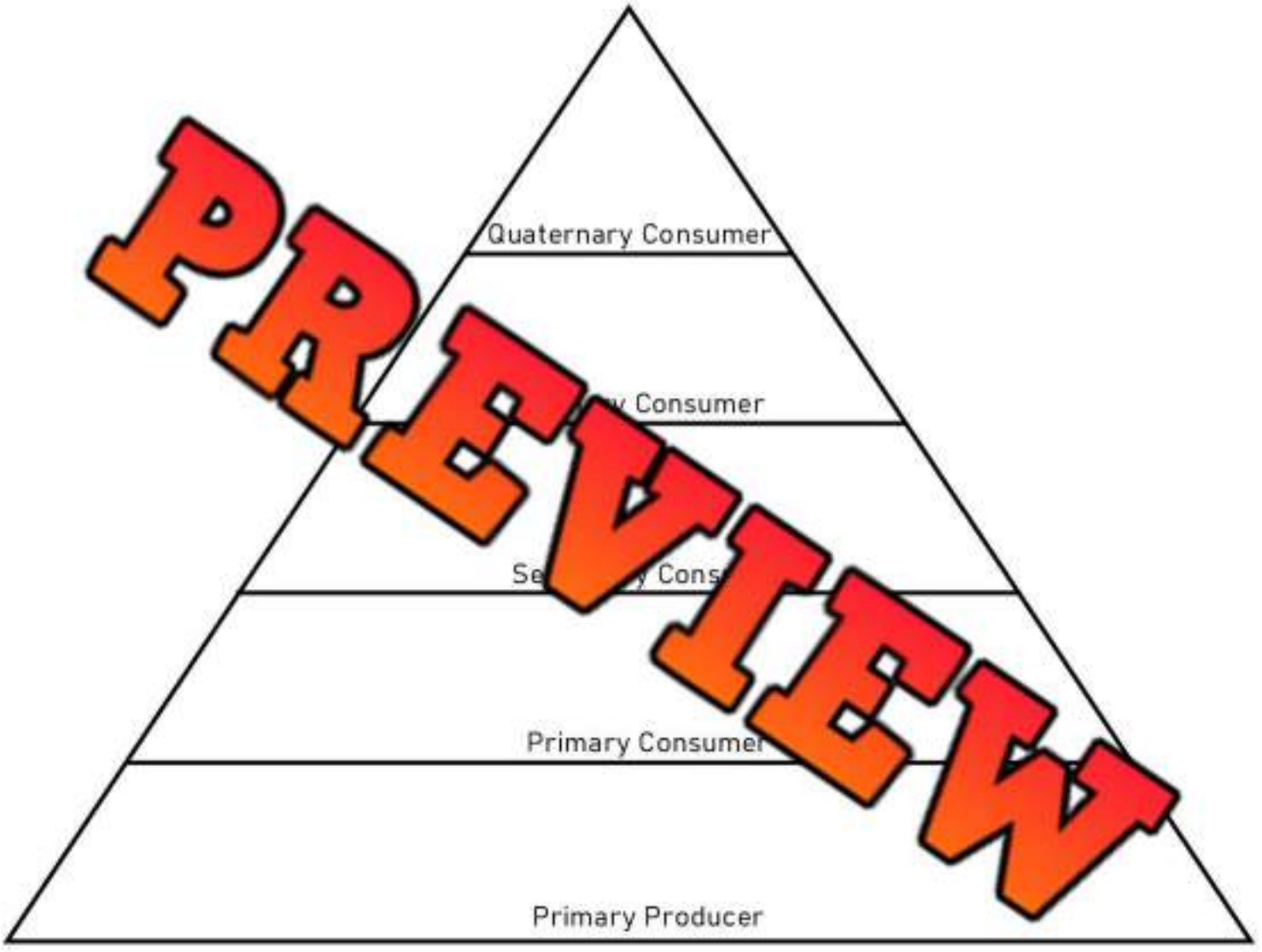
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My Food Chain

Research Create your own food chain by writing or drawing plants and animals in their appropriate step on the food chain.



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Question What is a quaternary consumer? Who did you choose in your food chain and why?

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B2.4

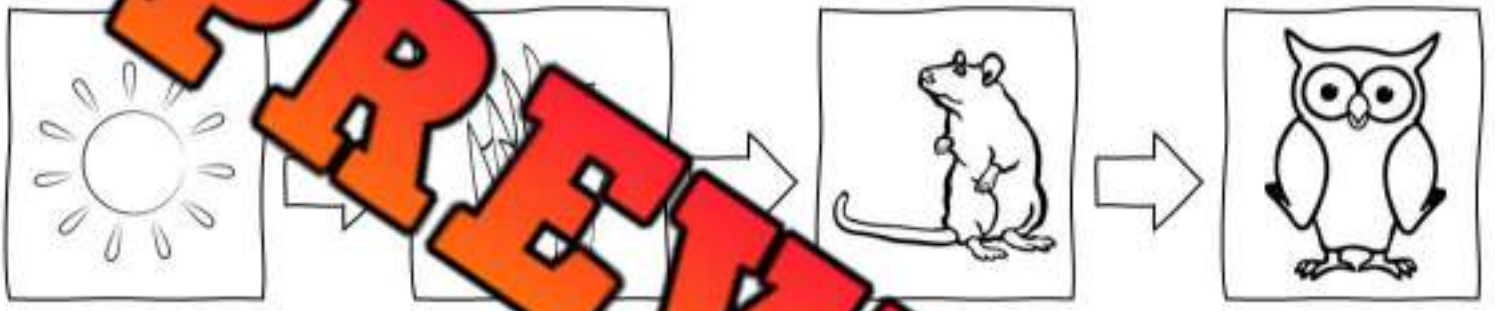
Food Chain

A food chain starts with the sun. The sun gives energy to producers so they can grow. The consumers herbivores and omnivores eat the plants. This gives these animals energy from the sun. Carnivores and omnivores eat other animals, which gives them energy from the sun as well. Some food chains are long, and some are short.

Food Chain Colour the food chains and label each link as a producer or consumer.

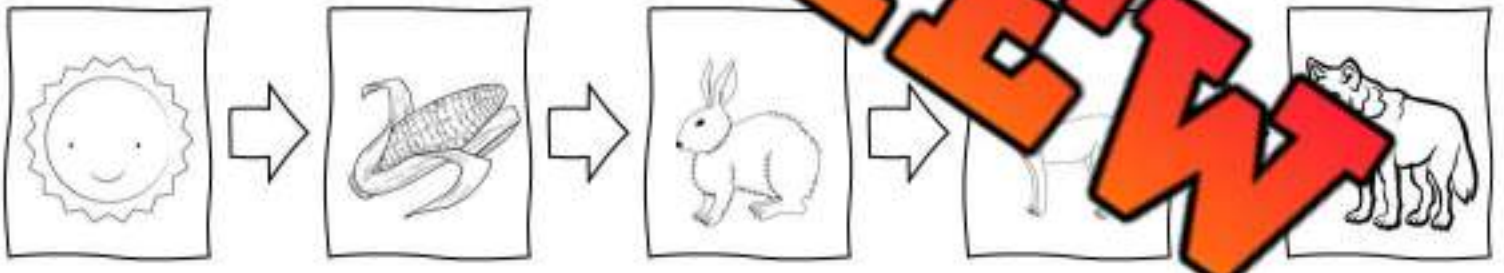
PREVIEW

4-Link Food Chain



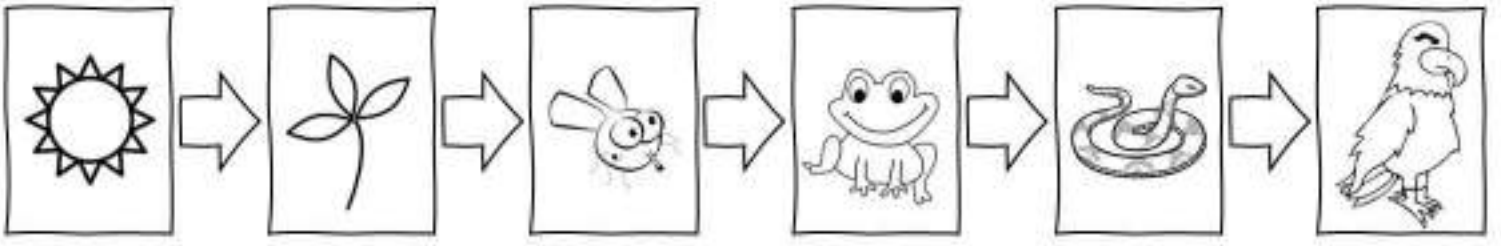
_____ _____ _____ _____

5-Link Food Chain



_____ _____ _____ _____

6-Link Food Chain



_____ _____ _____ _____ _____

Name: _____ 104

Curriculum Connection
B2.4

Food Chain Maze

Directions Help the mouse find its home under a rock. Follow the arrows to complete a food chain maze.



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Curriculum Connection
B2.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ | Mark

Circle True (T) or False (F) for each question.

1) A food chain begins with the Sun.	T / F
2) Producers make their own food using energy from the Sun.	T / F
3) Consumers can make their own food from sunlight.	T / F
4) Every food chain has exactly the same number of living things.	T / F

Name: _____ | Mark

Circle True (T) or False (F) for each question.

1) A food chain begins with the Sun.	T / F
2) Producers make their own food using energy from the Sun.	T / F
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4) Every food chain has exactly the same number of living things.	T / F

Name: _____ | Mark

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Name: _____ | Mark

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1) A food chain begins with the Sun.	T / F
2) Producers make their own food using energy from the Sun.	T / F
3) Consumers can make their own food from sunlight.	T / F
4) Every food chain has exactly the same number of living things.	T / F

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Curriculum Connection
A2.1

Coding - Else Statements

Computers make decisions using IF and ELSE statements. Food chains also follow simple rules. Complete the ELSE statements below based on what would happen in a food chain.

Is there enough sunlight?

IF there is enough sunlight → THEN Plants grow

ELSE → Plants do not grow

Direction[illegible] in the ELSE commands below with your own ideas.

Is there enough food?

IF [illegible]ough food THEN

ELSE



Is energy moving through the fo[illegible]in?

IF there is energy THEN

ELSE





Is one part of the food chain removed?

IF one part is removed THEN

ELSE

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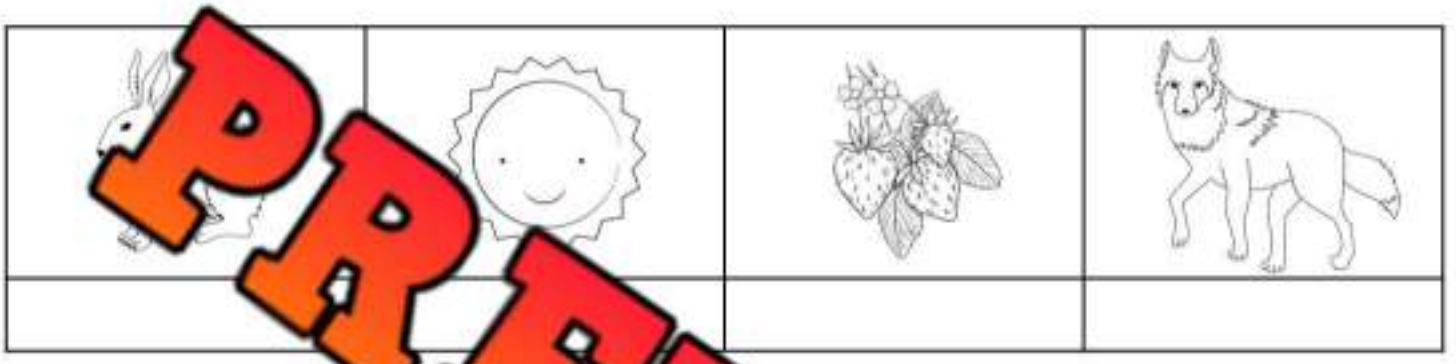
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B2.4

Ordering Food Chains

Food Chain Order the plants and animals by numbering them.

4-Link Food Chain

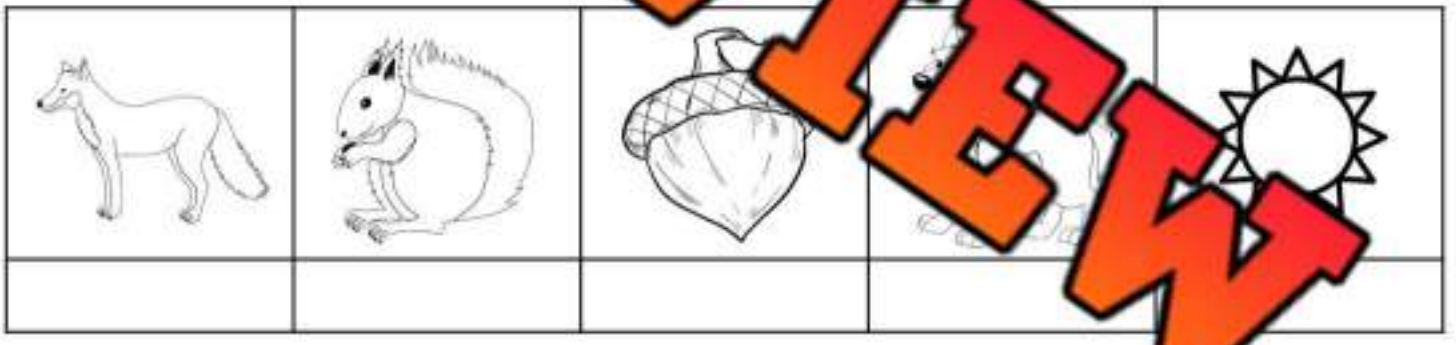
Number the plants/animals 1-4



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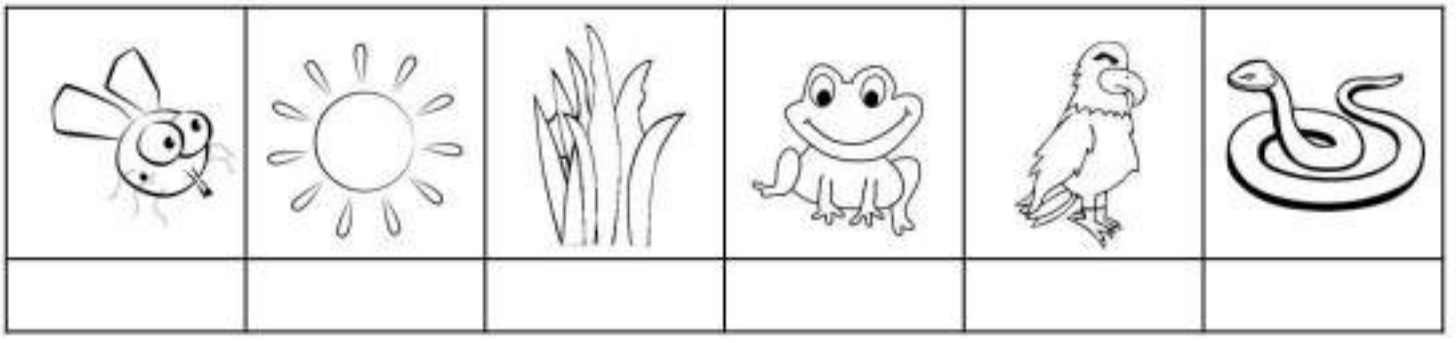
5-Link Food Chain

Number the plants/animals 1-5



6-Link Food Chain

Number the plants/animals 1-6



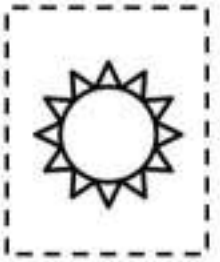
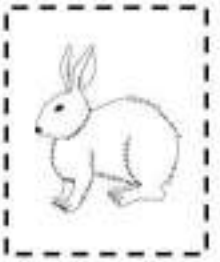
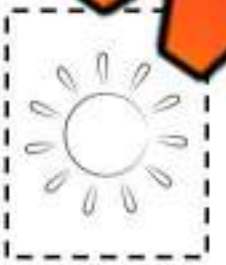
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Food Chains | Cut and paste the plants and animals into the food chains.

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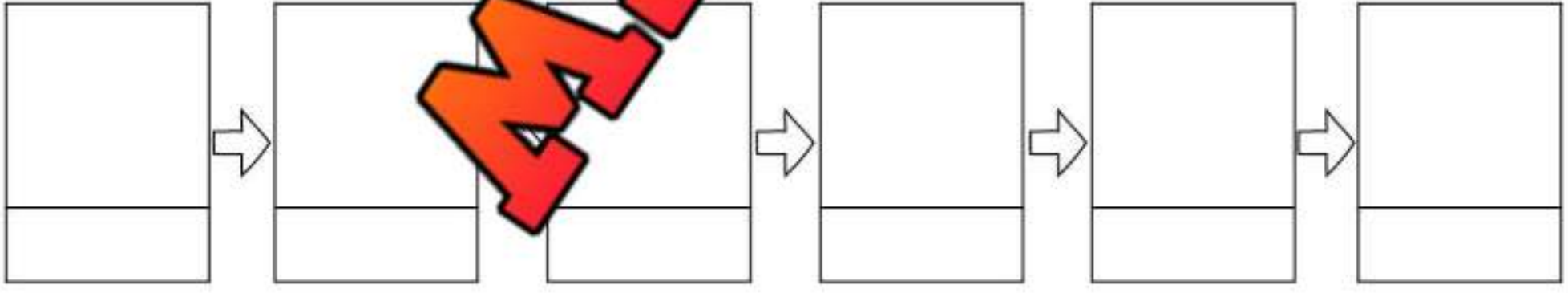
My Food Chains

Food Chains | Draw your own food chains below

5-Link Food Chain



Food Chain



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B2.4

Activity: Web of Life

Objective

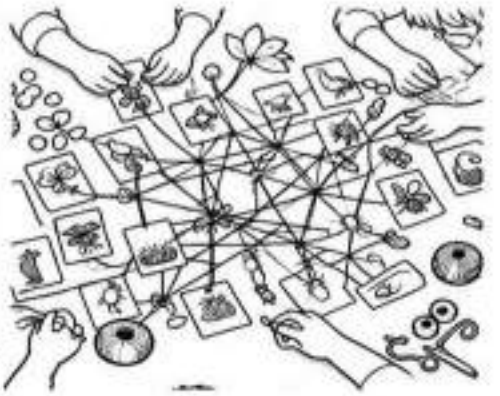
What are we learning about?

To help students visually and physically understand the interconnectedness of organisms within an ecosystem by creating a food web using yarn. This activity will illustrate how species depend on each other for survival.

Materials

What will you need for the activity?

- C[illegible] names of various organisms (p[illegible] herbiv[illegible]vores, omnivores, decomposer[illegible]
- A large ba[illegible]
- Tape
- Scissors
- A large open space o[illegible]



Instructions

How will you compl[illegible] activi[illegible]

1) Spread out the organism cards on the tabl[illegible] the[illegible]pen space where all students can reach them.
2) Assign each student to an organism, giving them th[illegible]ondi[illegible]d.
3) Explain that each piece of yarn will represent a feeding r[illegible]tion[illegible] organisms.
4) Have the first student (a producer, such as a plant) hold the end of t[illegible]n.
5) The student representing an organism that would eat or decompose the plant (like a herbivore or decomposer) then takes hold of the yarn and rolls it out to their station, cutting it to length and taping the end to their card.
6) Repeat the process with other students, with herbivores passing yarn to carnivores or omnivores, and so on, illustrating who eats whom within the ecosystem.
7) Once all the feeding relationships are represented by the yarn, step back and observe the web of life that has been created.
8) Discuss how this web shows the flow of energy (food) through the ecosystem and what happens if one strand (species) is removed.
9) Carefully untangle and gather the yarn to clear up.

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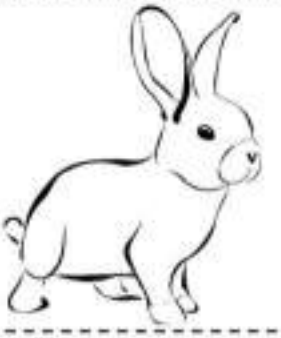
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B2.4

Cards | Picture cards of various organisms. Cut them out to use.



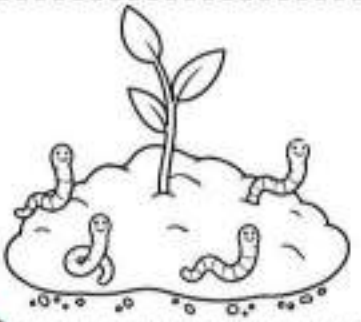
Grass



Rabbit



Lion



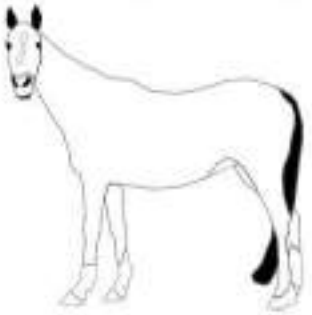
Worms



Algae



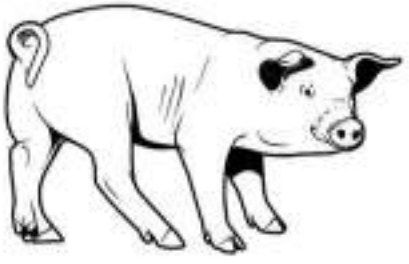
Bear



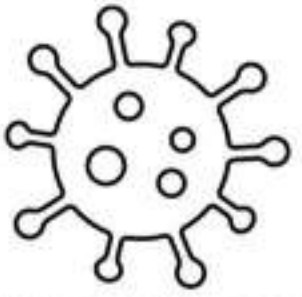
Horse



Hawk



Pig



Bacteria

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B2.4

Cards Picture cards of various organisms. Cut them out to use.



Corn



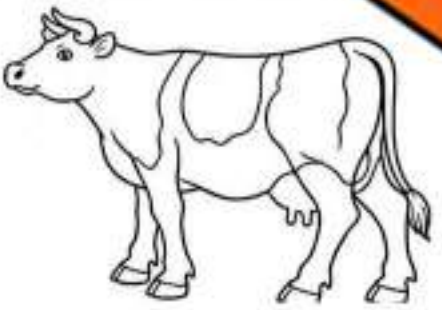
Fox



Fungi



Chicken



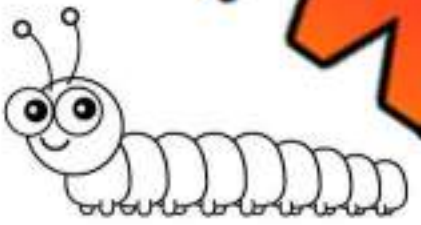
Cow



Beetle



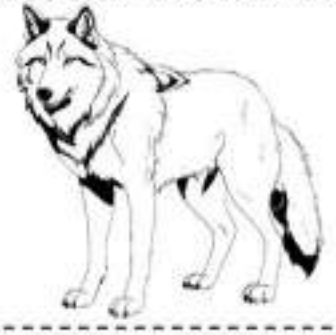
Raccoon



Caterpillar



Oak Tree



Wolf

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B2.4

Reflection Answer the questions below.

1) What role did your organism play in the food web?

2) How di[illegible] to see the entire web connected by yarn?

3) What might happe[illegible]ism goes extinct?

4) Why is it important for an ecosystem to have a [illegible]ty [illegible]

5) How do decomposers contribute to the stability of the food web?

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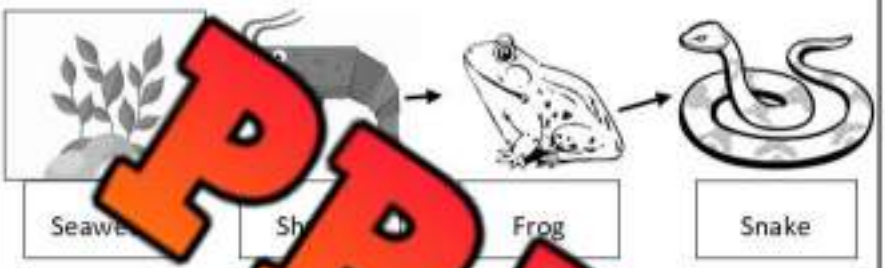
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B2.4

Food Web in a Wetland

Diagram Interpret the diagram of the food web in a pond.



What is happening in the food web?

Diagram Draw two differ ebs. N e the animals belong to the same habitat.

t is happening in the food eb?

What is happening in the food web?

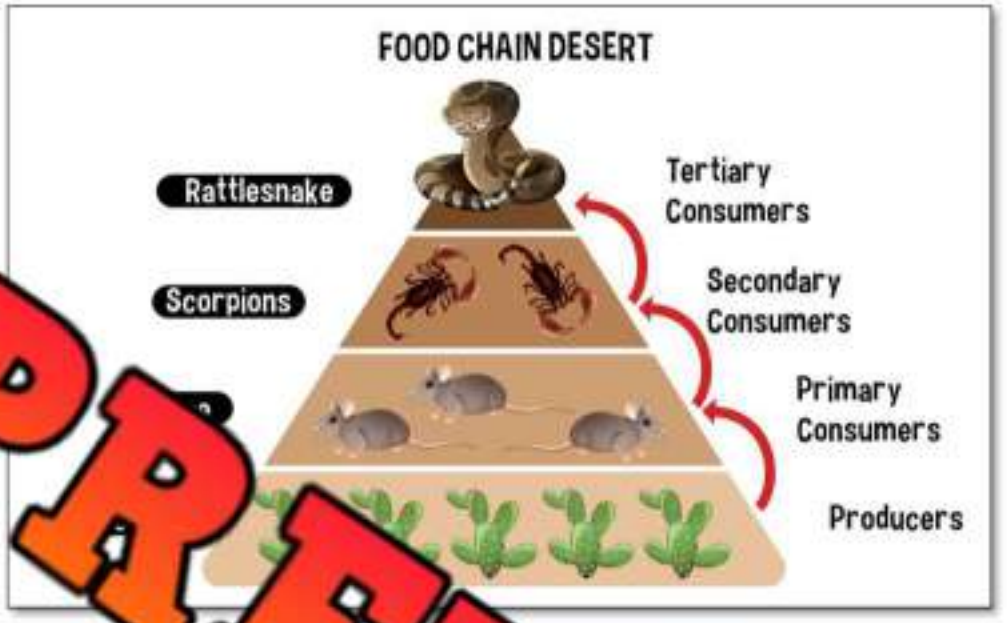
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Food Chain - Desert



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Questions	Answer th ns b

1) Describe the food chain in the des

2) What would happen if plants (cacti) stopped growing in the

3) Why do you think rattlesnakes are at the top? Why aren't there larger animals or birds living in the desert?

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Food Chain – African Savanna



Level	Examples
Primary [illegible]	Grass, Acacia Trees, Baobab Tree, Wild Fig, Star Grass
Prim[illegible]	Zebras, Elephants, Antelopes, Gazelles, Giraffes
Secondary Cons[illegible]	[illegible]gs, Baboons, Mongooses
Tertiary Consu[illegible]	Hye[illegible]an Wild Dogs, Cheetahs, Jackals
Top Predators	[illegible]iles, Leopards

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Questions Answer the ques[illegible] be[illegible]

1) Create your own food chain like the one abo[illegible]ng [illegible]nt animals.

2) Are the biggest animals always higher on the food chain? Explain.

3) Do animals only eat the animals below them on the food chain? Explain.

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B2.4

Create Your Food Web Drawing Contest

Objective What are we learning about?

To enhance students' understanding of ecosystems by having them create detailed drawings of food webs, which include producers, consumers, and decomposers.

Materials What will you need for the activity?

- Dr g pap et per student)
- Crayons, olo d pencils
- Reference ut co od webs (optional)
- A list of ecosyste com ts (to help students choose d w



Instructions How will you compl e acti

1) Explain that they will be drawing a comple ate fo b that includes producers, consumers, and decompos a gi osystem.
2) Provide each student with a sheet of drawing paper a d ac materials.
3) Allow students to select from a list of ecosystems (forest, ocea esert, etc.). They should choose one ecosystem and include appropriate producers, consumers, and decomposers in their food web.
4) Encourage students to think carefully about the different stages of the food web and how energy is transferred from one organism to another, ensuring they include various types of organisms.
5) Give students ample time to complete their drawings. They can use reference materials for ideas and accuracy.
6) Once everyone is finished, have a gallery walk where students can view each other's work and discuss the different stages and careers they included.

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B2.4

Handout Below are tables for each ecosystem.

Forest Ecosystem		
Producers	**Consumers**	**Decomposers**
Herbivores	**Carnivores**	
Oak Tre	Deer	Mushrooms
Pi	Rabbit	Moss
Bushes	rrel (re)	
Grass		
Flowers	Bear (ore)	
	Owl	

Ocean Ecosystem		
Producers	**Consumers**	**Deco po**
Herbivores	**Carnivores**	
Algae	Fish	Sea Sponges
Seaweed	Dolphin (Omnivore)	Bacteria
Plankton	Shark	
Coral	Seal	
	Sea Turtle (Omnivore)	

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B2.4

Handout Below are tables for each ecosystem.

Desert Ecosystem		
Producers	**Consumers**	**Decomposers**
Herbivores	**Carnivores**	
Cactus	Lizard	Fungi
Shrub	Snake	Bacteria
Wildflow	Coyote (Omnivore)	
G	Hawk	
	ck it	

cosystem		
Producers	**C**	**Decomposers**
Herbivores	**Carnivores**	
Grass	Zebra	arthworms
Wildflowers	Gazelle	les
Shrubs	Lion	
Trees	Hyena (Scavenger)	
	Elephant (Omnivore)	

Arctic Ecosystem		
Producers	**Consumers**	**Decomposers**
Herbivores	**Carnivores**	
Lichens	Caribou	Bacteria
Mosses	Polar Bear	Moss
	Arctic Fox (Omnivore)	
	Seal	
	Penguin	

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Draw Draw the different stages of your chosen food web's journey.

Ecosystem Name: _____

Producers (All the producers (plants, algae) Use green colour)

Herbivores ( )	ores (red colour)	Omnivores (yellow colour)

Decomposers (use brown colour)

Draw arrows from each food source to the animals that eat it, indicating the flow of energy.

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Curriculum Connection
B2.4

Reflection Answer the questions below.

1) What ecosystem did you choose for your food web and why?

2) H[illegible]ch organisms to include in your food web?

3) What did you learn about the roles of produ[illegible]cons[illegible]s, and decomposers in your chosen ecosystem?

4) What was the most challenging part of creating your food web and how did you overcome it?

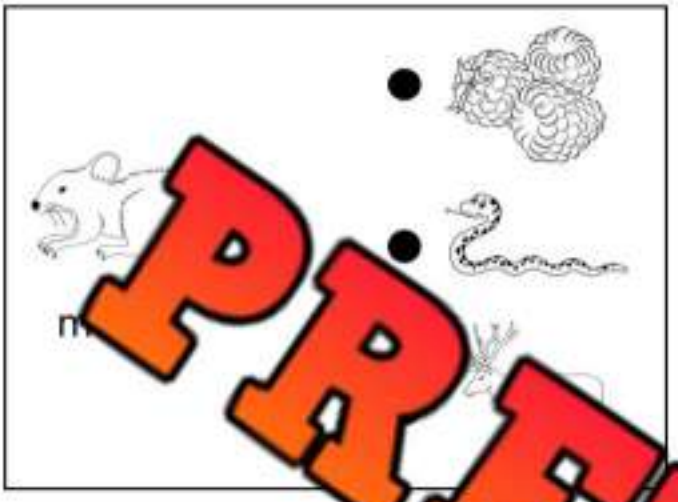
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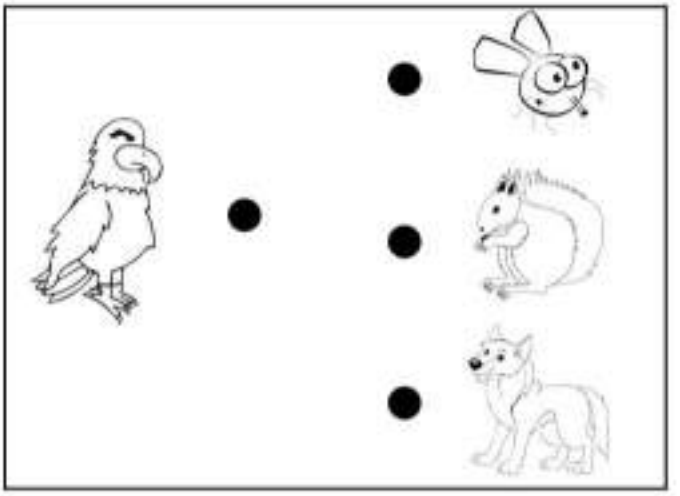
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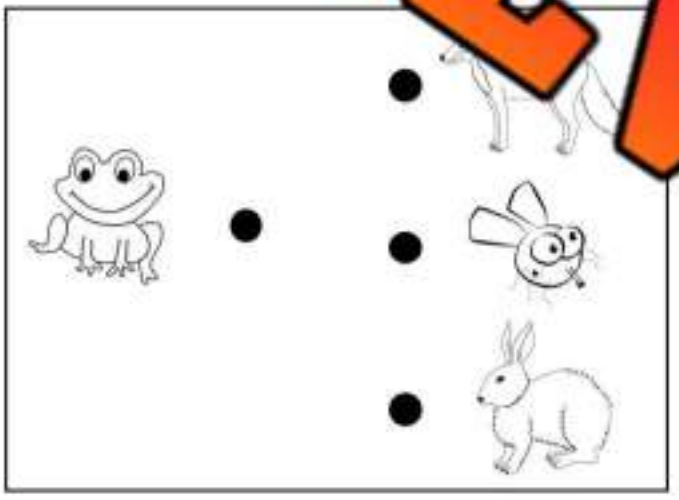
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Food Chain - Animal's Food

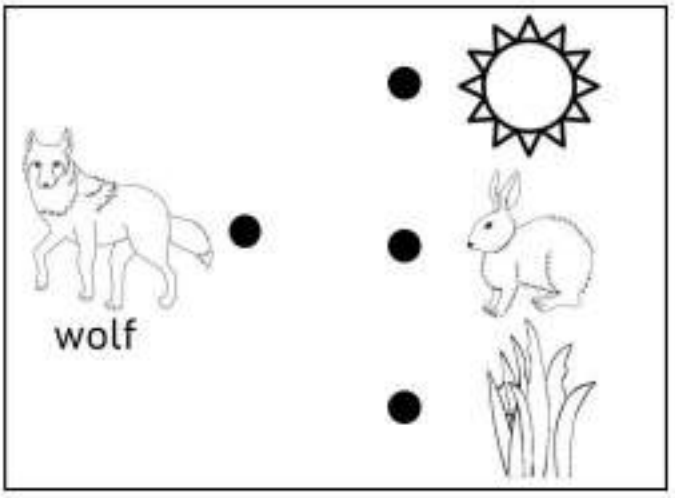
Matching Draw a line from the animal to what it eats for energy.

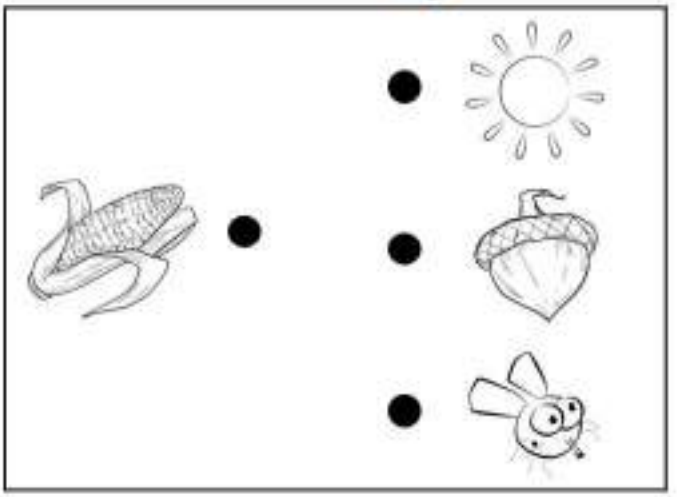










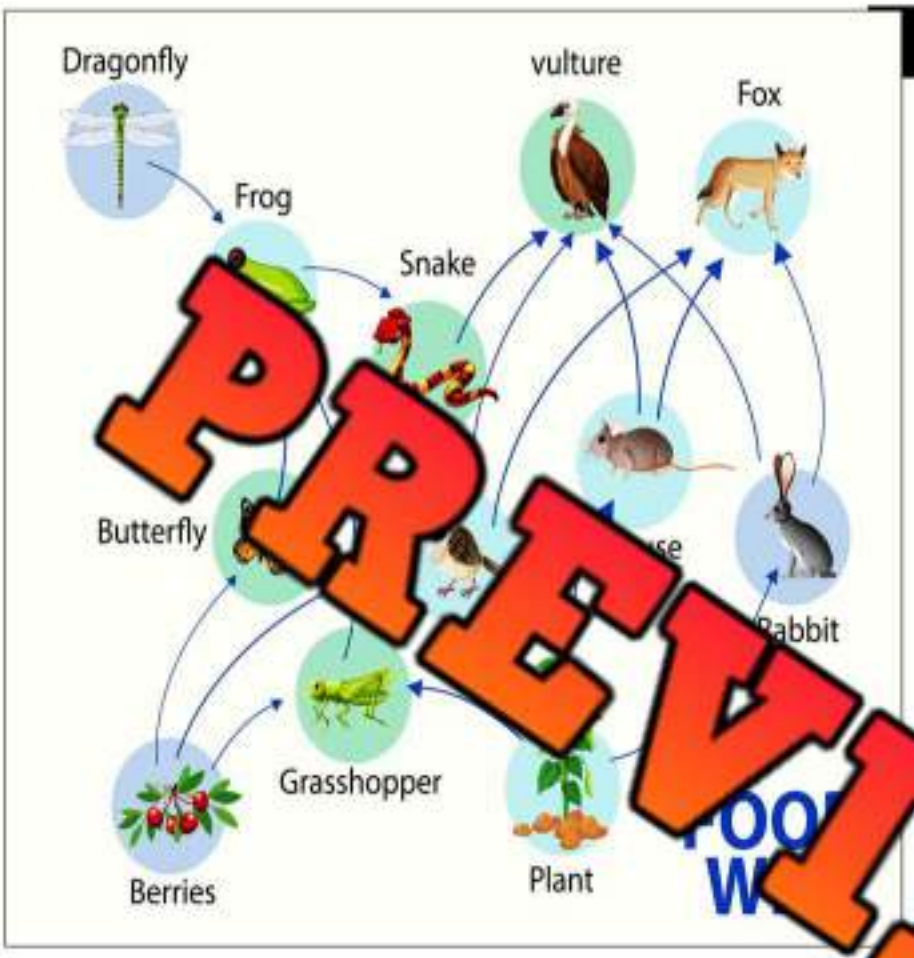


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B2.4

Reading a Food Web



Fill in the table

Producers
Primary Consumers
Secondary Consumers
Tertiary Consumers

Questions Answer the questions below.

1) What might happen if butterflies became extinct?

2) Choose another animal and explain its importance to the food web.

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B2.4

Ecosystem Vocabulary Spelling Bee

Objective What are we learning about?

To enhance students' understanding and retention of key vocabulary related to ecosystems, food chains, and energy transfer through a competitive spelling bee format.

Materia ...will you need for the activity?

- List of spe... el... to ecosystems, food chains, an... transf... ided
- Bell or buzzer for ... incorr... llings



Instructions How will you comple... ctivi...

1) Use the list of spelling words related to ... chai... ...ransfer, and ecosystems.
2) Divide participants into teams or have them compe... ...ivi... ... class size and dynamics.
3) Clarify the rules, including turn-taking, scoring, and handling o... ...spellings.
4) Begin the bee by having the first participant spell a word from the theme list, noting their attempt on the board.
5) Use a signal device to indicate correct or incorrect responses and display the correct spelling for any mistakes.
6) Progress through participants, allowing multiple attempts and cycling through the word list.
7) Tally correct spellings to determine scores for each participant or team.

PREVIEW

Name: _____ 130

Curriculum Connection
B2.4

Spelling Terms List of ecosystems and energy transfer related words.

Easy	Moderate	Hard	Very Hard
Plant	Herbivore	Photosynthesis	Biodiversity
Water	Carnivore	Decomposer	Ecosystem
S	Omnivore	Habitat	Conservation
e	od Chain	Aquatic	Energy Flow
Grass	M	Nutrients	Temperate
Soil		Tropical	Food Web
Leaf	Reptile	Pr r	Pollination
Flower	Insect	sum	Community
Fungi	Desert	Scave	Ecology
Bird	Pollen	Nectar	on
Seed	Bacteria	Migration	Wildlife
Fruit	Shark	Breakdown	Creature
Scat	Humus	Dragonfly	Mushroom
Algae	Predator	Prey	Decomposition
Bush	Adaptation	Environment	Species

PREVIEW

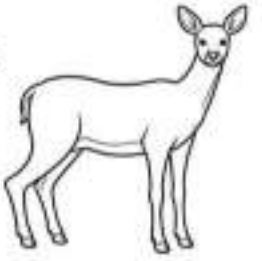
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Curriculum Connection
B2.5

Herbivores, Carnivores, Omnivores

Herbivores
Consumers that are **herbivores** eat only plants. Examples of herbivores are cows, deer, goats, gorillas, butterflies, camels, horses, rabbits, rhinos, and sheep.



Carnivores
Consumers that are **carnivores** eat only other animals for energy. Examples [illegible]ers, lions, sharks, walrus, platypus, penguins, wolves, owls, alligators, and foxes.

Omni[illegible]
Cons[illegible] that ar[illegible]**es** eat both plants and animals. They eat whatever they can find! Exa[illegible]ples o[illegible] in[illegible]de dogs, cats, pigs, chickens, squirrels, rats, bears, raccoons, coy[illegible], ant[illegible]ost humans.

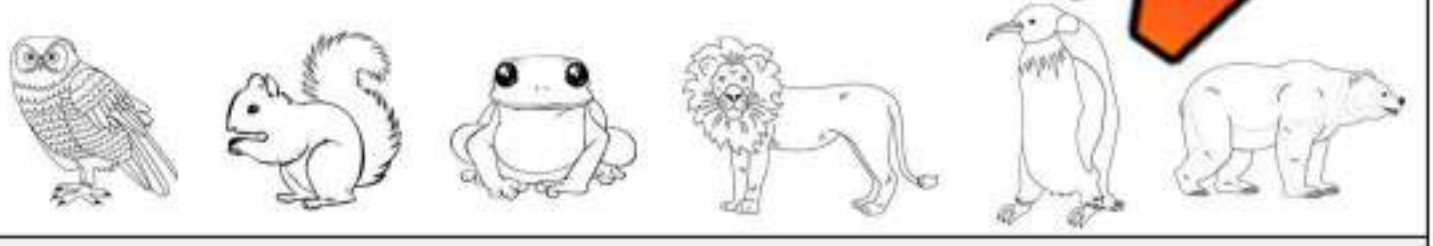
PREVIEW

Questions | Answer[illegible]ions

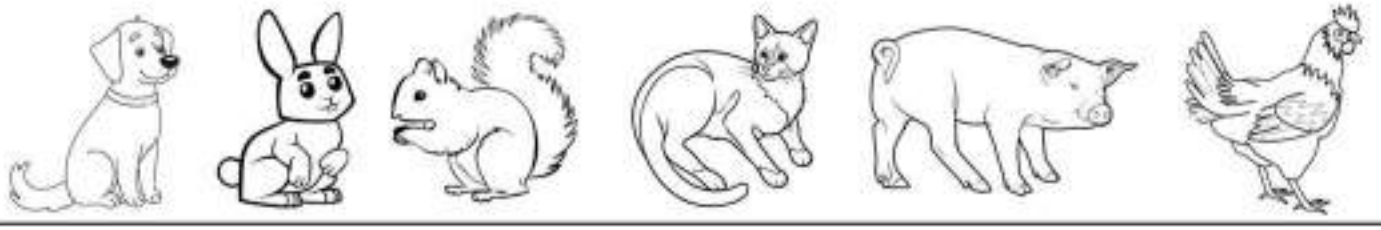
1) Circle the animals that are herbiv[illegible]



2) Circle the animals that are carnivores.



3) Circle the animals that are omnivores

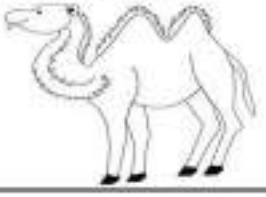


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Curriculum Connection
B2.5

Directions Is the organism a carnivore, herbivore or omnivore?

Elephant 	Bird 	Turtle 
Snake 	Skunk 	Chipmunk 
Frog 	Fish 	ider 
Alligator 	Camel 	Beaver 

PREVIEW

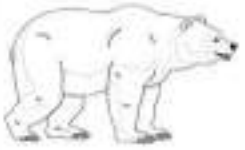
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Name: _____ 133

Curriculum Connection
B2.5

Classifying Organisms

Research Fill in the table about the organisms in the first column.

Animals	Producer, Consumer, Decomposer	Herbivore, Omnivore, Carnivore	Primary Producer or Primary, Secondary, Tertiary, Quaternary Consumer
 Ea			
 Grass			
 Rabbit			
 Bear			
 Fox			
 Deer			

PREVIEW

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Curriculum Connection
B2.7

Blog Post: Impact of Invasive Species

Impact of Invasive Species

Date: March 28, 2026 Author: By: Ava Benjamin *3-minute read*

Imagine you have a fish tank with only goldfish. One day, you introduce a new fish, not knowing it's a piranha. Soon, the piranha begins to harm your goldfish. This is similar to what happens when invasive species enter new environments.

Invasive species are plants, animals, or other organisms that are not native to an ecosystem and cause harm. For example, zebra mussels, originally from Russia, were found in the Great Lakes. These small creatures attach to surfaces, multiply quickly, and filter large amounts of plankton that other species need to survive. This disrupts the food chain and harms the local ecosystem.

Another example is purple loosestrife, a beautiful but aggressive plant that takes over wetlands. It squeezes out native plants and reduces biodiversity.

Invasive species can outcompete native species for resources, introduce diseases and change habitat conditions.

The impact is usually negative and can lead to the decline or extinction of native species, affecting biodiversity and the local economy.

Till next time,
Ava Benjamin

PREVIEW

Comments:



Lisa Ray – March 29, 2026

Very informative post! However, it's important to note that sometimes humans intentionally introduce species for agriculture or aesthetic reasons without knowing the consequences.

Like Reply 2 weeks ago



John Carter – April 12, 2026

Lisa, I respectfully disagree. Intentional or not, the introduction of invasive species almost always ends badly for the native ecosystems. In Ontario, zebra mussels block municipal water intake pipes and destroy fish habitat and food webs, not to mention the irreversible environmental impacts!

Like Reply 1 hr ago

Name: _____ 141

Curriculum Connection
B2.7

True or False Is the statement true or false?

1) Invasive species can introduce new diseases.	True	False
2) All non-native species are harmful.	True	False
3) Zebra mussels help increase plankton levels in lakes.	True	False
4) Invasive species can change habitat conditions.	True	False
5) Human[illegible]r intentionally introduce invasive species.	True	False

Questi[illegible] [illegible]uestions you have about the text.

1)	
2)	

Questions Answer the questions below.

1) What is an invasive species?

2) Why are invasive species problematic for local ecosystems?

PREVIEW

Name: _____ 148

Curriculum Connection
B1.1

Human Dependency on Habitats

Human Dependency on Habitats

We rely on natural habitats for many different reasons varying from survival needs to leisure activities. Humans find medicines in different habitats, obtain water from freshwater sources, control floods using wetlands, and enjoy recreational activities in different habitats.



Water

Humans ... ater habitats for drinking water. Rivers, creeks, lakes, ponds, and ... ater habitats. Freshwater accounts for only three percent ... the w... r as the rest is saltwater.

Preventing Floo...

Wetlands slow the ... ws the water to seep into the ground, th... ishin... und water supply that most plants and ... d... slowing of the water flow also ... duc... areas downstream and around them ... nds s... Canada up to $500 million in flood damages.



Leisure Activities

Humans use many different habitats for leisure ac... leisu... vity is an activity that is done for enjoyment, amusement or plea... nd ... to be fun. We use mountain habitats for hiking, biking, and skiing/snowboarding.

We also use water habitats for swimming and boating. Many other habitats offer recreational activities that humans rely on for pleasure and enjoyment.





Finding Medicines

Medicines are critical to the survival of humans as we depend on them to cure diseases and offer pain relief for our ailments. Different medicines grow in different habitats, which makes it important to preserve all of the habitats on the Earth so we can have access to the variety of medicines that we need.

PREVIEW

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Curriculum Connection
B1.1

Questions

Answer the questions below using evidence from the text.

1) What do you think we rely on the most from natural habitats?

2) What l ctivities do you enjoy the most? Which habitat do you use?

PREVIEW

Making Connections

Wha the ind you of?

True or False

Circle whether the statement is true or false.

1) Medicines only grow in tropical rainforests.	True	False
2) Humans use different natural habitats for leisure activities.	True	False
3) Wetlands stop flooding by storing water and reducing water flow.	True	False
4) Humans need freshwater from oceans.	True	False
5) Saltwater accounts for 97% of the water on the planet.	True	False

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Name: _____ 154

Curriculum Connection
B1.1

Role Play – Humans Destroying Habitats

Objective — What are we learning about?

To help students understand and demonstrate how human activities can damage habitats.

Materials — What do we need?

- ✓ [illegible]
- ✓ Co[illegible]mes a[illegible]
- ✓ A space [illegible] ar[illegible]rformance
- ✓ Camera o[illegible]hone [illegible]ding (optional)



Method — How do we [illegible] the [illegible]nt?

1) Cut out the human activities on [illegible]xt pag[illegible]old each one up. Place them in a hat.
2) Divide the class into small groups of 3-[illegible]ent
3) Each group will pick a piece of paper from the [illegible]hum[illegible]vity written on the paper will be the theme for their skit.
4) Give the groups time to research their chosen human acti[illegible]uld understand how the activity damages habitats and what effect [illegible]on animals, plants, and the environment.
5) Each group will then brainstorm and write a short skit that shows how this human activity damages a habitat. Make sure the skit includes a solution or a call to action to solve this problem.
6) Groups will need to rehearse their skit, deciding who will play each role and how they will perform their skit.
7) Finally, each group will perform their skit for the class. After each skit, have a class discussion about the human activity and what we can do to lessen our impact on habitats.

PREVIEW

Name: _____ 155

Curriculum Connection
B1.1

Deforestation: Cutting down trees removes the habitat of many animals and plants, leading to loss of biodiversity.

Urbanization: Building cities and expanding human settlements often destroys natural habitats.

Pol[illegible]aste into rivers, oceans, or on land can poison habit[illegible]and [illegible]n unlivable.

Overfishing: Removi[illegible]many [illegible]om the sea disrupts the balance of aquatic ecosystems.

Mining: Taking resources from the ea[illegible]n lea[illegible]tat destruction and pollution.

Agriculture: Large-scale farming often involves clear[illegible]using pesticides which can destroy habitats.

Climate Change: Human activities leading to global warming can cause habitats to change faster than wildlife can adapt.

Poaching and Hunting: Illegal or excessive hunting can deplete wildlife populations and disrupt habitats.

PREVIEW

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Name: _____ 156

Curriculum Connection
B1.1

Planning Plan your skit below.

1) What is the human activity for your skit?

2) How will you act out this skit?

a) What characters will you have? Who will play who?

b) What will happen in your skit?

c) What will the solution to the human activity be?

PREVIEW

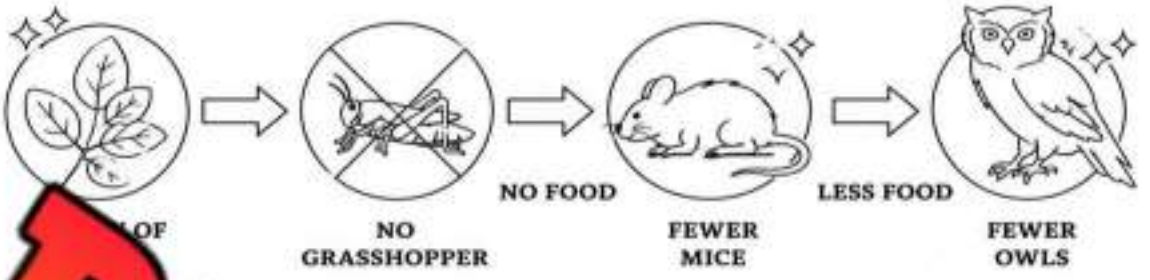
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Name: _____ 159

Curriculum Connection
B1.1, B1.2

Altering the Food Chain

IMPORTANCE OF THE FOOD CHAIN



Chan C

When we ange e we can sometimes cause unintended changes to food chains that can affect differe In the basic example above, you can see that if we get rid of grasshopp e l ill grow drastically while the mice population will shrink. With less mice e ow n will also shrink.

Altering the Food Chain – Real L Exan

In Borneo, DDT was used as a pesticide mosqui ried malaria. **Malaria** is a disease caused by a parasite that mosquitoes sp peopl a can be deadly but usually causes flu-like symptoms.

The problem with using DDT was that it didn't just squi also killed all the other insects in the region it was used. This meant the coc che h were the main food for lizards. The number of lizards dropped dram as the number of cats that ate the lizards. The cats kept the rat population under ol. With less cats, the rat population grew tremendously.

The overpopulation of rats became a serious problem in Borneo. The rats ended up causing multiple epidemics that caused more deaths than malaria caused in the first place. To solve the problem of too many rats, the government of Borneo brought in thousands of cats from other countries. "Operation Cat Drop" was a success! With cats back in Borneo, they began to control the rat population.

Many lessons were learned from Borneo. Mainly that if you don't understand the inter-relationships between things, solutions often cause more problems.

PREVIEW

Name: _____ 160

Curriculum Connection
B1.1, B1.2

Questions Use information from the text to support your answer.

1) What can happen if we alter a food chain?

2) Give yo[illegible] example of a food chain. Discuss what would happen if humans affected [illegible] of the chain.

PREVIEW

Summarize What happened in Bo[illegible]

True or False Circle whether the statement is true or false.

1) When humans get rid of pests, it can have an effect on other animals.	T	F
2) In Borneo, the use of DDT was successful in eliminating mosquitos.	T	F
3) Getting rid of mosquitos would have no other consequences.	T	F
4) Eliminating one species will only affect the organisms that feed on them.	T	F
5) One small change in a habitat can cause big changes to all organisms.	T	F

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Curriculum Connection
B1.1, B1.2

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Circle the correct answer.

1) What happened to the mice when there were no grasshoppers?	Fewer mice
	More mice
2) What happened to the owls when there were fewer mice?	More owls
	Fewer owls
3) The rat population grow in Borneo because_?	Fewer cats
	More mosquitoes
4) What did scientists bring back to Borneo to help control the rats?	Cats
	Snakes
5) What happened to the leaf population when the grasshoppers disappeared?	Leaves increased
	Leaves disappeared

Name: _____ Mark

Circle the correct answer.

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	Leaves disappeared

PREVIEW

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Name: _____ 162

Curriculum Connection
B1.1

How You Can Help Habitats

Importance of Helping Habitats

Every species in a habitat is important. We need each other to maintain the balance of life that we currently have. Remember, if one species goes extinct, it can be devastating to other species.

For example, if the coyote population became extinct, the deer population would grow out of control. This would have an impact on plant species as deer are herbivores that eat bark, leaves, and other plants.

PREVIEW

How You Can Help

You can stand up for habitat life by doing one of the following things:



- **Your voice matters** – Write to elected officials and government agencies to restrict hunting, fishing, and other threats to protect plants and animals
- **Clean up trash in a habitat** – organize a garbage clean-up in a local forest or at a local stream to help the fish
- **Reduce, reuse, recycle** – Waste is a huge problem for habitats because the more we waste, the more garbage we have in our habitats. Use the 3 Rs to help!
- **Save energy** – Drive less, use energy efficient vehicles and appliances and turn off the lights when you leave a room. Doing these things will use less energy, which means less fossil fuels being burned. The burning of fossil fuels hurts habitats because it is heating up our planet and changing the makeup of habitats.





- **Do not cut down trees or damage plants** – Instead, try planting native flowers, trees, and bushes in your backyard. Don't use chemical pesticides or fertilizers when you are planting!

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Name: _____ 163

Curriculum Connection
B1.1

Action Plan

What are you going to do to help habitats in your area?

Brainstorm 5 specific ideas that you could do to help habitats in your area.	
1)	
2)	
3)	
4)	
5)	

PREVIEW

Draw

Draw a picture of a healthy habitat and an u habit

Healthy Habitat	Unheal

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Name: _____ Date: _____

Habitats and Communities - Unit Test

Multiple Choice /6

1) Which of the following is **not** a survival need for animals? a) Water b) Food c) Air d) Social [illegible]ips	2) An animal that eats both plants and animals is a... a) Carnivore b) Herbivore c) Omnivore d) Multivore
3) Pl[illegible] cr[illegible]r own food are... a) Consumers b) Decomposers c) Producers d) All of the above	4) Animals that do not have any predators are... a) Tertiary Consumers b) Primary Consumers c) Quaternary Consumers d) [illegible]ondary Consumers
5) Fungi and bacteria that eat dec[illegible]ng matter are called... a) Consumers b) Decomposers c) Producers d) All of the above	[illegible] Whi[illegible]e following is a decomposer? a) S[illegible] b) [illegible] c) Fungi d) Dragonfly
7) Which terrestrial habitat has the most animals living in it? a) Desert habitat b) Grassland habitat c) Forest habitat d) Wetland habitat	8) Which aquatic habi[illegible] animals living in it? a) Lake habitat b) Pond habitat c) Swamp habitat d) Coral Reef habitat
9) Which wetland has trees and water? a) Swamp b) March c) Bog d) Fen	10) Which animal is an omnivore? a) Deer b) Bear c) Penguin d) Horse

PREVIEW

Definitions (1 marks each) /3

Term	Definition (what does it mean)
Carrying Capacity	
Habitat	
Food Chain	

PREVIEW

Short Answer Questions (2 ma[illegible]s ea[illegible]

1) What is the difference between a ge[illegible]eralize[illegible]cies [illegible] specialized species?

2) How do humans rely on habitats for their survival?

3) How have plants and animals been designed to survive in their environment?
Think: Cactus, Fish

Long Answer Questions **/10**

1) What is the food chain? What part do decomposers, plants, and animals play in the food chain? How are nutrients transferred to the different parts of the food chain?

2) Choose one habitat and describe its climate (temperature and precipitation), animals, plants, as well as the adaptations the plants and animals have that allow them to survive in the habitat.

PREVIEW

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Ontario Science Curriculum

Rocks, Minerals, & Geological Processes– Grade 4

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!



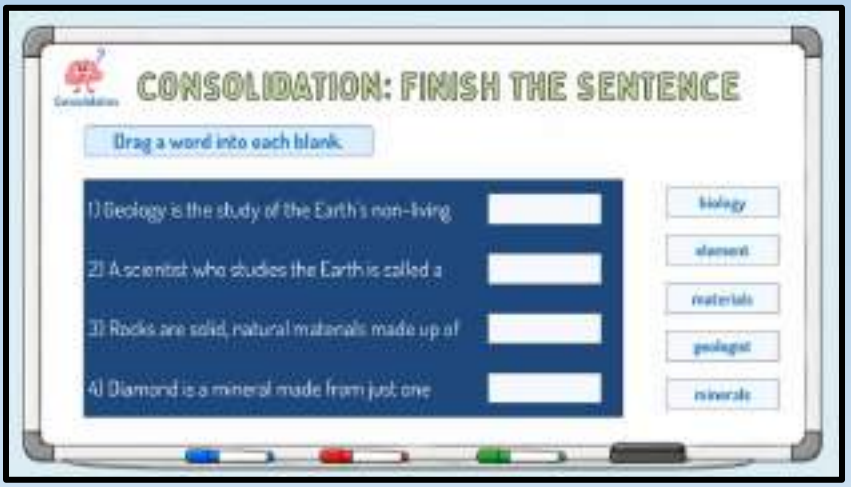


Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

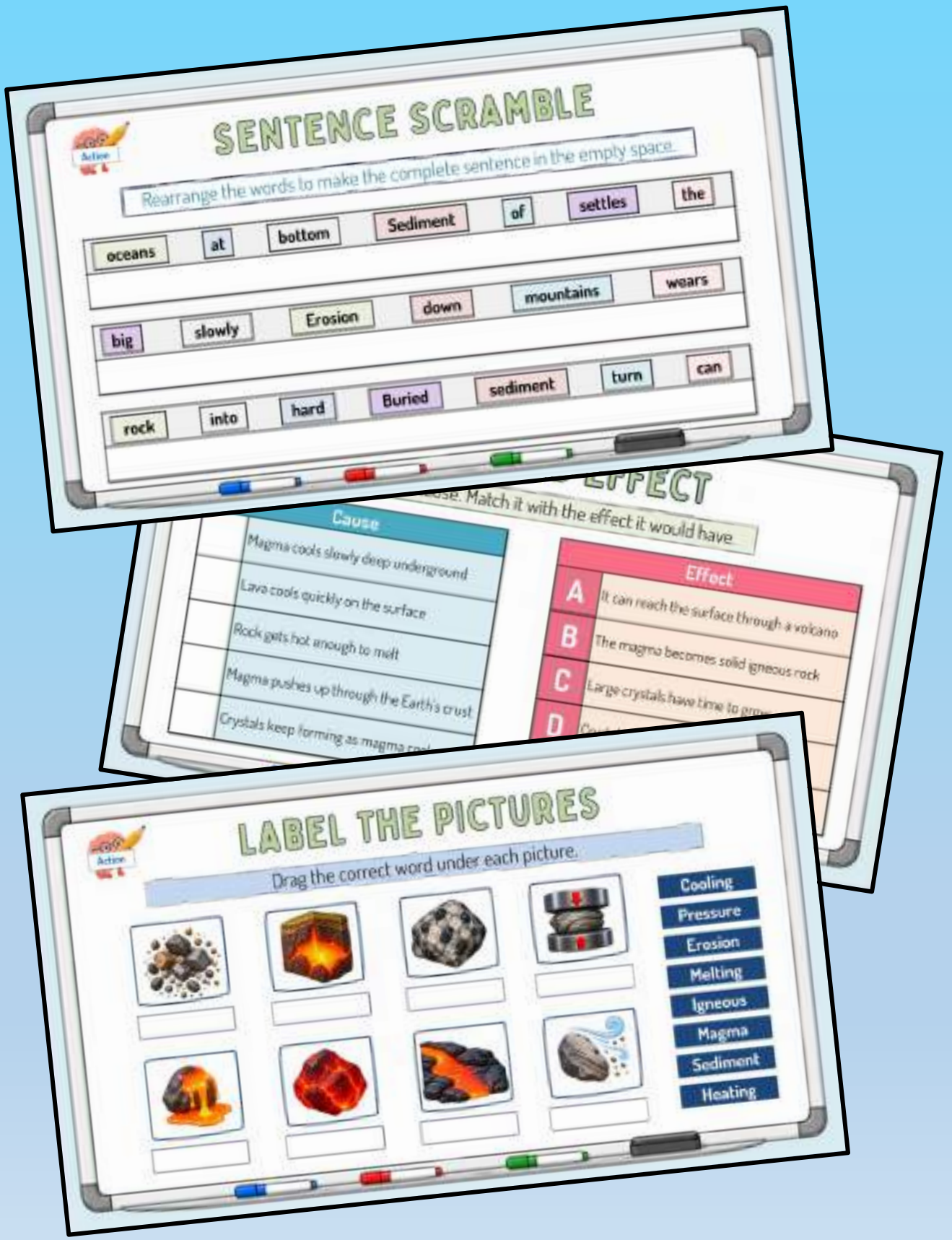
Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!



Ontario Science Curriculum

Rocks, Minerals, & Geological Processes– Grade 4



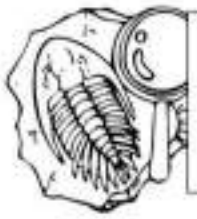
Ontario Science Curriculum

Rocks, Minerals, & Geological Processes– Grade 4



Workbook Preview

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Grade 4 Science – 2022 Curriculum

Rocks, Minerals, and Geological Processes



	Curriculum Expectations	Pages
E1.1	analyse ways in which geological processes impact society and the environment	75-96, 112-114
E1.2	assess social and environmental impacts of extracting and refining rocks and minerals and of manufacturing, recycling, and disposing of products derived from rocks and minerals, while taking various perspectives into account	125-133
E2.1		29, 71-, 112-
E2.2		9-62, 0
E2.3	classify different rocks and minerals according to their composition and physical properties, using various tests and criteria	35-38, 53-58
E2.4	describe everyday uses of rocks and minerals	115-118
E2.5	describe how fossils are formed and what information they can provide about Earth's history	101-103, 106-111
E2.6	demonstrate an understanding of First Nations, Métis, and Inuit geological knowledges that are used in the selection of different rocks and minerals for specific purposes	120-122

Preview of 100 pages from this product that contains 217 pages total.

Grade 4 Science Unit

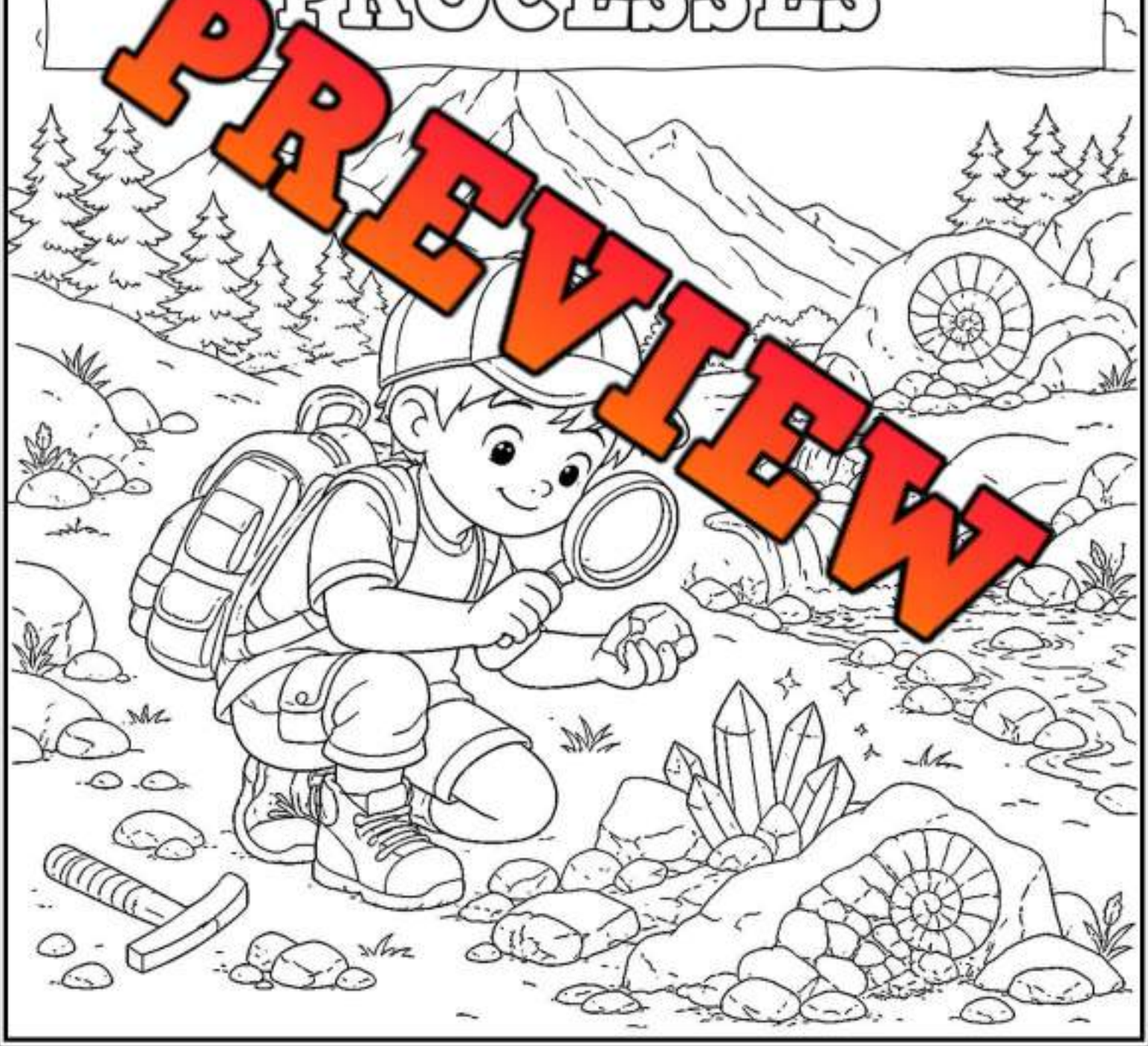
Strand A - STEM Investigation and Communication Skills

	Curriculum Expectations	Pages
A1.1	use a scientific research process and associated skills to conduct investigations	137-138, 143-146
A1.2	use a scientific experimentation process and associated skills to conduct investigations	63-64
A1.3	use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems	16-17, 99-100, 104-105, 123-124
A1.4	follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials	16-17, 63-64, 99-100, 104-105, 123-124
A1.5	communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes	16-17, 63-64, 99-100, 104-105, 123-124
A2.1	write and execute code in investigations and when modelling concepts, with a focus on decomposing problems into smaller steps	30-34, 119, 139-142
A2.2	identify and describe impacts of coding and of emerging technologies on everyday life	119, 143-146
A3.1	describe practical applications of science and technology concepts in their home and community, and how these applications address real-world problems	134-138, 143-146
A3.2	investigate how science and technology can be used with other subject areas to address real-world problems	134-138, 143-146
A3.3	analyse contributions to science and technology from various communities	134-138, 143-146

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NAME: _____

ROCKS, MINERALS AND GEOLOGICAL PROCESSES



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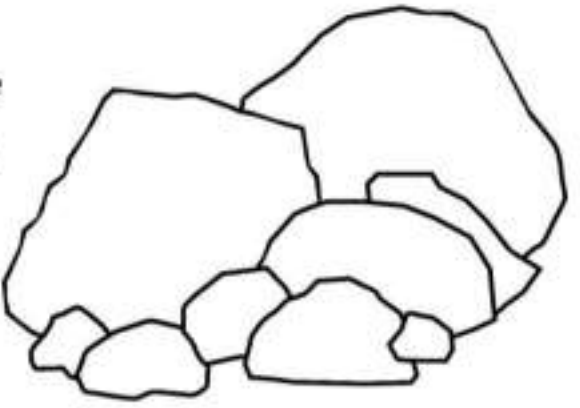
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Curriculum Connection
E2.1

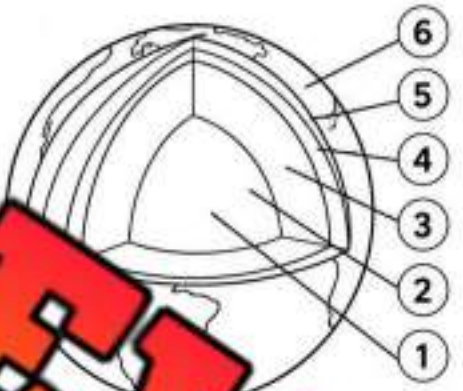
Geology

What is Geology?



Geology is the study of the materials that make up the Earth, the features and structures found on the Earth as well as the processes that act upon them. Geo means Ea[illegible]d ology means study of, so **geology,** is simply [illegible] of the Earth. Geology and biodi[illegible] because geology is the study o[illegible]n-livin[illegible] Earth, whereas biodiversity studies the living things on Earth.

Non-livi[illegible] all [illegible]at do not breathe, grow, or move. Living things are the things around u[illegible] can [illegible] and grow.



Why is Geology Important?

A scientist who studies the Earth is kno[illegible] **geolo**[illegible]. Geologists can tell us how the Earth was made, w[illegible]s made of, and how it has changed over time. They [illegible]nd map where important minerals like diamonds are, or w[illegible] we can find fuels like oil. They also provide information abou[illegible]ge[illegible] processes like earthquakes and floods.

PREVIEW

Geology Basics

- Minerals are naturally occurring substances that are sometimes made from one element but more often are compounds made from two or more elements
- Diamond is made up of just carbon, which means it is a mineral made from just one element. White fluorite is a compound made from the elements calcium and fluorine.
- Rocks and stones are naturally occurring solids made up of minerals.
- The Earth's crust is made up of rock
- Rocks have been used for millions of years as tools and weapons

Name: _____ 10

Curriculum Connection
E2.1

True or False

Circle whether the statement is true or false.

1) Geologists study the Earth and how it has changed.	True	False
2) Minerals are made of just one element.	True	False
3) A rock is a solid made from minerals.	True	False
4) The Earth's crust is made from rock.	True	False
5) Geo means Earth and ology means Earth.	True	False

Questions

Answer the questions below using evidence from the text.

1) Why is it important that we study geology?

2) What is the difference between geology and biology?

PREVIEW

Questioning

Write 3 questions you have about geology.

1)	
2)	
3)	

Curriculum Connection
E2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark ____

Check only the true statements.

Statement	✓
Geology is the study of the Earth and the materials that make it up.	
A geologist studies living animals and plants.	
Rocks and stones are naturally made up of minerals.	
The Earth's crust is mostly made of water.	
Geologists can help find important minerals and fuels.	
Diamonds are made from many different minerals.	

Name: _____ Mark ____

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A geologist studies living animals and plants.	
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Geologists can help find important minerals and fuels.	
Diamonds are made from many different minerals.	

PREVIEW

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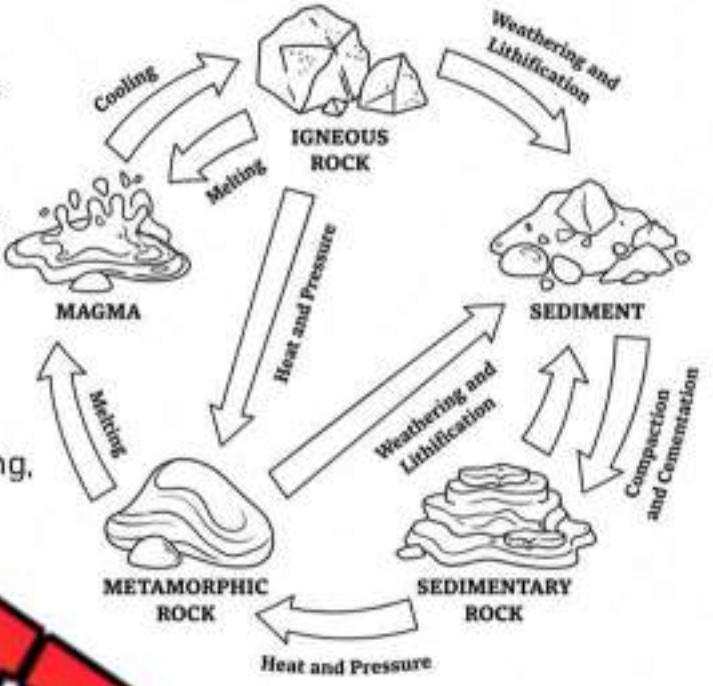
Curriculum Connection
E2.1

The Rock Cycle

The Rock Cycle

The **Rock Cycle** is the process by which rocks change forms from one type to another.

There are three main kinds of rocks: igneous rock, meta[illegible]phic rock, and sedimentary rock. Each [illegible]rock can change into anoth[illegible]g [illegible]following physical proces[illegible]compa[illegible]nting, weathering, cooling, melti[illegible]and p[illegible]



PREVIEW

Magma and Sedimen[illegible]

Magma and sediment are [illegible]s tha[illegible] become rocks and enter the roc[illegible]cycle. [illegible]ock that is underground.

Sediments are particles from ro[illegible]ion an[illegible]. These sediments eventually will become sedimentary rock in the [illegible]

Igneous Rock

Igneous rock is hardened magma that can happen below [illegible]the [illegible]. It can become one of the other types of rocks through the following proce[illegible] magma, eroding into sediment, or be compacted and pressurized to [illegible]eco[illegible] metamorphic.

Metamorphic Rock

Metamorphic rock is igneous or sedimentary rock that has been heated and squeezed under heat and pressure. It can erode into sediment or melt into magma.

Sedimentary Rock

Sedimentary rock is compacted sediment. Sediment can be in the form of tiny rock materials or remains of living things. When these tiny materials are compacted together, they form a weak rock known as sedimentary rock.

Name: _____ 13

Curriculum Connection
E2.1

True or False

Circle whether the statement is true or false.

1) Metamorphic rock is hardened magma.	True	False
2) Rocks can change forms under physical processes like heating.	True	False
3) Sediments are big chunks of rock.	True	False
4) A sedimentary rock is very strong and tough to break.	True	False
5) Igneou[illegible]k can be compacted to become metamorphic.	True	False

Quest[illegible]

[illegible]w[illegible]questions below using evidence from the text.

1) What is the[illegible]

2) How can rocks change from one form into anoth[illegible]

PREVIEW

Summarize

What is the main idea and supporting details from the reading passage?

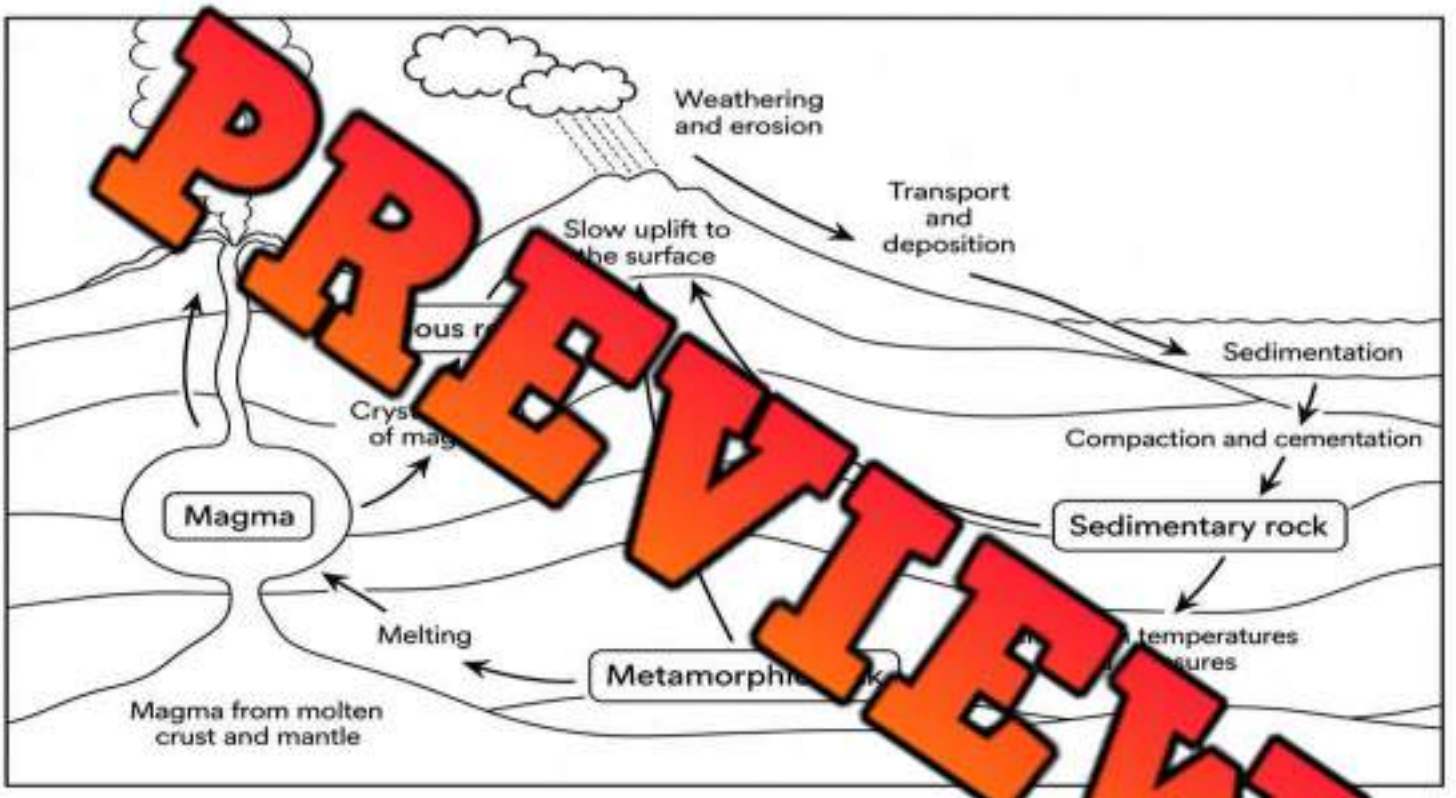
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Curriculum Connection
E2.1

The Rock Cycle – Diagram

The Rock Cycle
The rock cycle is a long, slow journey for rocks to travel from the Earth's inner core to the Earth's surface and then back down again. Rocks change during the process that we call the rock cycle. Throughout the rock cycle, rocks form deep in the Earth and often change forms through intense heating, compacting, erosion and settling. The three main kinds of rocks are igneous, sedimentary, and metamorphic.



PREVIEW

Interpret Read the diagram and answer the question below

Describe the journey of a rock through the rock cycle. Notice that it is not a perfect circle, and that not all rocks go through the same journey.

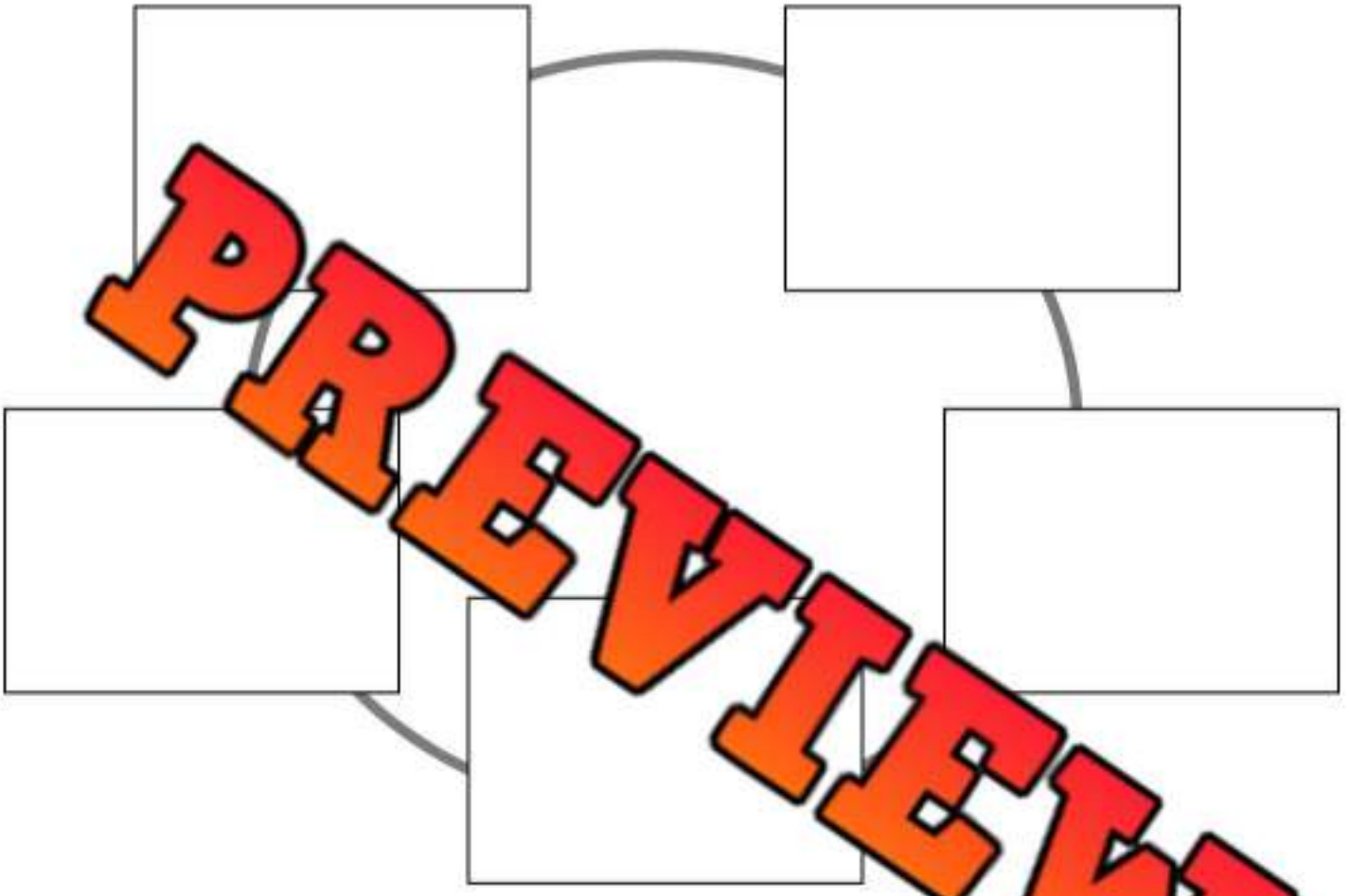
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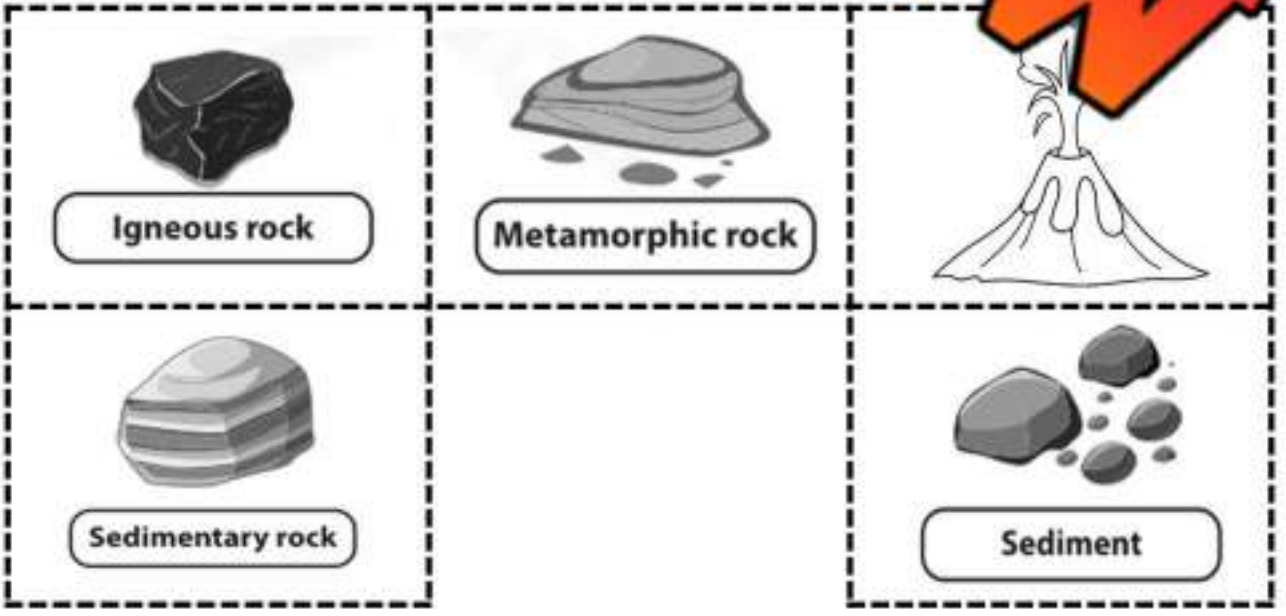
Curriculum Connection
E2.1

The Rock Cycle

Instructions Cut and paste the stages of rock cycle in the correct order.



PREVIEW



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Name: _____ 16

Curriculum Connection
A1.3, A1.4, A1.5

Chocolate Rock Cycle Lab

Information | What is this lab about?

The **rock cycle** is the process by which rocks change forms from one type to another. There are three main kinds of rocks: **igneous rock**, **metamorphic rock**, and **sedimentary rock**. Each type of rock can change into another type through the following physical processes: cooling, melting, heating, compacting, cementing, weathering, and extreme pressure.

PREVIEW

Research
How is e formed?



Mate
1. Dark and white baking squares
2. Tinfoil
3. Plastic knife
4. Hot water
5. Empty container



Method
1) To make sedimentary chocolate, sc otat vings off of the baking squares. Put the shavings onto a piece of ti d wrap tinfoil to enclose the chocolate shavings. Press down on the tinfoil our r by standing on it. Open the tinfoil enclosure and observe the entar
2) Create a bowl/boat with your tinfoil. Place ye edi g with some more chocolate shavings and some bigger chunks aking ate in the tinfoil boat. Fill your empty container with hot water e y il t on the water. Let the heat from the water melt your chocola until uch (test with your knife!). After allowing the chocolate to cool, obs chocolate is similar to metamorphic rock.
3) Use pieces of your sedimentary and metamorphic rock as well as so eces of your original baking chocolate and put them in the tinfoil boat. Place your boat on very hot water and allow the chocolate to melt until it is a liquid. Carefully remove the boat from the water and allow the chocolate to cool. Observe how this is similar to igneous rock.

Hypothesis – What do you think will happen?

How will heat and pressure affect the chocolate?

_____

_____

_____

_____

Name: _____ 17

Curriculum Connection
A1.3, A1.4, A1.5

Observations | What happened?

Type of Rock	Observations
Sedimentary	
Metamorphic	
Igne	

PREVIEW

Results | An[illegible]low.

1) Was your hypothesis [illegible]?

2) How was sedimentary rock formed? How was th[illegible]ow the other two types of rocks were formed? How was it simila[illegible]

3) How do these processes naturally occur on Earth? Where do they occ[illegible]

4) Do you think rocks stay as the same type of rock for all of time? Why or why not?

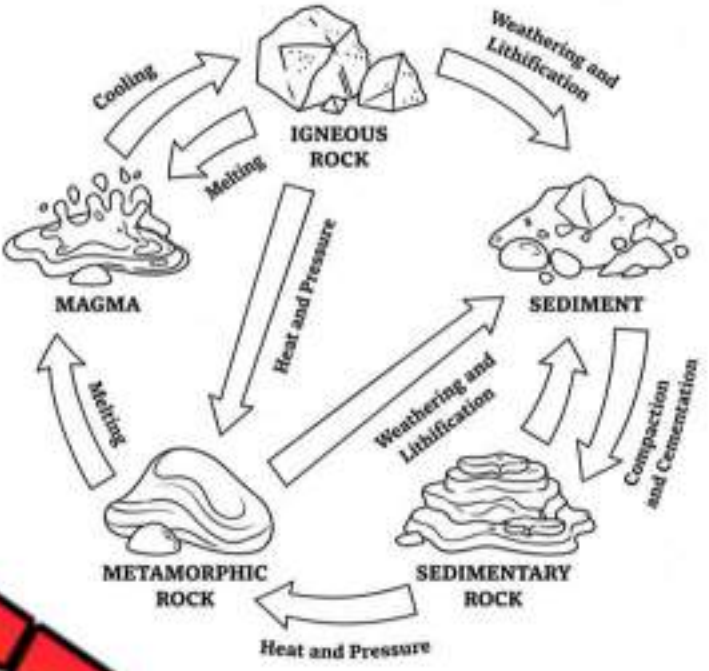
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Curriculum Connection
E2.1

Formation of Different Rocks

Explain Explain the questions below.



1) How are sedimentary rocks formed?

2) How ar orphic rocks formed?

3) How are igne form

4) How do igneous rocks turn into meta rock

5) How do metamorphic rocks turn into sedimentary ro

PREVIEW

True or False Circle whether the statement is true or false.

1) When magma is cooled, it turns into metamorphic rock.	True	False
2) Igneous and metamorphic rocks can be weathered into sediments.	True	False
3) Sediments are compacted and cemented into sedimentary rock.	True	False
4) Igneous rock cannot become metamorphic rock.	True	False
5) Through heat and pressure, magma becomes metamorphic rock.	True	False
6) Metamorphic rock can melt into magma.	True	False

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Curriculum Connection
E2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____

Circle the answer for each question.

Mark

What is underground liquid rock called?	Lava	Magma
Which rock forms when magma hardens?	Igneous	Metamorphic
Which process wears rocks into pieces?	Weathering	Cooling
Which process turns sediment into rock?	Cementing	Melting
Which rock forms from heat and pressure?	Sedimentary	Metamorphic

Name: _____

Circle the answer for each question.

Mark

What is underground liquid rock called?	Lava	Magma
Which rock forms when magma hardens?	Igneous	Metamorphic
Which process wears rocks into pieces?	Weathering	Cooling
Which process turns sediment into rock?	Cementing	Melting
Which rock forms from heat and pressure?	Sedimentary	Metamorphic

Name: _____

Circle the answer for each question.

Mark

What is underground liquid rock called?	Lava	Magma
Which rock forms when magma hardens?	Igneous	Metamorphic
Which process wears rocks into pieces?	Weathering	Cooling
Which process turns sediment into rock?	Cementing	Melting
Which rock forms from heat and pressure?	Sedimentary	Metamorphic

PREVIEW

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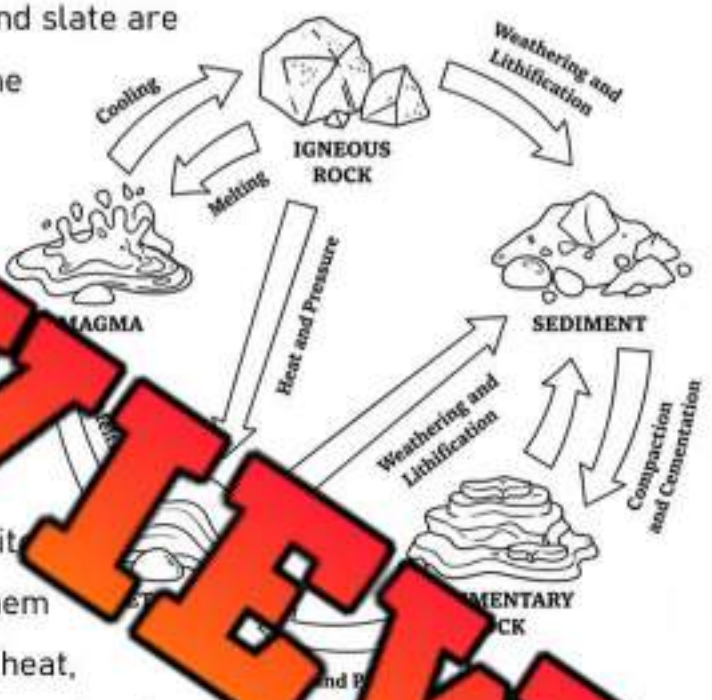
Curriculum Connection
E2.1

Metamorphic Rock



What is Metamorphic Rock?

Metamorphic rock is one stage a rock becomes in the rock cycle. Rocks become metamorphic when they are affected by high temperatures and pressures. They don't melt, but the chemicals they contain may change forms and you may see crystals inside of the rock. Marble and slate are two e… …hic rocks. The name **metamo…ic** com… Greek words "change of sha…



What do they look like…

As you can see in the pictu… …rp… rocks sometimes have alternating …and… and dark minerals. They can also be ma… mostly one mineral, such as marble or quartzit… Metamorphic rocks rarely contain fossils in them because of the extreme conditions (pressure, heat, compression) that they face. The fossils rarely survive these …ditio…

PREVIEW

How Metamorphic Rocks are Formed

Metamorphic rocks are formed from other rocks that are changed because of heat and pressure. They could start out as a sedimentary or igneous rock and then they metamorphosize into a metamorphic rock.

The conditions required to form a metamorphic rock are very specific. The existing rock must be exposed to high heat, high pressure deep inside the earth, or to a hot, mineral-rich fluid. These conditions are most often met deep in the Earth's crust. It is important for the existing rock to remain a solid and not melt. If there is too much heat or pressure, the rock will melt and become magma.

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Curriculum Connection
E2.1

True or False

Circle whether the statement is true or false.

1) All metamorphic rocks have dark and light bands in them.	True	False
2) Metamorphic rocks can form from a liquid.	True	False
3) Metamorphic rocks are made from extreme pressure and heat.	True	False
4) Metamorphic rocks form deep inside the Earth's crust.	True	False
5) If a metamorphic rock faces too much heat/pressure, it can melt.	True	False

Questions

Answer the questions below using evidence from the text.

1) What is a metamorphic rock? How is it made?

2) What do metamorphic rocks look like?

PREVIEW

Visualizing

Draw what you were picturing while you were reading. Explain the picture.

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Curriculum Connection
E2.1

Sedimentary Rock

What is Sedimentary Rock?



Sedimentary rocks are formed by sediment that is deposited over time, usually as layers at the bottom of lakes and oceans. **Sediment** is tiny pieces of plants, mi[illegible]s, and other organic matter that settle at t[illegible]n of a liquid. Over time, the sedi[illegible]ot[illegible] lakes and oceans become compre[illegible]d and [illegible] into solid layers of rock that we call sedimentary rock.

What Does Sedi[illegible] Rock L[illegible]

Sedimentary rocks ca[illegible] [illegible]or[illegible] minerals. The layers are usually the same shade. Other sedimentary r[illegible] like [illegible]cks that are compacted or cemented together. The picture in the bottom cor[illegible] thi[illegible] of sedimentary rock.

Sedimentary rocks sometimes co[illegible]n fossils [illegible]s b[illegible]se they are the softest rock that allow impressions to be made into th[illegible]er th[illegible]rphic and igneous rock. Over time, the soft sediment can be imprinted [illegible]eth[illegible]al [illegible]leaves of plants and what is left is a fossil that shows the shape o[illegible]t.

PREVIEW

How Sedimentary Rock Forms



As mountains age, rock gets worn down by erosion. **Erosion** is when water or wind removes tiny bits of rock from larger rocks.

A waterfall erodes the rock behind the falling water because the force of the water slowly breaks down the rock. The mountains we see erode much slower but are crumbling one little bit at a time.

The sediments end up on the Earth's surface. If sediment is buried deeply, it becomes compacted and cemented, forming sedimentary rock.

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Curriculum Connection
E2.1

True or False

Circle whether the statement is true or false.

1) Sediments are tiny pieces of rock, plants, or other organic material.	True	False
2) Erosion creates sediments from the movement of wind and water.	True	False
3) Waterfalls don't cause much erosion.	True	False
4) Sediments can be compacted or cemented into rocks.	True	False
5) When sediments are buried, they become metamorphic rocks.	True	False

Question

questions below using evidence from the text.

1) What is a sedi[illegible]? [illegible] is it formed?

2) Why are fossils more likely to form [illegible]mentar[illegible]?

PREVIEW

Making Connections

What does the reading remind you of?

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Curriculum Connection
E2.1

Igneous Rock

What is Igneous Rock?



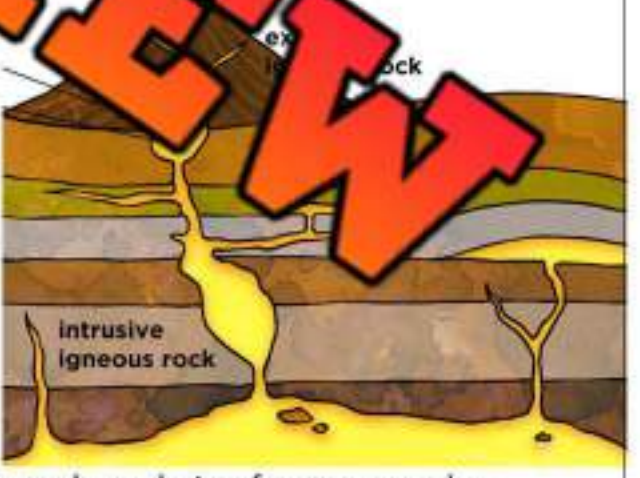
Igneous rock is rock formed when magma or molten lava cools and becomes a solid. Igneous rock can form above or below the Earth's surface. The upper section of the Earth's crust is made up of 95% ...ous rock. The rocks that form below the Earth's surface a... **intrusive rocks**, while the rocks that have cool... ...Earth's surface are called **extrusive rocks.**

PREVIEW

What do igneous ... like

When liquid mag... lava c... rm crystals. These crystals keep forming as the cooling process cont... ... crystals form, they smash into each other and form a rock that is so h... not ... art. An example of an igneous rock is granite. You can see the crystals in gran... ...many household kitchens.

When looking at an intrusive igne... ock tha... ...rmed below the surface, you can see the mineral crystals. Extrusive igne... cks c... ...ster because it is exposed to the cooler air temperatures outside of the Earth's crust. Extrusive igneous rocks have small grained crystals that are so small, you can't see them. The Earth's moon is made out of igneous rock!



How Igneous Rock is Made?

When sedimentary and metamorphic rocks make their way through the Earth's crust, they eventually reach pockets of magma under volcanoes. These sedimentary and metamorphic rocks melt and become magma when they are exposed to the magma in the Earth's crust. The magma reaches the Earth's surface through volcanoes. As the magma makes its way up towards the Earth's surface, it will cool and form into either intrusive or extrusive igneous rock.

Name: _____ 28

Curriculum Connection
E2.1

True or False Circle whether the statement is true or false.

1) Igneous rock forms when lava or magma cools and becomes a solid.	True	False
2) If a rock forms under the Earth's surface, it is an extrusive rock.	True	False
3) Intrusive rocks are formed under the Earth's surface.	True	False
4) Igneous rocks have lots of crystals in them.	True	False
5) Igneous [illegible] are not as strong as sedimentary rocks.	True	False

Questi[illegible]er [illegible]stions below using evidence from the text.

1) How is igne[illegible]ned?

2) What is the difference between intrusive and ext[illegible]e ig[illegible]rock?

PREVIEW

Visualizing Draw what you were picturing while you were reading. Exp[illegible] the picture.

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Curriculum Connection
E2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Circle the correct answer.

1) Which type of rock forms when magma or lava cools?	Sedimentary / Igneous
2) Which type of rock is most likely to contain fossils?	Sedimentary / Metamorphic
3) Which type of rock forms because of heat and pressure?	Igneous / Metamorphic
4) Which rock is an example of a metamorphic rock?	Granite / Marble
5) Which rock is made from layers of compacted sediment?	Sedimentary / Igneous

Name: _____ Mark

Circle the correct answer.

1) Which type of rock forms when magma or lava cools?	Sedimentary / Igneous
2) Which type of rock is most likely to contain fossils?	Sedimentary / Metamorphic
3) Which type of rock forms because of heat and pressure?	Igneous / Metamorphic
4) Which rock is an example of a metamorphic rock?	Granite / Marble
5) Which rock is made from layers of compacted sediment?	Sedimentary / Igneous

Name: _____ Mark

Circle the correct answer.

1) Which type of rock forms when magma or lava cools?	Sedimentary / Igneous
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3) Which type of rock forms because of heat and pressure?	Igneous / Metamorphic
4) Which rock is an example of a metamorphic rock?	Granite / Marble
5) Which rock is made from layers of compacted sediment?	Sedimentary / Igneous

PREVIEW

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Curriculum Connection
A2.1

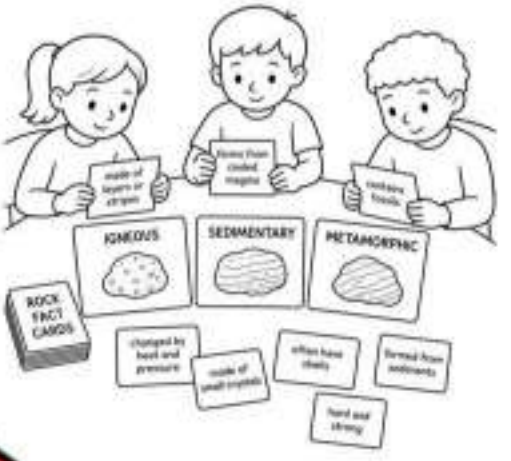
Coding Activity – Rock Classification

Objective — What are we learning about?

To learn more about the three main types of rocks through a fun coding activity. This is a physical activity that uses the principles of coding to help students classify rocks based on how they are formed.

Materials — What do we need?

- ✓ Flashcards with the names of the three rock types
- ✓ Flashcards with characteristics and facts about each
- ✓ Open space for movement



Method — How do we complete the activity?

1) Setup: Lay out the flashcards with the names of rocks in order from the ground up in a line across the room or field.

2) Creating Human Code: Divide the students into groups. Each group will represent a "program" and each student in the group will represent a layer of the atmosphere.

3) Rock Fact Cards: Give each group a set of fact cards about each rock. These cards can include facts such as "forms from cooled magma," "contains fossils," "changed by heat and pressure." The facts should correspond to the type of the rock.

4) Programming: The task for each group is to assign the correct facts to each member, representing the correct type of rock. They need to "program" their group by discussing and matching the facts to the rocks.

5) Execution: Once the groups have assigned the facts, each group will present their "program". When someone says, "run" or "start", they will line up in the order of the rocks, and each student will say out loud the name of the rock they represent and the facts they were assigned.

6) Debugging: If a fact is wrong or misplaced, the other students can help "debug" the program by suggesting corrections.

PREVIEW

Name: _____ 31

Curriculum Connection
A2.1

IGNEOUS

SEDIMENTARY

METAMORPHIC

PREVIEW

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Name: _____ 32

Curriculum Connection
A2.1

Set 1

This rock forms when magma or lava cools.

This rock often has layers of sediment.

Marb[illegible] example of this rock.

This rock [illegible] ain [illegible] ssils.

This rock is chan[illegible] heat [illegible] ressure.

Set 2

Granite is an example of this rock.

This rock forms from tiny pieces of rock called s[illegible]

This rock usually does not contain fossils.

Slate is an example of this rock.

This rock can form above or below Earth's surface.

PREVIEW

Name: _____ 33

Curriculum Connection
A2.1

Set 3

This rock is made when sediments are compacted and cemented together.

This rock may have crystals.

This r[illegible]n begin as an igneous or sedimentary rock before chan[illegible]

Sandston[illegible]am[illegible] of this rock.

This rock forms f[illegible] cooling [illegible]ma.

Set 4

This rock forms because of high heat [illegible] inside [illegible]n.

This rock often has visible layers of sediment.

Basalt is an example of this rock.

This rock can be intrusive or extrusive.

This rock forms when existing rocks change without melting.

PREVIEW

Name: _____ 34

Curriculum Connection
A2.1

Set 5

This rock may be found at the bottom of lakes and oceans.

This rock forms when lava cools on Earth's surface.

This r[illegible]ten contains the remains or impressions of living thin[illegible]

This r[illegible]ck [illegible]bec[illegible]se of heat and pressure.

Quartzite is an e[illegible]le of t[illegible]k.

Set 6

This rock forms when molten rock coo[illegible] to a so[illegible]

This rock is made from layers of compacted sed[illegible]

Limestone is an example of this rock.

This rock can have alternating bands of light and dark minerals.

This rock forms without melting

PREVIEW

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Curriculum Connection
E2.3

Rocks vs Minerals

What is a Mineral?

A **mineral** is a solid substance that has a specific chemical structure that is the same throughout the entire mineral. Minerals can be made of just one element, like gold or copper. Minerals can also be made of more than one element.

We describe minerals based on their lustre, streak, and hardness. Minerals have their own properties that make them different.

Rocks are a combination of different minerals. Examples of minerals include:



Feldspar



Mica

What are Rocks?

Rocks are a combination of minerals. When some minerals above are combined together, they form the rock named granite. **Granite** is an intrusive igneous rock that is formed underground when these minerals undergo extreme heat and pressure to form magma. When the magma cools, the minerals solidify and form the rock.



Examples of Rocks and Minerals

Obsidian

Minerals
- Silica - Sodium - Potassium

Sandstone

Minerals
- Quartz - Feldspar

Limestone

Minerals
- Calcium carbonate - Quarts - Graphite - Pyrite

PREVIEW

Name: _____ 36

Curriculum Connection
E2.3

True or False Circle whether the statement is true or false.

1) Minerals are made of smaller rocks.	True	False
2) Rocks are made of smaller minerals.	True	False
3) Sandstone is made of two minerals – quarts and feldspar.	True	False
4) Mica is a type of mineral.	True	False
5) Marble [illegible] type of mineral.	True	False

Questio[illegible] [illegible] questions below using evidence from the text.

1) What is the [illegible] between rocks and minerals?

2) Describe a granite rock. What minera[illegible] made [illegible] of rock is it?

PREVIEW

Draw Draw a picture of a granite rock. Label the minerals in the [illegible]te.

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Curriculum Connection
E2.3

Research – Rocks and Mineral Composition

Rocks are made up of different minerals. Research the rocks below by searching: "rock name mineral composition". Draw a diagram of the rock by labelling the minerals it is made of.



Research Look up the rock and its mineral composition. Draw a diagram of it.

Rock Name	Gneiss
Mineral Composition	
Diagram	

Rock Name	Limestone
Mineral Composition	
Diagram	

PREVIEW

Name: _____ 38

Curriculum Connection
E2.3

Research Look up the rock and its mineral composition. Draw a diagram of it.

Rock Name	Conglomerate
Mineral Composition	

Rock Name	Schist
Mineral Composition	
Diagram	

Rock Name	Breccia
Mineral Composition	
Diagram	

PREVIEW

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Curriculum Connection
E2.2

Physical Properties of Igneous Rocks

Properties of Rocks

When we describe a rock's properties, we use the following terms/properties:

- Colour – the colour of the rock
- Lustre – how light reflects off the rock. We use these terms to describe lustre: metal[illegible]-metallic, silky, pearly, greasy, waxy, dull, earthy, shiny, and glassy
- Text[illegible]k smooth or rough?
- T[illegible]arency – [illegible]see through the rock?
- Hardness – [illegible]tro[illegible]r can it be scraped or broken?

PREVIEW

Properties of Igneo[illegible]cks

Not all igneous rocks are [illegible], whi[illegible] it hard to describe the properti[illegible]f ev[illegible] rock. Intrusive and extrusive rocks ge[illegible]y have different properties.



Obsi[illegible]rusive Igneous Rock

Intrusive Igneous Rocks

1) Larger crystals which give it a rougher texture
2) Not as hard as extrusive rock because the crystal size is larger but still a very hard rock, harder than sedimentary rocks
3) Not usually shiny or transparent



Granite – Intrusive Rock

Extrusive Igneous Rocks

1) Smaller crystals not visible because the lava cools quickly on the surface
2) Texture is smooth and glassy
3) Very hard rock because of the very small crystals
4) Glassy lustre that reflects light

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Curriculum Connection
E2.2

Describe What are the general properties for intrusive and extrusive igneous rocks?

Intrusive	Extrusive

PREVIEW

Compare Describe the [illegible] of the rocks below.

		
Type	Intrusive Extrusive	Intrusive [illegible]rusive
Lustre		
Hardness		
Transparency		
Texture		

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Curriculum Connection
E2.2

Physical Properties of Sedimentary Rocks

Types of Sedimentary Rocks

Sedimentary rocks are formed from smaller rock pieces or pieces of once-living organisms. There are three main types of sedimentary rock.



Clastic Sedimentary Rock

1) Comm dimentary Rocks

These ro s sediments that are carried in river ns and lakes. When they get buried, the sediments lose water and bec e cem m r k. Examples include sandstone, limestone, and shale.

2) Clastic Sed Rocks

Rocks that are weathe small pieces of rock. When they are sent by wind or water to a basin he ied in the ground. Underground, the sediments are compacted and ce ente tary rock. Examples are shale and sandstone.



oal ic Rock

3) Biologic Sedimentary Rocks

When living things die, their organic material pile up are compressed and cemented together. This creates biologic sedimentary rocks. Coal is an example of plant material tha cted to form a biologic sedimentary rock that can be burned for energy.

PREVIEW

Properties of Sedimentary Rocks

Common Rock
Limestone



Sedimentary rocks vary a lot depending on the type of rock.

In general, sedimentary rocks are:

- Not as hard
- Have layered and rough textures
- Often have shells or organic material cemented in the rock
- Can have small, medium, or large grains
- Can have fossils imprinted into the rock

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Curriculum Connection
E2.2

Compare Describe the physical properties of the rocks below.



Type	Lustre	Hardness	Transparency	Texture
Common				
Clastic				
Biologic				



Type	Lustre	Hardness	Transparency	Texture
Common				
Clastic				
Biologic				



Type	Lustre	Hardness	Transparency	Texture
Common				
Clastic				
Biologic				

PREVIEW

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Curriculum Connection
E2.2

Direction

Start at the Start box and follow the pathway labels by choosing the rock that correctly matches the property in each box. Continue tracing the correct path until you reach the Finish box without crossing into the wrong pathways.



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E2.2

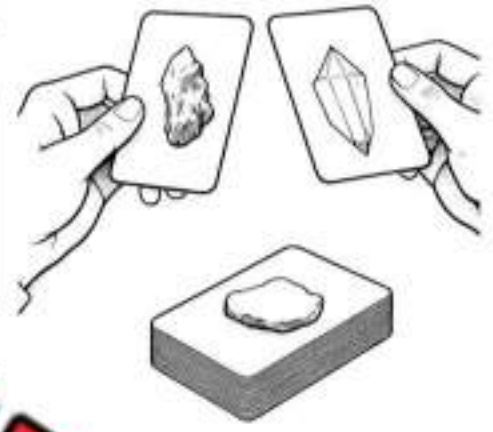
Memory Game: Rock and Mineral Match

Objective What are we learning about?

To reinforce key vocabulary related to rocks and minerals through a fun memory game, enhancing both memory skills and geological understanding.

Materials What will you need for the activity?

- Memory game cards (provided) with the terms on one set and definitions on another set.
- A flat surface to lay out the cards.



Instructions How will you complete the activity?

1) Divide the class into groups of 3 or 4. Give each group a set of Memory Game cards. (Provided)
2) Have each group lay all the cards face down in a grid on a table or the floor.
3) The students take turns flipping over two cards at a time, trying to find a matching term and its definition.
4) If a student finds a match, they remove those cards from the grid and keep them.
5) If the cards do not match, they are turned back over, and the next student takes a turn.
6) The game continues until all the cards have been matched.
7) After the game, review the terms and definitions with the class.
8) Discuss why these terms are important to understand and how they relate to rocks and minerals.

PREVIEW

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Curriculum Connection
E2.2

Cards | List of terms related to rocks and minerals

Term	Definition
Rock	A solid material made of minerals found on Earth.
[illegible]al	A natural substance with a specific chemical composition.
Characteristic	[illegible]eat[illegible] that helps to [illegible]iden[illegible] describe [illegible]mol[illegible]
Property	A quality or tra[illegible] that something has.
Scratch Test	A method to test the hardness of a mineral by scratching it.

PREVIEW

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Curriculum Connection
E2.2

Cards | List of terms related to rocks and minerals

Term	Definition
Streak Test	A test to see the colour of a mineral's powder.
[illegible]us	Rocks formed from cooled lava or magma.
Sedimentary	Ro[illegible] m[illegible] from particles of [illegible] and [illegible] and other ma[illegible] [illegible] together.
Metamorphic	Rocks changed by [illegible]eat and pressure inside Earth.
Fossil	Remains or traces of ancient life that have been preserved in rock.

PREVIEW

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Curriculum Connection
E2.2

Cards | List of terms related to rocks and minerals

Term	Definition
Organism	Any living thing, from plants and animals to bacteria.
[illegible]	A term used when a species no longer exists anywhere on Earth.
Soil Formation	[illegible]ess by which [illegible] rock and [illegible]tes soil.
Erosion	The wearing aw[illegible] the Earth's surface by wind, water, or ice.
Natural Phenomena	Natural events like earthquakes, tornadoes, or volcanic eruptions.

PREVIEW

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Curriculum Connection
E2.2

Cards | List of terms related to rocks and minerals

Term	Definition
Habitat	The natural environment where an organism lives.
C[illegible]ation	The protection and preservation of natural resources.
Biodiversity	[illegible]y of life in the [illegible]orl[illegible] particular [illegible]stem.
Recycle	The process of c[illegible]erting waste materials into new materials and objects.
Renewable Resource	Natural resources that can be replenished naturally with the passage of time, like sunlight.

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Curriculum Connection
E2.3

Identifying Rocks

Identifying Rocks

It can be challenging to identify rocks because some rocks have overlapping properties. Using the checklist below will help you identify the type of rock.

PREVIEW


Gas bubbles


Interlocking crystals, glassy, and smooth

It is igne[illegible]

- ❑ [illegible] glassy
- ❑ It has a sp[illegible]
- ❑ It has gas bu[illegible]n it
- ❑ It has interlocking [illegible]


Bands [illegible]e and black

It is metamorphic if...

- ❑ It has banding – stripes of different colour[illegible]
- ❑ It has waves of bands in it that are differe[illegible]lou[illegible]
- ❑ The waves or bands are not perfectly horizonta[illegible]
- ❑ It is very hard – doesn't scratch easily


Fossil


Wavy bands of different colours

It is sedimentary if...

- ❑ It has fossils – imprints or shells in the rock
- ❑ It has particles of rock cemented together
- ❑ It looks like different rocks are compacted together
- ❑ It has horizontal layers of the same shade of colour
- ❑ It isn't as hard – it can be scraped or chipped


Horizontal layers, same shade

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Curriculum Connection
E2.3

Label | Which type of rock is it? Explain how you know.



Type of Rock



Type of Rock



Type of Rock



Type of Rock

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Curriculum Connection
E2.2

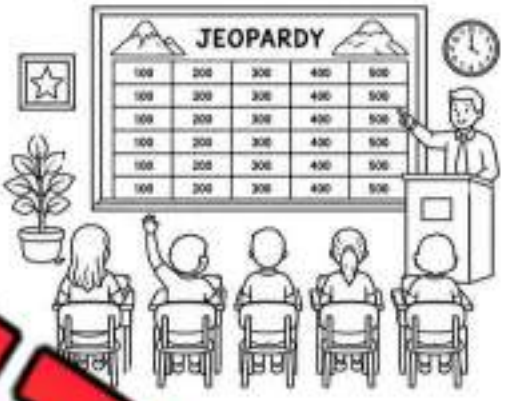
Activity – Rock and Mineral Jeopardy

Objective What are we learning about?

To review and reinforce students' knowledge of rock types, mineral properties, testing methods, and famous geological formations through a competitive Jeopardy-style game.

Materials What you need for the activity?

- Jeopardy board (the next page)
- Buzzer or bell



Instructions How will you complete the activity?

1) Print the Jeopardy board on the next page.
2) Divide the class into two teams.
3) Ask one team to go first by selecting a point value.
4) Read the question aloud from the point value.
5) The first team to ring the bell or buzzer gets to answer.
6) If they answer correctly, award them the points. If not, the other team can answer.
7) Continue the game until all questions have been answered.
8) Tally the points to determine the winning team.
9) Conclude by discussing what they learned about the topics in the questions.

PREVIEW

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Curriculum Connection
E2.2

Jeopardy Question | Ask students the questions below.

1 Points	2 Points	3 Points	4 Points	5 Points
What is molten rock called? **Magm**	What does erosion do? **Wears rocks down**	What rock forms from cooled lava? **Igneous**	What rock is shiny and often used in jewelry? **Quartz**	What rock is very heavy and used for building? **Basalt**
Is granite ha or soft? **Hard**	**Meta**	Which rock can u find fossils in? **S tary**	What is fossilization? **Turning remains into rock**	What is the hardest mineral? **Diamond**
Are diamonds hard? **Yes**	What test checks how hard a mineral is? **Scratch test**	is a ro made fr creat shells? **Limestone**	is the **tone**	What rock is made from plant remains? **Coal**
What are gems? **Precious stones**	Is limestone hard? **No**	Can quartz be colourful? **Yes**	What is the streak of a mineral? **Colour**	mineral an draw on paper? **Graphite**
Is coal a rock? **Yes**	What is a mineral? **Natural solid**	What causes rocks to layer? **Pressure**	What does igneous mean in Latin? **Fire**	What type of rock is granite? **Igneous**

PREVIEW

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Curriculum Connection
E2.2

Activity – Properties of Rocks

Find two rocks that look different. Examine them closely and explain their properties below.

Examine Look closely at your rocks and fill in the information below.

Prope	Rock # 1	Rock #2
Lustre (Shiny, dull, glassy, metallic, earthy)		
Texture (rough, smooth, uneven)		
Transparency (see-through or opaque)		
Hardness (Is it strong? Can it be scratched?)		

PREVIEW

Which rock do you like better? Explain why.

_____

_____

_____

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Name: _____ 63

Curriculum Connection
A1.2, A1.4, A1.5

Experiment – Testing Hardness of Rocks

Background — What is the lab about?

The **hardness** of a rock is determined based on whether it can be scratched. Scientists refer to hardness of a rock as how resistant they are to abrasion. Natural glass that happens in nature has a lower hard[illegible] it can be scratched easily. Some rocks scratch easily [illegible] have hard minerals like diamond, are not.

[illegible]erick Mo[illegible] geologist who created the Mohs Hardness Scal[illegible]ian [illegible]ferent rocks and minerals by scratching their [illegible]o det[illegible] hardest rocks and minerals. He found tha[illegible]as the [illegible]st mineral (10), and Talc was the weakest (1)

Mineral	Hardness
Talc	1
Gypsum	2
Calcite	3
Fluorite	4
Apatite	5
Feldspar	6
Quartz	7
Topaz	8
Corundum	9
Diamond	10

PREVIEW

Materials — What will you need to c[illegible]ete the [illegible]?

- At least 5 different rocks. Try to find a variety [illegible] sedimentary, and igneous rocks.
- A hard rock to scratch the other rocks with
- A coin
- A steel nail or washer



Procedure — How will you complete the experiment?

1) Use a clean surface to test each rock.
2) Hold the rock firmly and attempt to scratch each rock with your fingernail, another hard rock, and a nail/washer.
3) Try to scratch the coin with your fingernail, a hard rock, and the nail/washer.
4) Look for an etched line. You can also rub the line with your finger to see if any dust (sediments) came loose. If you see dust, you have scratched the surface.
5) Record your observations in the table on the next page.

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Curriculum Connection
A1.2, A1.4, A1.5

Observations

What did you observe while you scratched the rocks?

Rock #	Did your fingernail scratch the surface?	Did the other hard rock scratch the surface?	Did the washer/nail scratch the surface?
1			
2			
3			
4			
6			
Washer/Nail			
Coin			

PREVIEW

Results

What did you learn from t[illegible]xperim[illegible]

1) Which rock or rocks were the strongest? Explai[illegible] were and why they are so strong.

2) Which rock or rocks were the weakest? Explain which type of rocks they were and why they were weak.

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Curriculum Connection
E2.2

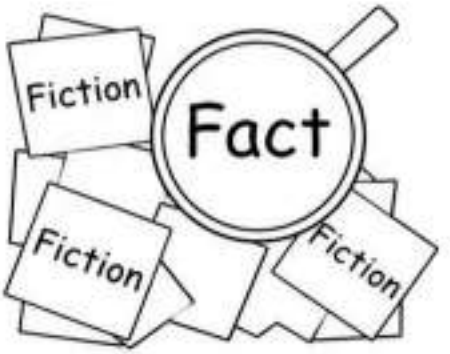
Mineral Myths: Fact or Fiction?

Objective What are we learning about?

To enhance students' understanding of mineral properties and uses while debunking common myths, promoting critical thinking and active learning.

Materials What will you need for the activity?

- A list of statements about minerals
- A 'Fact' sign and 'Fiction' sign to distinguish the two sides of the room
- Designated areas in the classroom for the 'Fact' and 'Fiction' signs, allowing students to move to either side



PREVIEW

Instructions How will you complete the activity?

1) Your teacher will read statements. Pay close attention as each statement is shared.
2) Consider carefully whether you think the statement is true or false.
3) If you decide the statement is true, walk to the 'Fact' side of the room.
4) If your guess is that it's not true, move to the 'Fiction' side of the room.
5) Stay on your chosen side and listen attentively for the correct answer to be revealed.
6) When the right answer is announced, return to your seat, ready for the next round.
7) Have fun getting up and moving!

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Curriculum Connection
E2.2

Fact or Fiction | Read the statements to the class.

#	Statement	Fact or Fiction
1	Diamonds are the softest mineral.	Fiction
2	Talc is used in making baby powder.	Fact
3	Mica can be found in granite.	Fact
4	All [illegible] are shiny.	Fiction
5	[illegible] is hard[illegible]lass.	Fact
6	Gold is th[illegible]her[illegible]	Fiction
7	Limestone diss[illegible] in [illegible]	Fact
8	The streak test is used [illegible]min[illegible]olour.	Fact
9	Rubies can scratch talc.	Fact
10	Marble is formed from sandstone.	Fiction
11	Obsidian is a type of volcanic glass.	Fact
12	Salt can scratch steel.	[illegible]iction
13	Fossils can be found in metamorphic rocks.	[illegible]ion
14	Gypsum is used to make wall plaster.	Fact
15	Coal is considered a renewable resource.	Fiction
16	Fluorite glows under ultraviolet light.	Fact
17	Pumice is so light it can float on water.	Fact
18	All rocks contain minerals.	Fact
19	The Mohs scale measures a mineral's brightness.	Fiction
20	Diamonds can form from compressed coal.	Fact

PREVIEW

Name: _____ 67

Curriculum Connection
E2.2

Reflection | Answer the questions below.

1) What was the most surprising fact you learned today? Why?

2) Wri[illegible]wing the truth about minerals can be useful.

3) What is one new thing you learne[illegible] abou[illegible]roperties and uses of various minerals?

4) How did you decide whether a statement was fact or fiction? What clues did you use?

PREVIEW

Name: _____ 72

Curriculum Connection
E2.1

Rock Cycle – Earth's Processes

The Processes of the Rock Cycle
Rocks will change type when they are exposed to certain processes on and inside the Earth. The main processes are heating, compacting, erosion, cooling, pressure, carrying, and settling.

Matching Use your prior understanding to match the process with its description.

Answer	Process	Description
	Heating	a) The rock particles at the bottom of an ocean or lake get pressed together and eventually harden to form a sedimentary rock.
	Compacting	b) Rivers and streams carry rock pieces away from glaciers and mountains.
	Settling	c) Sediments are pieces by a river, glacier, or wind.
	Carrying	d) Deep inside the Earth, this process will change rock from sedimentary rock to metamorphic. When the metamorphic rock goes deep into the Earth, it will melt and turn into magma.
	Erosion	e) Rock pieces and pebbles eventually get carried into the sea by rivers and rock pieces build up on the bottom of the sea.
	Cooling	f) Deep inside the Earth's core, rocks are squeezed which causes them to turn into magma.
	Pressure	g) When magma reaches the Earth's surface, it turns into igneous rock because of this process.

PREVIEW

Questions Use information from the text to answer the questions.

1) Which process changes magma into igneous rock?	
2) Which process changes rock pieces into sedimentary rock?	
3) Which processes change a sedimentary rock into metamorphic?	
4) Which process changes a metamorphic rock into a magma?	

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Curriculum Connection
E1.1

Erosion

Erosion



When soil and rock are moved from one place to another, it is called **erosion**. Erosion happens when heavy rains and water run[illegible]our over soil. The soil often flows in[illegible]other bodies of water. [illegible], but it is made worse when humans cut down trees, plants, and sh[illegible]plan[illegible]eep the soil strong because their roots hold the soil together. Fa[illegible]make[illegible]rse when they have too many animals. These animals eat mos[illegible]lants [illegible]eakens the soil.

When soil is lost into [illegible]the[illegible]es polluted. Also, farmers need soil to plant their crops in. If farmers [illegible]o mu[illegible], they can't grow the food we need to survive.

Wind is also a force that can cause eros[illegible]Whe[illegible]trees on farmlands, there is nothing to block heavy winds fr[illegible]g so[illegible]

Slowing Down Erosion

We can reduce erosion by having plants to cover the soil. Shru[illegible]roots that grow in all directions in the soil. They help keep the soil strong. Shrubs and trees also block the wind from causing erosion.



Using a cover crop also slows down erosion. A **cover crop** is a fast-growing crop that grows between other crops or when the other crops have been harvested. Cover crops are used to make the soil stronger because their roots stop the soil from erosion.

PREVIEW

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Curriculum Connection
E1.1

Questions Answer the questions below using evidence from the text.

1) What is erosion?

2) How ar mans causing erosion?

PREVIEW

Visualizing Draw what yo ictur le you were reading. Explain the picture.

Reaction If you were a farmer trying to stop erosion, what would you do?

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Curriculum Connection
E1.1

Experiment – Soil Erosion Model

Research Questions | What are we learning about?

Is soil erosion worse in soil that has plants growing in it or in soil that has no plants?

Materials | What do we need for our experiment?

- ✓ 3 [illegible] same size – 2L bottles work well
- ✓ Soil
- ✓ Mulch or dead leaves/sticks
- ✓ Sod or grass seed
- ✓ 3 clear cups
- ✓ Blocks to support your bottles
- ✓ Scissors or utility knife
- ✓ Watering can
- ✓ Tape to help fasten the materials





Method | How do we complete the experiment?

1) Cut off one side of each bottle – cut it lengthwise so it still has a bottom and spout.
2) Fill one bottle with sod (or soil and plant grass seed and wait for it to sprout).
3) Fill one bottle with just soil.
4) Fill the last bottle with mostly soil but add mulch or dead leaves/sticks on the top.
5) Top the bottles so they are resting on the blocks with the spout angled down.
6) Put the cups under the end of the bottles so they can catch the water from the spout.
7) Pour water on the different types of soil. Observe what is landing in the cups.



PREVIEW

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Curriculum Connection
E1.1

Observations

What did you notice?

Soil Types	What Happened?
Just Soil	
Sod – S… Gr…	
Soil with Mulch	

PREVIEW

Results

Answer the questions below.

1) What is soil erosion?

2) Which soil had the least amount of soil erosion?

3) Why does soil with grass or plants growing have less erosion?

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Curriculum Connection
E1.1

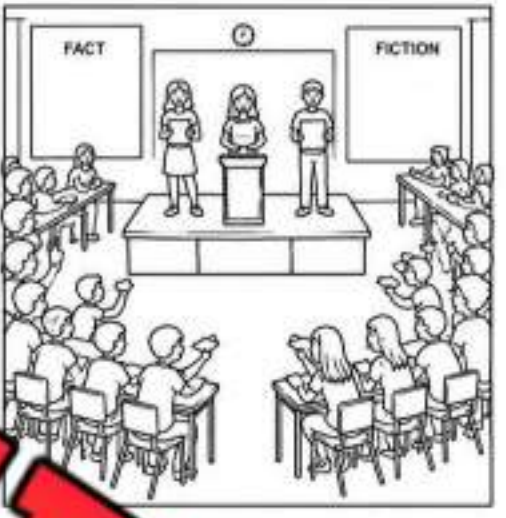
Erosion Effects: Fact or Fiction?

Objective What are we learning about?

To enhance students' understanding of erosion and its impacts on landscapes by differentiating between common myths and facts.

Materials What will you need for the activity?

- A set of statements about erosion effects
- A 'Fact' sign and 'Fiction' sign to distinguish the two sides of the room
- Designated areas in the classroom to place the 'Fact' and 'Fiction' signs, allowing students to move to either side



Instructions How will you complete the activity?

1) Your teacher will read statements. Pay close attention as each statement is shared.
2) Consider carefully whether you think the statement is true or false.
3) If you decide the statement is true, walk to the 'Fact' side of the room.
4) If your guess is that it's not true, move to the 'Fiction' side of the room.
5) Stay on your chosen side and listen attentively for the correct answer to be revealed.
6) When the right answer is announced, return to your seat, ready for the next round.
7) Have fun getting up and moving!

PREVIEW

Name: _____ 84

Curriculum Connection
E1.1

Fact or Fiction Read the statements to the class.

#	Statement	Fact or Fiction
1	Erosion can create new islands.	Fact
2	All types of erosion are harmful.	Fiction
3	Wate[illegible]he only cause of erosion.	Fiction
4	Pla[illegible]top erosion.	Fact
5	[illegible] during heavy rains.	Fiction
6	Glaciers [illegible]	Fact
7	Wind cannot m[illegible]	Fiction
8	Erosion makes rivers [illegible]	Fact
9	Deserts don't experience erosion.	Fiction
10	Coastal erosion can lead to loss of beaches.	Fact
11	Erosion always results in the formation of va[illegible]	Fiction
12	Human activities have no impact on erosion rates.	[illegible]iction
13	Mudslides are a type of erosion.	[illegible]act
14	Without erosion, we wouldn't have sand on beaches.	Fact
15	Only rainwater can cause erosion.	Fiction
16	Erosion can uncover fossils in the ground.	Fact
17	Erosion can affect water quality in rivers and lakes.	Fact
18	Ice erosion is called abrasion.	Fiction
19	Building walls along coastlines can stop all coastal erosion.	Fiction
20	Mountains can't be affected by erosion.	Fiction

PREVIEW

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Curriculum Connection
E1.1, E2.1

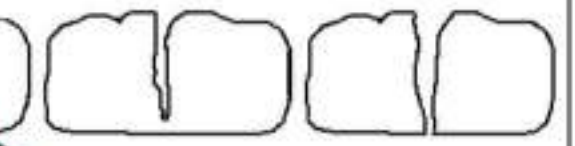
Weathering Rocks – Soil Formation

Weathering

The term **weathering** means that rocks are broken down into smaller rocks that make up our soil. The weathering process is very slow and is a result of temperature changes, abrasion, chemical reactions, and interactions with living things.

PREVIEW

Temperature Changes – As the temperature changes from warm to freezing cold, rocks break apart because water gets into the cracks in rocks. When the water freezes, it expands a bit. As it changes into ice. As it gets colder, it cracks open the rock.



Abrasion – Abrasion happens when rocks collide or rub against each other and break down. This happens a lot to rocks at the bottom of a river. The water moves the rocks, so they bump into other rocks. This makes the rocks smoother as the corners of rocks are chipped off.



Chemical Reactions – Rocks will breakdown when they react with water, air, or other chemicals. Acids from rain or chemicals humans add to water can also weather rocks.

Living Things – Plants and animals affect rocks and can break them down. For example, plant roots can grow into the cracks of rocks, making them split. Some animals burrow into rocks, scratching and digging into a rock's weakest point.

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Curriculum Connection
E1.1, E2.1

Visualizing Draw what you were picturing while you were reading. Explain the picture.



True or Fals whether the statement is true or false

1) Soil is made from ocks.	True	False
2) Soil is made from many t ing rocks.	True	False
3) Weathering rocks means rock fall sky ain.	True	False
4) Weathering rocks means they brea down ar sm	True	False
5) Plants can grow inside the cracks of rock split	True	False

Questions Use information from the text to supp an

1) What does weathering mean?

2) How does the weathering of rocks lead to soil formation?

PREVIEW

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Curriculum Connection
E1.1, E2.1

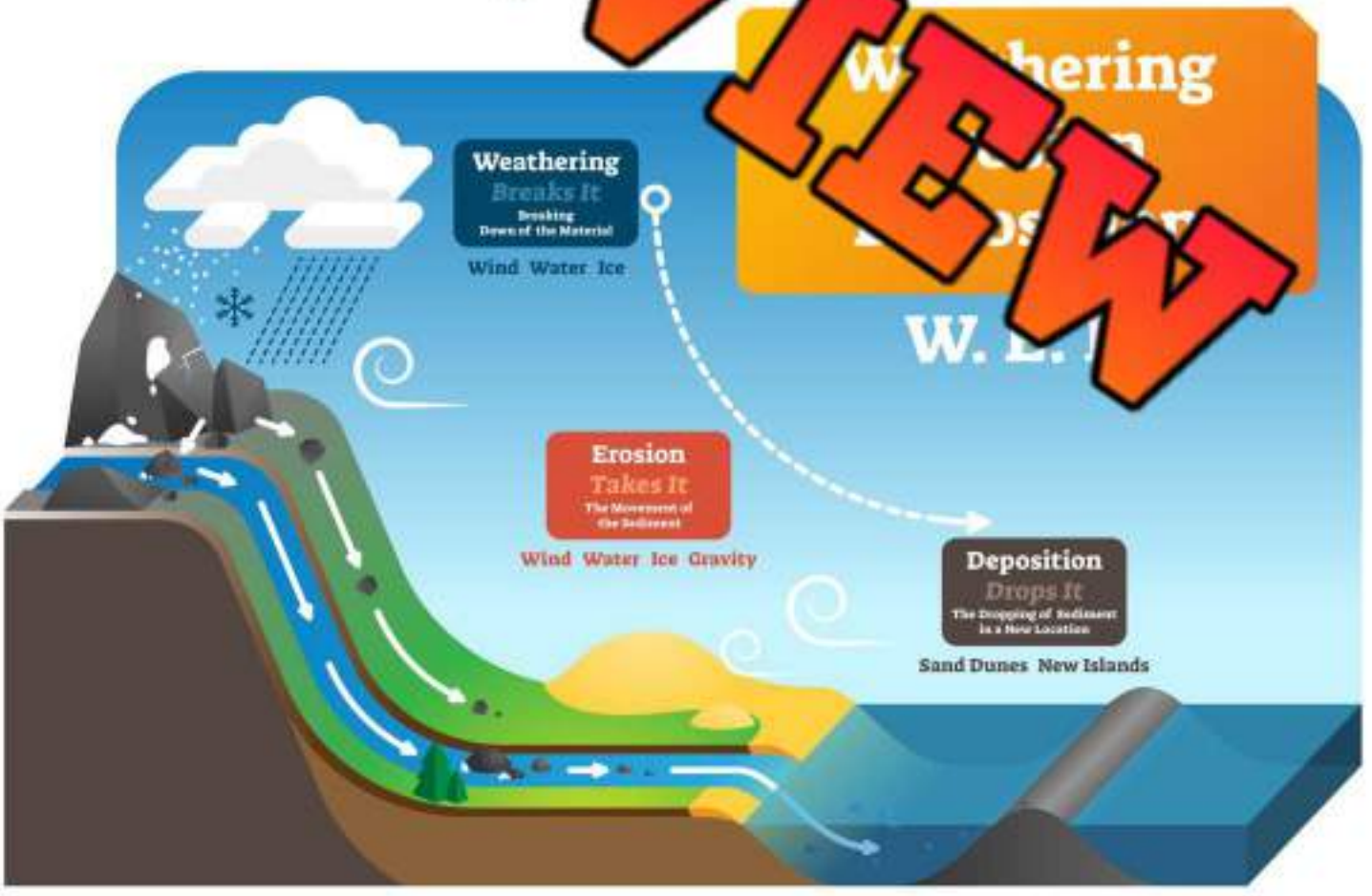
Weathering, Erosion, Deposition

Weathering, Erosion, and Deposition

There is a process that is slowly changing our land. It is known as weathering, erosion, and deposition.

1) When rocks are weathered, they are broken down into smaller pieces that can be er
2) Wh are small enough, the force of wind and water erode the ed rock pieces are called **sediments**. These sediments become
3) The sedime mov spot where they are dropped. The new spot might be a sand the s nts travel to due to wind or water patterns. If enough sed pa water, an island can even form!

PREVIEW



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Curriculum Connection
E1.1, E2.1

True or False

Is the statement true or false?

1) Weathered rock becomes sediment.	True	False
2) Sediments are large rocks.	True	False
3) Erosion sends sediments to new places.	True	False
4) Erosion and weathering can make sand dunes and islands.	True	False
5) Weath[illegible]erosion, and deposition changes our land.	True	False

Ques[illegible]

[illegible] questions below.

1) How does [illegible], ero[illegible]d deposition change our land?

2) How are sand dunes formed?

PREVIEW

Word Search

Find the words in the wordsearch.

Word Bank	
Soil	Erosion
Rocks	Sediment
Land	Deposition
Dunes	Weathering

W E A T H E R I N G H L Q K U L Z
J Y I D G K J A A K A I X R R Z S
S E D I M E N T M J W T G M O D O
G K L G X G C Q W Y F M Y C C N I
D E P O S I T I O N W G H H K A L
E R O S I O N D U N E S R H S L P

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Name: _____ 93

Curriculum Connection
E1.1, E2.1

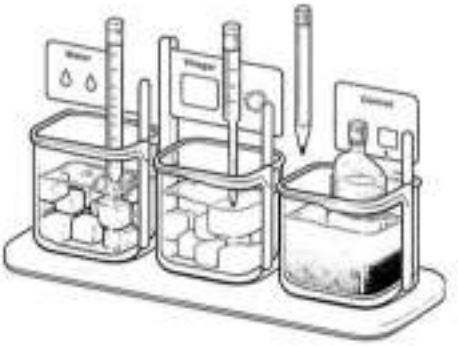
Simulating Soil Formation

Objective — What are we learning about?

To demonstrate how rocks weather over time to form soil, using sugar cubes and chalk to simulate rock weathering under different conditions.

Materials — What will you need for the activity?

- Sugar cubes and chalk pieces
- Small plastic containers or dishes
- Water and vinegar
- Droppers
- Timer
- Magnifying glass



PREVIEW

Instructions — How will you complete the activity?

1) Give each student or small group of students a few sugar cubes and pieces of chalk.
2) Place the sugar cubes and chalk pieces into separate plastic containers.
3) Add a small amount of water to one container and a small amount of vinegar to another container. Leave one container with no liquid as a control.
4) Use the timer to check the sugar cubes and chalk every 5 minutes for 30 minutes.
5) Observe and note any changes in the appearance of the sugar cubes and chalk under different conditions.
6) Use the magnifying glass to examine the materials closely and observe finer details of how they weather.
7) Discuss as a class what happens to each material in water and vinegar and compare these changes to the control group.

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Curriculum Connection
E1.1, E2.1

Record Sheet Record your findings from the soil formation experiment.

Material	Condition	5 minutes	10 Minutes	15 Minutes	20 Minutes	Final Observation
Sugar Cube **(Example)**	Water	Starting to dissolve	Slightly smaller, smoother	More erosion, less defined edges	Almost dissolved	Completely dissolved into a sugary solution
Sugar Cube	Vi					
Sugar Cube	Control (No Liquid)					
Chalk	Water					
Chalk	Vinegar					
Chalk	Control (No Liquid)					

PREVIEW

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Name: _____ 95

Curriculum Connection
E1.1, E2.1

Reflection Answer the questions below.

1) What changes did you notice in the sugar cubes and chalk in water compared to vinegar?

2) W you thi gar cube reacted the way it did in water?

3) How does this experiment help us understa w so s from rocks?

4) Draw a picture of what the sugar cube looked like before and after the experiment.

Before	**After**

PREVIEW

Name: _____ 99

Curriculum Connection
A1.3, A1.4, A1.5

Mixing Earth Materials Lab

Information | What is this lab about?

Earth's Materials are naturally occurring materials found on the Earth. These materials are raw, meaning they are not human-made. These raw materials provide us with the basic components for life, agriculture and industry. The following are types of Earth materials that we can find here in Canada: minerals, rock, clay, boulders, gravel, sand and soil.

Research

1. H... ...ls interact with one another?

Materia

1. Sand
2. Gravel – a mixt... ...sma... ...ocks
3. Soil
4. Water
5. Stopwatch
6. Jars
7. Shallow plastic tub



PREVIEW

Method

1. Fill your jar with the sand, gravel and soil in layers.
2. Add water to the jar and shake. Observe what happens to the m... ... down what you can see in the jar.
3. Allow the materials to settle in the jar. Observe what you can see.
4. Let the jar sit for 5 minutes and then observe once more.
5. Dump the materials out into the plastic tub and observe what you see.

Hypothesis – What will happen to Earth's materials when they are mixed with each other and water?

_____

_____

_____

Curriculum Connection
A1.3, A1.4, A1.5

Observations | What happened?

Stage	Observations
Shaken jar	
Settled jar	
Settled jar 5 minutes later	
Materia dumped	

Result… What d… rn from the experiment?

1) Did you see … ials in … after shaking it with water? Why do you think this happened?

2) Was the water clear or muddy once the jar w… ken? W… t after it sat for 5 minutes?

3) Why was the sand tricky to get out of the jar once it was wet?

4) After the jar was shaken, could you still see all of the materials you added? Explain.

PREVIEW

Name: _____ 101

Curriculum Connection
E2.5

Rocks and Fossils

Fossil Facts



Geologists don't just guess about the species who lived on the Earth before we did. Instead, they study fossils which give clues about animals and plants that lived a long, lon me ago.

Fos he remains or impressions of plants and anim o. Fossils can take the form of impressions, which are stone imprin animal an also be remains of plants and animals, such as bones, shells, or exo ssils ture's records of animals and plants!

Most animal act they decayed, which means we know nothing about them. Only a smal e of t aurs that ever lived have been or will be found as fossils.



Fossil Impressions

How can animal remains turn into stone over th ell, w body of a dead animal sinks into dirt or mud, some of ts of the animal's body will decay over time. However, the harder, st pa like the teeth and bones will remain. These remains stay in the mud

Over time, more mud will pile on top, which presses down on top o nimal's remains. Eventually, minerals from the surrounding environment turn the remains into a hard fossil. The fossil ends up being a stone copy of the original plant or animal.

Petrification

Another way that fossils will form is through petrification. **Petrification** is when minerals replace the structure of an organism. This happens as the organism decays and the minerals surrounding the decaying organism fill it in. We are left with a rock that takes the shape of the organism.

PREVIEW

Name: _____ 102

Curriculum Connection
E2.5

True or False

Circle whether the statement is true or false.

1) Fossils are imprints or remains left from plants and animals.	True	False
2) Most animals produced fossils.	True	False
3) Petrification is a process where fossils are formed.	True	False
4) Bones t[illegible] are found from many years ago are considered fossils.	True	False
5) Fossil[illegible]o collect but don't tell us much about history.	True	False

Question[illegible]

Use[illegible]n from the text to support your answer.

1) How is a fossil fo[illegible]?

2) Why do you think it is important to study foss[illegible]

PREVIEW

Making Connections

What does the reading remind you of?

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Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Circle the correct answer.

1) What is a fossil?	
A living	Remains of living thing
2) What	the soft parts of an animal after it dies?
	turn into diamonds
3) Which part of	most likely to become a fossil?
Fur	
4) What is petrification?	
Rocks melt into magma	Minerals replace the structure of an organism

Name: _____ Mark

Circle the correct answer.

1) What is a fossil?	
A living animal	Remains of living thing
2) What usually happens to the soft parts of an animal after it dies?	
They decay	They turn into diamonds
3) Which part of an animal is most likely to become a fossil?	
Fur	Bones
4) What is petrification?	
	Minerals replace the structure of an organism

Name: _____ Mark

Circle the correct answer.

1) What is a fossil?	
A living animal	Remains of living thing
2) What usually happens to the soft parts of an animal after it dies?	
They decay	They turn into diamonds
3) Which part of an animal is most likely to become a fossil?	
Fur	Bones
4) What is petrification?	
Rocks melt into magma	Minerals replace the structure of an organism

Name: _____ Mark

Circle the correct answer.

1) What is a fossil?	
A living animal	Remains of living thing
2) What usually happens to the soft parts of an animal after it dies?	
They decay	They turn into diamonds
3) Which part of an animal is most likely to become a fossil?	
Fur	Bones
4) What is petrification?	
Rocks melt into magma	Minerals replace the structure of an organism

PREVIEW

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Name: _____ 104

Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Fossils

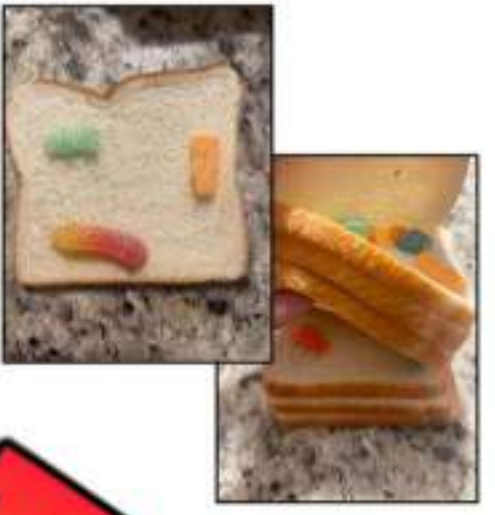


Research Question — What are we learning about?

How are fossils formed? What needs happen for an animal to become a fossil?

Materials — What will you need for the experiment?

- ❑ [illegible] used 7 but if you're doing th[illegible]h a la[illegible] you could use 3 pieces for each grou[illegible]
- ❑ Gummy bea[illegible]ter if [illegible]texture on them that can b[illegible]e[illegible]
- ❑ Gummy worms – the [illegible]e b[illegible] texture
- ❑ Plastic wrap



PREVIEW

Method — How will you complete t[illegible]eri[illegible]

1) Put 3 or 4 candies on each slice of bread.
2) Layer the bread and keep adding candies between the layers
3) Wrap the layers of bread in plastic wrap
4) Put something heavy on top and let it compress the bread for at least 8 hours – we used books
5) Unwrap the plastic and carefully pull apart the layers. What do you see?



Curriculum Connection
A1.3, A1.4, A1.5

Observations

What happened?

Results

Answer the questions below.

1) What did the gummy bears represent?

2) What did the weights on top represent?

3) Why was this experiment an example of how fossils are made?

4) Since the bread is soft, which type of rock did it represent? Explain.

PREVIEW

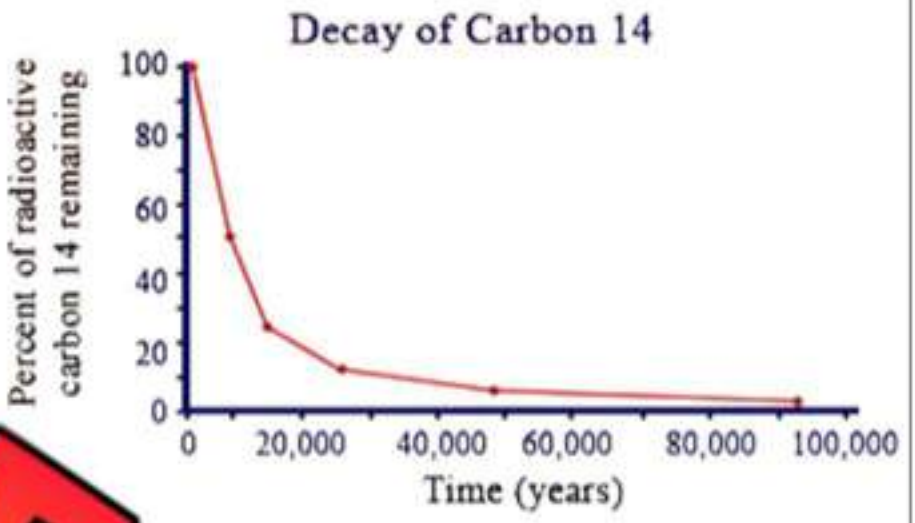
Name: _____ 108

Curriculum Connection
E2.5

Dating Fossils – Absolute Dating

Understanding Absolute Dating

Absolute dating is a way to find out exactly how old something is in years. It works by looking at how much an object has changed over time.



Absolute dating is like a clock, but instead of using hands, it looks at tiny bits inside very old things like bones or rocks. It's called absolute because it changes into a different kind of atom over time. By measuring how much is left, we can tell when the object was formed.

Different Types of Absolute Dating

Carbon Dating

One common type of absolute dating is carbon dating. It's used to find the age of things that were once alive. When a plant or animal dies, it stops taking in a special atom called carbon-14. Therefore, older fossils have less carbon-14 than newer ones. Scientists measure how much carbon-14 is left in the fossil to figure out how old it is.

Scientists use a special machine, called a mass spectrometer to measure the amount of carbon-14 in the fossil.

Potassium-Argon Dating

Another method scientists use is potassium-argon dating. This helps find out how old rocks are by measuring a special atom found in rocks called potassium-40. Over time, potassium-40 changes into another atom called argon-40.

By looking at how much argon-40 is in a rock compared to the original amount of potassium-40, scientists can tell how old the rock is.

PREVIEW

Name: _____ 109

Curriculum Connection
E2.5

True or False Circle whether the statement is true or false.

1) Absolute dating can give a more precise age of a fossil/rock.	True	False
2) When an organism dies, it builds up more C-14.	True	False
3) When something dies, it stops taking in carbon-14.	True	False
4) When a rock forms, it has a certain amount of potassium-40 atoms in it.	True	False
5) Over tim[illegible]k will gain more potassium-40 atoms.	True	False

Qu[illegible]s [illegible]ver the questions below using evidence from the text.

1) What is absol[illegible]g? In [illegible]w do these methods help us date rocks/fossils?

2) Describe how carbon dating works.

Opinion Do you think it is important to learn about the history of the Earth? Explain.

PREVIEW

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Curriculum Connection
E2.4

Everyday Uses of Rocks

Everyday Uses of Rocks

Did you know that every person in Canada will use over one million pounds of rocks, minerals, and metals in their life? You may not realize that rocks and minerals are used to make many of the things we use every day.

People who mine rocks and minerals by digging them out of the ground allow us to make many of the things we need. In Canada, the mining of rocks is a major industry that employs many people. The Canadian Shield is the largest region in Canada, and it contains many valuable minerals, like nickel, gold, silver, and copper.

PREVIEW



Examples Of How Rocks Are Used

- Buildings – are often made of stone, steel (iron) and cement
- Jewelry – made of diamonds and other precious stones
- Pencils – use lead, which is a mineral
- Mirrors – made of shiny steel, which is the mineral iron that comes from sedimentary rocks
- Chalk – made from a very soft, white, sedimentary rock
- Electronics – made from metals that come from iron (sedimentary)
- Soda Can – made from aluminum, which is a mineral from the earth



How We Use Each Type of Rock

Igneous	Statues, granite for countertops, pumice is used for scrubbing
Metamorphic	Quartz and marble are used in statues, vases, and countertops/tile
Sedimentary	Coal is used to burn for energy, iron makes steel, salt is used to eat

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Curriculum Connection
E2.4

True or False

Circle whether the statement is true or false.

1) Salt is a metamorphic rock.	True	False
2) Sedimentary rocks are used for countertops and tile floors.	True	False
3) Metamorphic and igneous rocks are used for countertops.	True	False
4) Chalk is a sedimentary rock.	True	False
5) The lead in a pencil is a mineral.	True	False

Questions

Use evidence from the text to support your answer.

1) How do rocks and minerals differ?

2) What types of rocks are used in tiles and countertops? What are they used?

PREVIEW

Making Connections

What does the reading remind you of?

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Name: _____ 119

Curriculum Connection
A2.1, A2.2

Coding – Sort the Materials

Computers can sort objects by following simple rules. Today you will become the computer and use the code to sort everyday objects into the correct rock or mineral.

Directions Use the Coding Rules table to find the correct code for each rock or mineral. Then write the code in the blank beside the everyday object made from that rock or mineral.

PREVIEW

Code	Rock or Mineral
G	Gra
C	Coal
D	Diamond
L	Limestone
GO	Gold
M	Marble
CU	Copper
S	Salt
IR	Iron
GY	Gypsum
CL	Clay
SL	Slate

Common Everyday Use	Write the Code Letter
, electricity generation	
cutting tools	
cars,	
Kit count s, buildi	
Electrical wires,	
Bricks, pottery	
Cooking, preserving food	
Roof tiles, chalkboards	
Statues, floor tiles, countertops	
Jewellery, electronics	
Drywall, plaster	
Cement, concrete, buildings	

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Curriculum Connection
E2.6

Indigenous Groups Use of Rocks

Rocks Telling Stories


Inukshuk

Indigenous groups studied rocks and learned valuable lessons from them. In many areas, unique or special rocks are chosen by Indigenous peoples for impor[illegible]remonies. Rocks are sometimes used to [illegible]rtant areas or sacred places.

[illegible]t use Inukshuks as directional markers that allow them to know wh[illegible]e the[illegible] wh[illegible] they are out hunting. They use the inukshuks to mark areas of quality [illegible] Inuk[illegible]made of rocks found nearby. They are sturdy and able to withstan[illegible] [illegible]20[illegible] in the winter, as well as warmer temperatures in the summ[illegible]

PREVIEW

Red Rock and Flint



In Ontario, many indigenous groups mined re[illegible] from in the ground. The red rock was the red min[illegible] called 'hematite'. The hematite was crushed into a fine powder and mixed with water and other materials to make a red paint. The red paint was used to make sacred symbols call[illegible]ographs. The pictographs were drawn on rocky cliff faces and they are still visible today!


Flint

Flint was also mined. Flint is a rock made of the minerals silicon and quarts. Flint is very hard and sharp, which made it a great rock for making tools. Cutting tools used flint for the blade that could be used to cut wood, prepare food, and make clothing.

Flint was also used to make fire. The flint rock was used to strike iron and create sparks that would ignite a flame.

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Curriculum Connection
E2.6

True or False

Is the statement true or false?

1) Flint is used to make fire and cutting tools.	True	False
2) An Inukshuk is used by Inuit groups as directional markers.	True	False
3) Mining rocks is a new activity.	True	False
4) Rocks were used to make paint to draw pictographs.	True	False
5) Inukshuk last one year before they fall down.	True	False

PREVIEW

Question

Answer questions below using evidence from the text.

1) How do the Inuit [illegible] rocks?

2) How was flint used by Indigenous groups?

Questioning

Write 3 questions you have about how Indigenous groups used rocks.

1)	
2)	
3)	

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Curriculum Connection
E2.6

Inukshuks

Colour Colour the Inukshuk below. Each rock could be different so vary your colours.



Draw Draw your own Inukshuk below and [illegible]it. T[illegible]e for more room.

PREVIEW

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Curriculum Connection
A1.3, A1.4, A1.5

Activity – Clay Inukshuk

Background — What is the lab about?

Today, we will be making our own Inukshuks using clay. You will need to decide on the shape and arrangement of your clay rocks.

Material — What do we need?

- ○ [illegible] student to make at least 5 rocks

Procedure — [illegible] as ideas for your Inukshuk.

1) Draw a sketch of yo[illegible] have a plan.
2) Think about how many clay [illegible] your Inukshuk.
3) Also consider the number of vertic[illegible] horiz[illegible] you will use. In order for your Inukshuk to stand at the end, use a ho[illegible] bottom as a base.
4) Once you are happy with your sketch, begin sh[illegible]
5) Assemble your Inukshuk by putting your rocks togeth[illegible]

PREVIEW

Ideas — Use the Inukshuks below as ideas for your Inukshuk.







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Curriculum Connection
A1.3, A1.4, A1.5

Sketch Draw your Inukshuk below.



PREVIEW

Results Answer the questions below.

1) Why do the Inuit use Inukshuks? How do they help the Inuit?

2) How many rocks did you use to make your Inukshuk? How did you make it sturdy?

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Curriculum Connection
E1.2

Impacts of Mining

What is Mining?

Mining is the digging of rocks and minerals from the ground. We need these minerals to make the products we use everyday.



Open-Pit Surface Mine

Mini an be done in two ways – surface mining an round mining. **Surface mining** is oft where a large area is dug out to find minerals.

rgroun used when minerals are found below the Earth's surface. There is often to th and an elevator that takes miners down to the underground mine mi derground tunnels.



Underground Mine

Environmental Impacts o

The plants, animals, and peopl live be harmed by the mining. Mining often pol e air, and water nearby. Below are some ways mining h e en nt.

- When mining iron for steel, some of the iron mixe r. When water and iron mix, sulfuric acid is made. This acid gets i ter – s and rivers
- Mining has polluted drinking water wells as pollutants g o th
- When it rains in an open mining pit, acid water is made. When a drink the water, they get poisoned
- Mining is messy, causing a lot of dust and toxic waste particles polluting the air we breathe
- When mining begins in an area, the habitats in that area are destroyed.

Social Impacts of Mining

For people, mining has its benefits and drawbacks. It has allowed us to make things we need and enjoy and has created a lot of jobs for Canadians. On the other hand, people have been forced to move from their homes and have been affected by the pollution it causes.

PREVIEW

Name: _____ 126

Curriculum Connection
E1.2

True or False

Circle whether the statement is true or false.

1) Open-pit mining is done underground.	True	False
2) Mining for iron creates sulfuric acid that pollutes water.	True	False
3) Mining creates air, land, and water pollution.	True	False
4) The drinking water near a mine could be contaminated.	True	False
5) Mining bad and has no benefits.	True	False

Comp

What benefits and drawbacks of mining?

s	Drawbacks

PREVIEW

Reaction

How do you feel about mining? Should we continue mining?

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Curriculum Connection
E1.2

Mining Town - Mirny

Mining Town - Mirny



Mirny is a city in Russia that is built around a diamond mining pit. Mirny has a population of 40,000 people. Most of the reside[illegible]f Mirny work for Alrosa, which is t[illegible]t diamond mining comp[illegible]or

[illegible]aluabl[illegible]in the ground cause[illegible]ol[illegible]move[illegible] the mining pit. Man[illegible]ple m[illegible]t[illegible]rea to find a job. Some workers live hours away from the mine. The[illegible]te[illegible]take[illegible]o the mine and work a 2-week shift.

The pit is human-made, [illegible]ng l[illegible]g it out using machines. The pit is 525 me[illegible]ep!



Effects of the Mirny Mine

The community of Mirny deals with the following:

- Noise pollution from the loud machinery that dig f[illegible] diamonds.
- They are also exposed to poor air quality as dust particles get i[illegible]
- The emissions from machines as well as the dust particles cause poo[illegible]hat can cause lung problems, throat pain, and asthma in nearby residents.
- The machinery used to dig leak chemicals that get into the groundwater
- The water in the bottom of the mine is toxic
- The change in the land has created air pressure problems. Helicopters that have flow over it have reported being sucked into the hole! The temperature near the mine is also cooler, which changes habitats for local wildlife
- When no more diamonds are found, the mine will still be there. It may become a landfill for garbage

PREVIEW

Name: _____ 129

Curriculum Connection
E1.2

True or False

Circle whether the statement is true or false.

1) Most people living in Mirny work at the mine.	True	False
2) The pit is 425 metres deep.	True	False
3) The mine has sucked in helicopters.	True	False
4) A positive of the mine is that it gives jobs to people.	True	False
5) The mine used to take iron out of the ground.	True	False

Comprehension

...are the benefits and drawbacks of the Mirny mine?

Benefits of the Mine	Drawbacks of the Mine

PREVIEW

Questioning

Write 3 questions you have about the mine.

1)	
2)	
3)	

Name: _____ 132

Curriculum Connection
E1.2

Mining Town – Dawson City

Dawson City – Gold Rush

Dawson City was the centre of the Klondike Gold Rush in the Yukon. In 1885, a few hundred members of the Tr'ondëk Hwëch'in (Han) First Nation lived in the Dawson City area (it wasn't named Dawson City yet). In 1886, George Carmack, an American prospecto[illegible]nd gold in the Klondike region.

By [illegible]r 5,000 people successfully made the trip to Dawson City to make a fortu[illegible]lo[illegible]99, the population of Dawson City was 30,000 people! At the time, D[illegible]on City [illegible]er population than Vancouver and almost as large as Ottawa.

PREVIEW

Booming City



In 1899, over 300 bus[illegible]s flourishing in Dawson City. [illegible] were grocery stores, dress shops, blacksmiths, churches and more.

Wealthy residents dined on champagne, [illegible] and [illegible]reakfast while others ate stale bread, lard and tea. Those who fou[illegible]g[illegible]a t[illegible]style, and those that didn't got scurvy from eating nothing but cann[illegible]3 t[illegible]day.

Ghost Town

In 1900, the mineral everyone rushed to find was becoming harder to fin[illegible] was being found in nearby communities, like Nome, Alaska. Many people left Dawson City and headed for Alaska. The population went from 30,000 to just 8,000 in 1900.

In 1902, more and more people left Dawson City because corporate mining was becoming more popular. Big corporations were buying land and digging much easier than the individuals who moved to Dawson City could.

By 1918, the population had declined to less than 1,000 people. Dawson City was now a ghost town as the city that hosted 30,000 people now had only 1,000 remaining. Today, Dawson City is home to just 1,375 people.

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Curriculum Connection
E1.2

Summarize Summarize Dawson City from mining town to ghost town.

Questions Answer the questions below using evidence from the text.

1) Why did Dawson become a mining town?

2) Why do you think more people didn't stay or move to Dawson after the gold rush?

PREVIEW

Word Search Find the words from the word bank.

Q	W	E	A	T	H	E	R	I	N	G	K	U	L	Z	J	Y	I	D	G	K
J	A	A	K	A	I	X	R	Z	M	J	W	T	G	M	G	K	L	G	X	G
C	Q	W	Y	F	M	Y	C	W	G	H	H	R	H	P	K	S	O	I	L	C
S	E	D	I	M	E	N	T	F	O	R	R	O	C	K	S	R	S	L	J	E
E	Z	E	M	D	E	P	O	S	I	T	I	O	N	G	C	E	Q	J	T	E
P	E	I	L	H	S	X	T	V	D	U	N	E	S	U	S	K	B	Q	Q	J
W	I	S	P	L	C	G	I	D	W	R	V	H	Z	H	U	Q	Z	H	F	N
D	E	P	K	R	V	K	B	V	V	E	R	O	S	I	O	N	L	A	N	D

Word Bank

Gold
Rush
Natural
Resource
Town
Ghost
Dawson
City
Rich

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Name: _____ 134

Curriculum Connection
A3.1, A3.2, A3.3

Underground Drones

History of Drones

A **drone** is an aircraft with no on-board crew or passengers. Drones are also called "Unmanned aerial vehicles" (UAVs). Drones are controlled by a remote control.

The first done was made in Britain during the First World War. It was named, "Britain's [illegible] Target." It was tested and showed promise, but it wasn't used in the war.

Fas[illegible] over 100 years, and drones are now in many different ways, from moni[illegible]e to carrying out search and res[illegible] opera[illegible]atural disasters.



Underground [illegible]

Mining companies a[illegible] u[illegible] drones to help their mining proje[illegible]ones [illegible]to mines to search caves, collect d[illegible] and [illegible]erground tunnels.

Underground drones are useful in the f[illegible]ing wa[illegible]

- ✓ They have technology that can record the g[illegible]ls un[illegible]
- ✓ Can identify geological features like caves, volc[illegible]der[illegible]kes
- ✓ Sending quality video of what miners can expect whe[illegible] un[illegible]
- ✓ Can map out any dangerous areas before sending miners down

The technology has only been around since 2017, but it will be very usefu[illegible]g able to send drones underground to learn more about a mine will keep humans safer.

In the past, human surveyors were sent deep into these mines to do the research themselves. Drones will save them from potential collapses, unsafe gas conditions, and from getting trapped underground.



Drone Operators

A new job industry is becoming more popular as drones are being used more and more. To get into the drone industry, you'll need A Transport Canada Advanced RPAS Pilots License and a Class 5 Driver's License.

PREVIEW

Name: _____ 135

Curriculum Connection
A3.1, A3.2, A3.3



True or False

Is the statement true or false?

1) An underground drone can map out an underground mine.	True	False
2) Underground drones will save people's lives.	True	False
3) You can drive a drone as a professional without a license.	True	False
4) Drones can be sent into dangerous areas to protect humans.	True	False
5) Underground drones have been around a very long time.	True	False

Questions

Answer the questions below.

1) Is the mining industry growing? What can drones be used for?

2) How is science and technology helping miners? Without the underground drone technology, how are humans affected?

PREVIEW

Visualizing

Draw what you were picturing while you were reading. Explain the picture.

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Name: _____ 137

Curriculum Connection
A1.1, A3.1, A3.2, A3.3

Research – Underground Drones



Research Learn more about underground drones.

1) What is an underground drone?

2) How [illegible] do d[illegible]?

3) What are underground dron[illegible]d f[illegible]

4) Why is driving a drone underground hard?

5) How fast do drones fly? Do you think you can drive that fast underground?

PREVIEW

Name: _____ 139

Curriculum Connection
A2.1

IF/THEN Statements – Underground Drones

Directions Follow the if/then statements to migrate the butterfly to warmer weather.

1)	If sedimentary rock is the softest	then	Move down 2 spots
2)	If heat and pressure change rocks	then	Move right 3 spots
3)	If i ive igneous rocks form above ground	then	Move left 4 spots
4)	If ks are cooled lava	then	Move down 2 spots
5)	ocks ar nation of minerals	then	Move right 2 spots
6)	If we	then	Move down 2 spots
7)	If steel is wit	then	Move left 3 spots
8)	If rocks can tell istor	then	Move right 3 spots
9)	If rocks and minerals h no	then	Move right 2 spots
10)	If intrusive rocks have larger tals		Move down 1 spot





PREVIEW

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Name: _____ 140

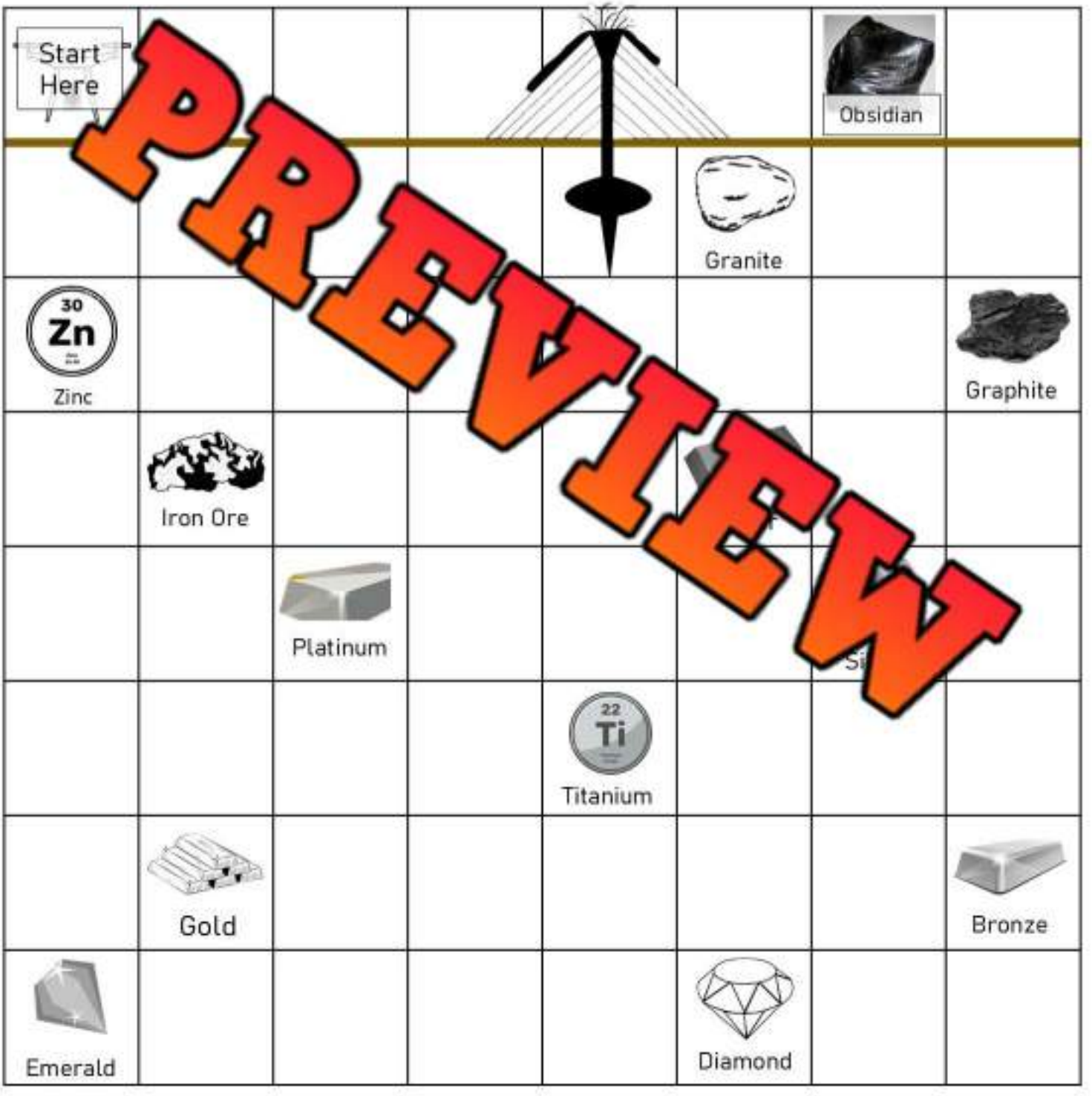
Curriculum Connection
A2.1

Writing Code – Underground Drones

Nova is a robot drone that helps gathers information about underground mines. Nova is controlled by a remote control.



Mining Use the map to write code on the next page.

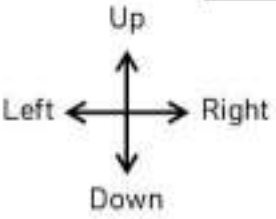


PREVIEW

Name: _____ 141

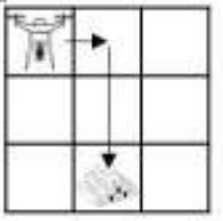
Curriculum Connection
A2.1

Writing Code – Underground Drones



Commands – Use the example below to learn the code

Move 1 right
Move 2 down



Mining Tell Nova where to dig so that they gets to all the materials.

1) Find t r and emerald.

2) Find the platinum and diamond.

3) Find the silver, graphite, and granite.

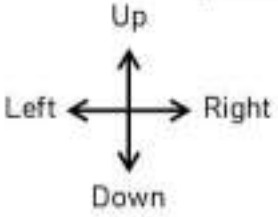
PREVIEW

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Name: _____ 142

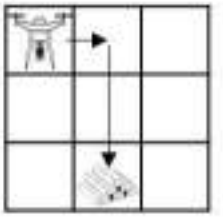
Curriculum Connection
A2.1

Writing Code – Underground Drones



Commands – Use the example below to learn the code

Move 1 right
Move 2 down



Mining Collect the minerals/rocks below using as few lines of code as possible. You can pick up the rocks/minerals in any order.

4) Find [illegible]e, copper, diamond, gold, and emerald.

5) Find copper, bronze, obsidian, granite, silver, [illegible]. Don't touch the lava!

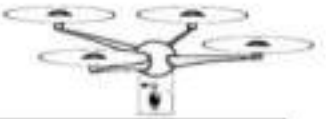
PREVIEW

Name: _____ 143

Curriculum Connection
A1.1, A2.2, A3.1, A3.2, A3.3

STEM Assignment – Underground Drone

Create your own underground drone. You'll need to write code for each of the buttons your done has. For each function, a new code needs to be written.



Questions Answer the questions about your machine below.

1) What buttons does your machine have? What functions does it perform?

2) How does your machine work? Write one example line of code for the machine to process. For example: IF light button is pressed, THEN turn on light

3) How much does it cost to make your machine?

4) Who will you sell your machine to?

5) How much will you sell it for?

6) If you sell 3 machines today, how much money will you make? Remember to subtract how much the machine costs to make!

PREVIEW

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Name: _____ 144

Curriculum Connection
A1.1, A2.2, A3.1, A3.2, A3.3

STEM Assignment – Underground Drone

Examples

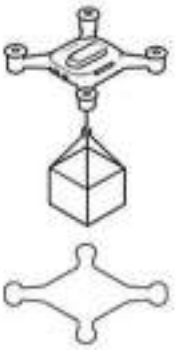
If the up button is pressed

THEN move the drone up

If the gas button is pressed

THEN test the gas, display the type of gas on screen 1





IF/THEN Write code for your invention

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

If

THEN

PREVIEW

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Name: _____ Date: _____

Unit Test – Rocks and Minerals

Multiple Choice /10

1) The study of rocks and the materials that makeup the Earth is called... a) Biodiversity b) Geology c) Biology d) Geograp	2) Which of the following is **not** a rock type? a) Sedimentary b) Magma c) Metamorphic d) Igneous
3) Whi liquified rock? a) Sedi tary b) Magma c) Metamorphic d) Igneous	4) Which type of rock is made up of tiny particles that are a result of erosion? a) Sedimentary b) Magma c) Metamorphic neous
5) Which type of rock has wavy l s of different colours? a) Sedimentary b) Magma c) Metamorphic d) Igneous	rocess slowly removes rock pieces they made into sedimentary rock? a) S g b) g c) Erosi d) Compacti
7) Which type of rock is hardened magma? a) Sedimentary b) Magma c) Metamorphic d) Igneous	8) Which type of rock t it in? a) Sedimentary b) Magma c) Metamorphic d) Igneous
9) Granite is an example of a... a) Rock b) Mineral c) Both d) None of the above	10) Which rock is used to make fire? a) Granite b) Obsidian c) Basalt d) Flint

PREVIEW

Definitions (1 marks each) **/3**

Term	Definition (what does it mean)
Rock	
Mineral	
Lustre	

PREVIEW

Short Answer Questions (2 marks each)

1) How can you describe a rock? Pictur[illegible]ck in y[illegible] describe it below.

2) How do we use rocks in our everyday lives?

3) How does erosion lead to sedimentary rock?

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Long Answer Questions /10

1) What is the rock cycle? How do rocks change type? What processes change rocks from one type to another?

PREVIEW

2) What is a fossil? How are they formed? What tell the Earth's history?

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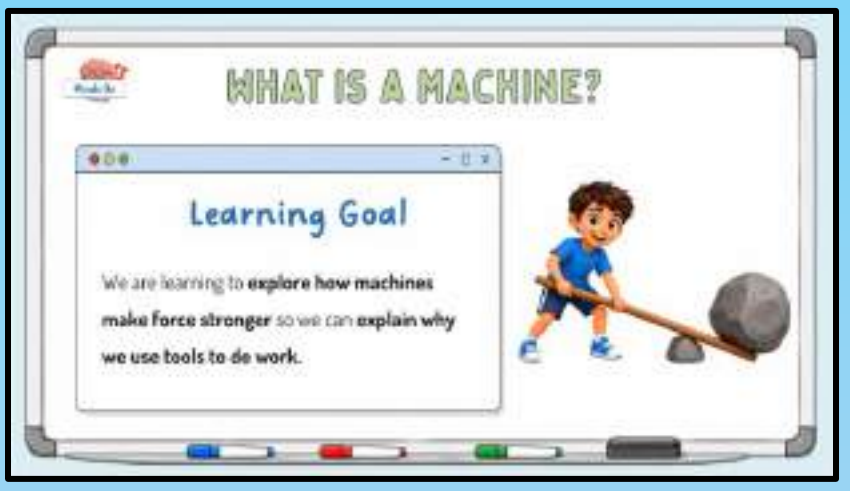
Google Slides Lessons Preview

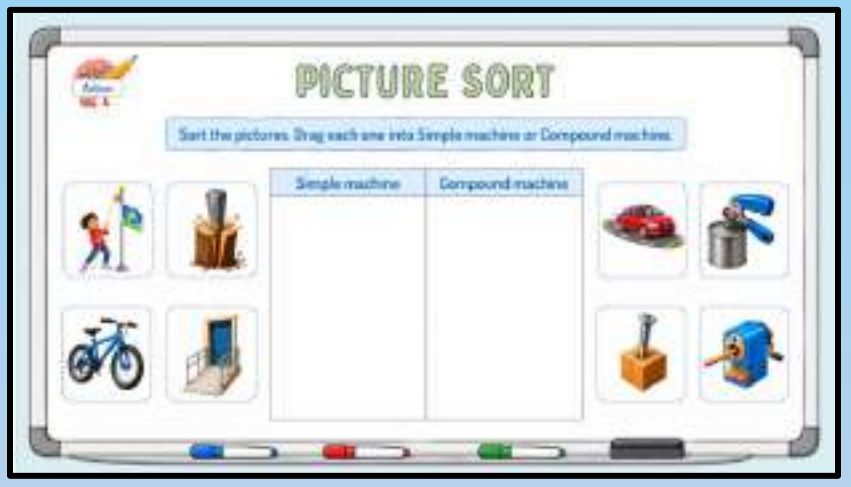
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Ontario Science Curriculum
Machines & Mechanisms– Grade 4

3-Part Lesson Format

Part 1 – Minds On!
- Learning Goals
- Discussion Questions
- Quotes
- And More!



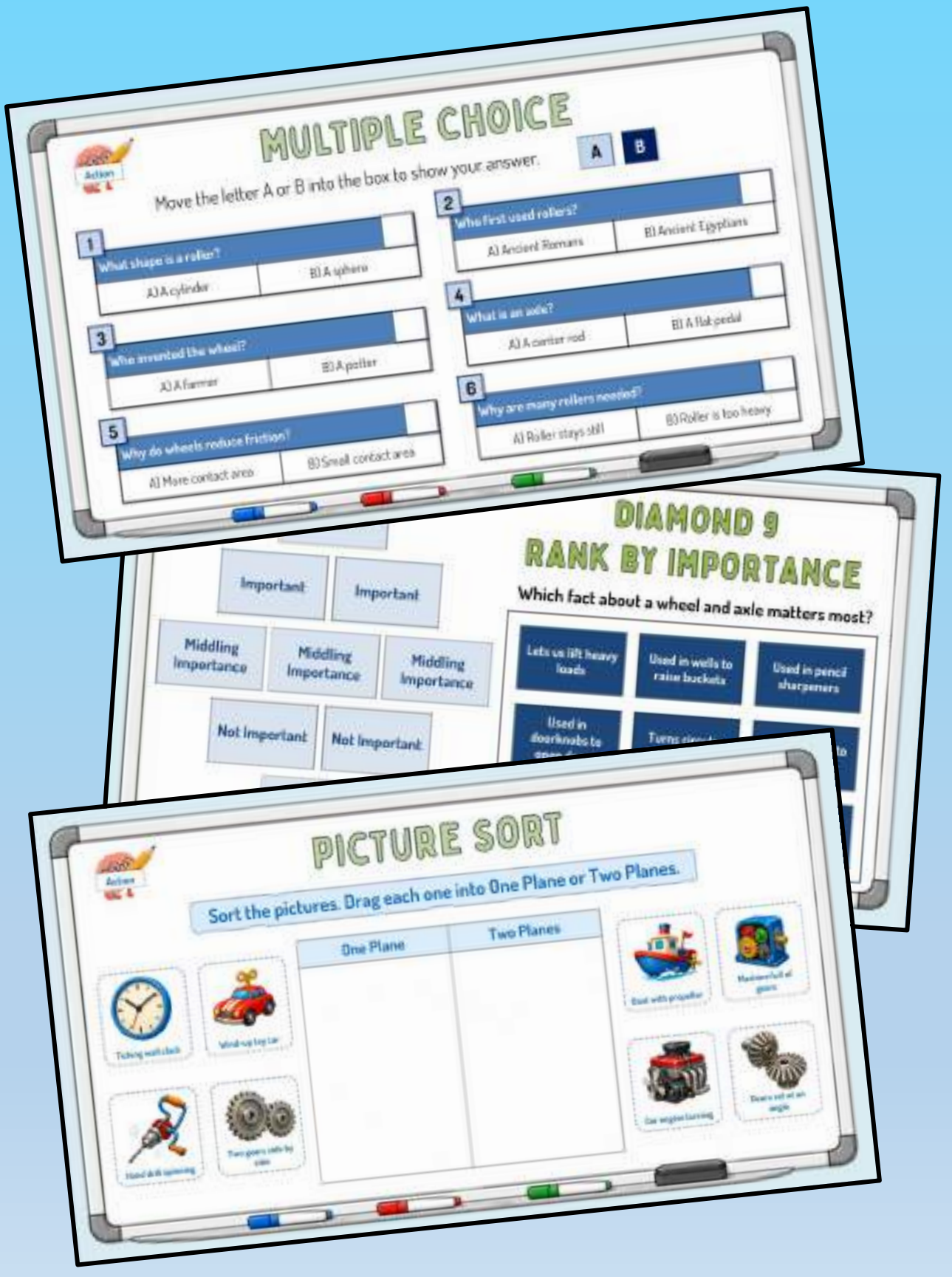


Part 2 – Action!
- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!
- Exit Cards
- Quizzes
- Reflection
- And More!



Ontario Science Curriculum
Machines & Mechanisms– Grade 4



Ontario Science Curriculum
Machines & Mechanisms– Grade 4



Workbook Preview

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Grade 4 Science – 2022 Curriculum

Machines and their Mechanisms

	Curriculum Expectations	Pages
D1.1	assess the impacts of machines and their mechanisms on the daily lives of people in various communities	9-17, 60-61, 82-90, 93, 97-106
D1.2	assess and compare the environmental impacts of using different machines designed for similar purposes	107-123
D2.1		-23, -66, -77,
D2.2	purpose of each part	-23, -57, 60-66, 71-73, 75-77, 80-81, 91-92, 97
D2.3	describe how different mechanisms transmit various types of motion, including rotary motion, from one system to another	18-19, 21-23, 36-41
D2.4	describe how mechanisms transform motion, including how they can change the geometric plane in which the motion occurs and the speed and/or direction of motion	45-47, 54, 60-64, 66
D2.5	explain how forces are changed in a variety of machines	42, 48-57, 60-61, 67-68, 71-74

Preview of 80 pages from this product that contains 193 pages total.

Grade 4 Science Unit

Strand A - STEM Investigation and Communication Skills

	Curriculum Expectations	Pages
A1.1	use a scientific research process and associated skills to conduct investigations	130-131
A1.2	use a scientific experimentation process and associated skills to conduct investigations	78-79, 94-96
A1.3	use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems	24-31, 58-59, 69-70
A1.4	follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials	24-31, 58-59, 69-70, 78-79
A1.5	communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes	24-31, 58-59, 69-70, 78-79
A2.1	write and execute code in investigations and when modelling concepts, with a focus on decomposing problems into smaller steps	124-129
A2.2	identify and describe impacts of coding and of emerging technologies on everyday life	20, 126-129
A3.1	describe practical applications of science and technology concepts in their home and community, and how these applications address real-world problems	130-131
A3.2	investigate how science and technology can be used with other subject areas to address real-world problems	130-131
A3.3	analyse contributions to science and technology from various communities	130-131

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MACHINES AND THEIR MECHANISMS



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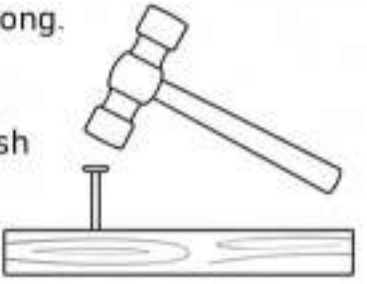
Name: _____ 9

Curriculum Connection
D1.1, D2.1

Machines

What is a Machine?

To perform work, we need to use a pulling or pushing force. This means when we lift a box, push a car, stand up out of bed, or jump up in the air, we are using force. When we jump really high or lift a really heavy box, we say we are really strong. What we should say rather, is that we can produce a lot of force.



Sometimes our muscles cannot produce enough force to push or pull. When this is the case, we can use a machine to help us. A **machine** is anything that makes a force stronger.

A hammer is a machine because it allows us to produce a stronger force on a nail then we would be capable of with our bodies. Knives and forks are also machines because they magnify the force of our hands, producing more force onto our food.

For example, if you tried to cut a steak with your hands, you would struggle. If you use a knife, the force you apply into the handle is magnified onto the steak. When we hit a nail with a hammer, the handle of the hammer increases the force you apply. The longer the hammer, the more magnified the force will be. That is why hammers have long handles.

PREVIEW

Simple Machines

Simple machines are the basic mechanical devices that allow us to apply more force. There are 6 types of simple machines: levers, wheels and axles, pulleys, wedges, screws, and inclined planes.



To apply an even greater magnitude of force, we can combine simple machines to make **compound machines.** Some examples of compound machines are: cars, bicycles, can openers, and pencil sharpeners.

Name: _____ 10

Curriculum Connection
D1.1, D2.1

True or False

Circle whether the statement is true or false.

1) A machine allows us to use more force.	True	False
2) There are 6 basic simple machines.	True	False
3) A compound machine is made of one simple machine.	True	False
4) A ramp is an example of a pulley.	True	False
5) A bicyc s a wheel and axle.	True	False

Quest sw questions below using evidence from the text.

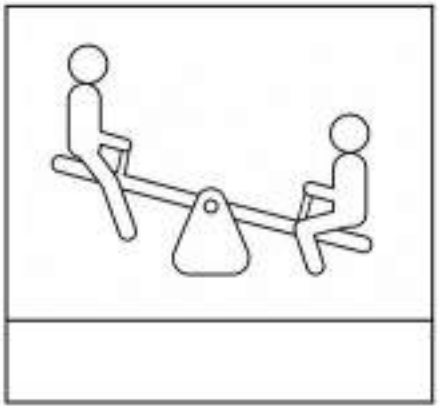
1) What is a m do w them?

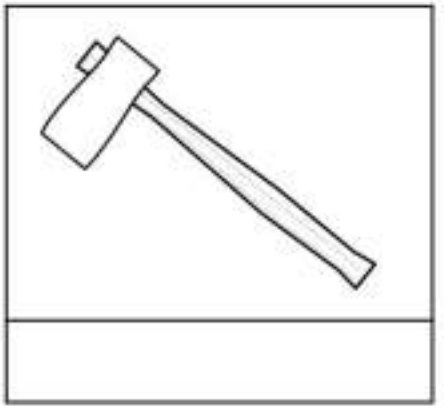
2) What is a simple machine? When have you used ple m ?

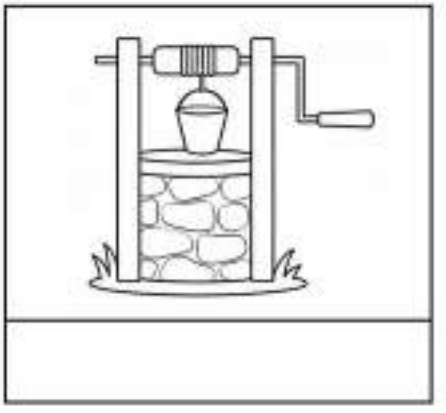
PREVIEW

Label

Which simple machine is in the picture?







Curriculum Connection
D1.1, D2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Match each item in Column A to B.

	Column A	Column B
	1) A tool that helps make work easier.	A) Wheel and axle
	2) The simplest type of machine.	B) Compound machine
	3) A machine made by combining two or more simple machines.	C) Machine
	4) Helps move heavy objects by reducing friction.	D) Six
	5) How many simple machines are there?	E) Simple machine

Name: _____ Mark

Match each item in Column A to B.

	Column A	Column B
	1) A tool that helps make work easier.	A) Wheel and axle
	2) The simplest type of machine.	B) Compound machine
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	5) How many simple machines are there?	E) Simple machine

Name: _____ Mark

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	2) The simplest type of machine.	B) Compound machine
	3) A machine made by combining two or more simple machines.	C) Machine
	4) Helps move heavy objects by reducing friction.	D) Six
	5) How many simple machines are there?	E) Simple machine

PREVIEW

Name: _____ 18

Curriculum Connection
D2.1, D2.2, D2.3

Wheel and Axle

Wheel and Axle
The wheel and axle is another type of simple machine that was invented around 5,500 years ago in the Middle East. It revolutionized transportation and made big changes to society as it allowed wagons to pull people and things. It uses a wheel with a rod attached through the middle that can spin if it is pushed or pulled. This machine can help move loads and lift loads.



A b d a car are examples of machines that use a wheel a e loads. We can also use a wheel and axle s. s an example of a wheel and axle that ca t a he

Example – A W
A well often uses a el water out of the ground. In this exa king el wraps the rope around the rod which bu ly a circular force to the crank which lifts t loa his example, rotary motion is creating linear motion. **Rotary motio** oveme is circular while **linear motion** is movement in a straight line.

PREVIEW

Magnified Force
If we simply dragged a cart across the ground, the on would it difficult to move anything heavy. Using wheels reduces the frictio ro leverage to move heavy things.

A bicycle uses gears to propel the bike forwards. Gears are lik eels with teeth that a chain can fit into. To move a bicycle, the user puts force into the larger gear connected to the pedals. The chain connects to a smaller gear that is connected to the back wheel. When you rotate the larger gear once with the pedal, it will rotate the smaller gear two or more times depending on the gear ratio. This means your force was magnified by at least double.



It is common for the highest gear ratio on a bike to be four times as many rotations, which means if you pedal once around, your bike will travel the distance of 4 tire rotations.

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Name: _____ 19

Curriculum Connection
D2.1, D2.2, D2.3

True or False Circle whether the statement is true or false.

1) Rotary motion is movement in a straight line.	True	False
2) Linear motion is movement in a straight line.	True	False
3) Using a wheel reduces the amount of friction.	True	False
4) A winch changes rotary motion into linear motion.	True	False
5) Bicycles use gears, which are like wheels.	True	False

Question Answer the questions below using evidence from the text.

1) What is a wheel and why do we use them?

2) Why do we want to magnify the force we apply to a machine like a wheel and axle?

PREVIEW

Visualizing Draw what you were picturing while you were reading. Explain the picture.

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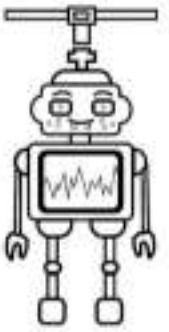
Name: _____ 20

Curriculum Connection
A2.2

Coding - Drawing a Bicycle

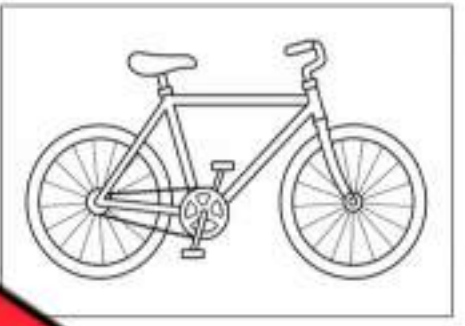
Directions Follow the code from Nora to draw a bicycle.

Hi, Nora here. Can you follow my code to draw a bicycle?



run program

- Draw [illegible]ge circles for the wheels.
- Dra[illegible]annect the wheels for the bicycle
- Draw a se[illegible]am
- Draw the hand[illegible]abo[illegible]heel.
- Draw two pedals in th[illegible]f the
- Draw a chain connecting the pedals[illegible]k w



PREVIEW

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Name: _____ 21

Curriculum Connection
D2.1, D2.2, D2.3

Newspaper Article: Wheels and Axles

Wheels and Axles: The Hidden Helpers

Publish Date: May 28, 2026

Did you k[illegible]hat wheels and axles are everywh[illegible]d us? At school and at hom[illegible]eels and axles to make w[illegible]A [illegible]eel and axle work toget[illegible]move [illegible] turning.

One example at school is the doorkn[illegible] When you turn a doorknob, you are using a wheel and axle. The knob is the wheel, and the rod inside is the axle. This makes it easy to open the door with just a little force.

Another example is a manual pencil sharpener. When you turn the handle, you are spinning the wheel and axle inside. This sharpens the pencil quickly.

At home, a bicycle uses wheels and axles too. When you pedal, the wheels turn on their axles, making the bike move forward. According to bike expert Mr. Johnson, "The wheels and axles on a bicycle help you ride smoothly and go faster."

Even hinges on doors work like wheels and axles. Ms. Brown, a mother, says, "When I open the door, the hinge lets it [illegible]wing easily. The hinge works like an [illegible]elping the door move."



In f[illegible] w[illegible] and axles are in many things we use every day. They help us by making tasks easier and faster. So next time you use a doorknob or ride a bike, remember the hidden helpers: wheels and axles!

PREVIEW

Name: _____ 22

Curriculum Connection
D2.1, D2.2, D2.3

True or False

Is the statement true or false?

1) Wheels and axles make tasks hard.	True	False
2) Axles help doors swing smoothly.	True	False
3) Bikes' wheels don't need axles.	True	False
4) Turning a knob uses force.	True	False
5) Doorkn[illegible]e wheels and axles.	True	False

Quest[illegible]

[illegible]uestions you have about the text.

1)	
2)	

Questions

Answer the questions below.

1) Explain how a bicycle moves using wheels and axles.

2) Give examples of a wheel and axle at home?

PREVIEW

Curriculum Connection
D2.1, D2.2, D2.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark ____

Check only the true statements.

Statement	✓
Wheels and axles help move objects more easily.	
A doorknob is an example of a wheel and axle.	
A bicycle uses wheels and axles to move forward.	
A wheel and axle can only be found in cars.	
Turning a manual pencil sharpener uses a wheel and axle.	
Wheels and axles make work harder.	
Hinges on a door can work like a wheel and axle.	
Wheels and axles are found in many everyday objects.	

Name: _____ Mark ____

Check only the true statements.

Statement	✓
Wheels and axles help move objects more easily.	
A doorknob is an example of a wheel and axle.	
A bicycle uses wheels and axles to move forward.	
A wheel and axle can only be found in cars.	
Turning a manual pencil sharpener uses a wheel and axle.	
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Name: _____ Mark ____

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Name: _____ Mark ____

Check only the true statements.

Statement	✓
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Wheels and axles make work harder.	
Hinges on a door can work like a wheel and axle.	
Wheels and axles are found in many everyday objects.	

PREVIEW

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Name: _____ 26

Curriculum Connection
A1.3, A1.4, A1.5

Activity – Balloon Car

Research Question — What are we learning about?

We will be creating a car that is able to move without us pushing it. To do this, we will use the force of moving air. Our car's wheels will attach to a rotating axle.

Material — What will you need for the experiment?

- ❑ Pl
- ❑ P ith holes poke through th are large enough fo it t
- ❑ 2 wooden ske ng e an over the width o ot
- ❑ Balloon
- ❑ Two straws
- ❑ Tape
- ❑ Scissors







PREVIEW

Method — How will you complete the

1) Cut one of the straws in half
2) Tape both pieces of the straw to one side of the water bo e
3) Put the wooden skewers through the straws
4) Press each bottle cap onto the ends of the wooden skewers. These w he wheels and axles
5) Give your car a push to see if it will roll properly. If it gets stuck or if the wheels don't roll, make sure your axles are parallel to each other.
6) Tape the neck of the balloon around one end of the other straw. Wrap the tape very tightly so the connection is airtight.
7) Cut a small hole in the top of the water bottle so that it is just big enough to push a straw through. Ask your teacher for help on this step!
8) Push the free end of the straw through the hole and out the mouth of the bottle
9) Tape the straw to the bottle so it is secured to the bottle
10) Blow up the balloon by blowing air into the straw. Keep your finger over the end of the straw until you are ready for the car to move!

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Name: _____ 27

Curriculum Connection
A1.3, A1.4, A1.5

Diagram Draw a picture of your balloon car. Label the wheels, axles, and power source. Use arrows to show which way the wind is blowing.

Results What ... with ... ur car? Answer the questions below.

1) How did your car ...e? E...

2) How could you improve the design of your car s... t... ...ber? Think about the following in your answer: weight, straw diam... ...els, si... alloon.

3) Newton's third law of motion states that for every action, there is an equal and opposite reaction. Why is this experiment an example of this law?

PREVIEW

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Name: _____ 28

Curriculum Connection
A1.3, A1.4, A1.5

Activity – Balloon Car #2

Research Question — What are we learning about?

In this experiment, we will be making a balloon car again, but this time with different materials. We will use wind power to propel our cars forward.

Materials — What will you need for the experiment?

- ❑ Bo[illegible]board, foam, plastic. Make it a streamlined shape that uses as l[illegible]aterial a[illegible], so it is lighter
- ❑ 4 pla[illegible]c lids f[illegible]l. Should be large enough to keep the body of the car off the ground 5-[illegible]
- ❑ 2 wooden sk[illegible]ng ep[illegible]an over the width of the car's body)
- ❑ Balloon
- ❑ Two straws
- ❑ Tape
- ❑ Scissors

PREVIEW

Method — How will you complete the experi[illegible]t?

1) Cut one of the straws in half
2) Tape both pieces of the straw to one side of the body of the car
3) Put the wooden skewers through the straws
4) Press each bottle cap onto the ends of the wooden skewers. These will be the wheels and axles
5) Tape the neck of the balloon around one end of the other straw. Wrap the tape very tightly so the connection is airtight.
6) Tape the straw to the top of the body of the car. This should give the balloon enough room to fill up
7) Blow up the balloon by blowing air into the straw. Keep your finger over the end of the straw until you are ready for the car to move!





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Name: _____ 29

Curriculum Connection
A1.3, A1.4, A1.5

Diagram Draw a picture of your balloon car. Label the wheels, axles, and power source. Use arrows to show which way the wind is blowing.

Results W[illegible]ed w[illegible]r car? Answer the questions below.

1) Did this car drive be[illegible] wate[illegible] version? Explain why it did or it didn't.

2) How could you improve the design of your car so th[illegible] trave[illegible]er? Think about the following in your answer: weight, straw diameter[illegible]s, s[illegible]?

3) Why is it important for a car to be light? Do you think heavier gas-powered cars use more gas or less? Do heavier wind powered cars need more wind?

PREVIEW

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Name: _____ 32

Curriculum Connection
D2.1, D2.2

Gears

What are Gears?

A **gear** is a wheel with teeth that slot together so that when one gear turns, the other turns as well. Gears are made in different sizes in order to increase the power or speed of a turning force. A smaller wheel turns quick[illegible]nd requires much less force to turn. A bigger wheel tur[illegible]lowly and requires more force.



Bicyc[illegible]

Bicycles [illegible]e gear[illegible]nnected by a chain. The chain works the same way as a gear because it has [illegible]onne[illegible]ears – one from the back wheel and one from the pedals. As you peda[illegible]gen[illegible]t[illegible] transfers the turning force from the pe[illegible]ke th[illegible] the wheel go around and move the [illegible]alon[illegible] vary in size so that the chain can be mo[illegible]tween gears which increases or decreases the speed of the bike.



When you want your bicycle to go fast, you switch [illegible]l gea[illegible]arger gear that has more teeth. If the pedal gear has 20 teeth and the s[illegible]r g[illegible]only has 10, your wheel will rotate twice as fast as your pedal gear. This [illegible]force you put into the pedal will be multiplied by two. You will need to work ha[illegible]o apply force into the larger gear to get it to rotate. You would only use the largest gear on flat ground or going downhill.

When you are going uphill, you want to be able to apply less force into the pedal. This means you change the gear to the lowest gear which is the smallest gear on the pedal. With the pedal gear being smaller, you don't need to exert as much force, but your wheel will not spin as many times when you rotate the pedal. This means you won't go as far but it will be easier to pedal.

PREVIEW

Name: _____ 33

Curriculum Connection
D2.1, D2.2

Questions

Answer the questions below.

1) What is a gear?

2) How do[illegible]cle work?

PREVIEW

Making Connections

[illegible] remind you of?

True or False

Circle whether the statement is true or false.

1) The larger the gear, the less force you need to apply to it.	True	False
2) You can multiply a force by using a smaller and larger gear.	True	False
3) A bicycle uses two separate gears connected by a chain.	True	False
4) If the pedal gear has 20 teeth and the wheel gear has 10, your force will be multiplied by two.	True	False
5) A bicycle gear system will work without a chain.	True	False

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Curriculum Connection
D2.1, D2.2

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Sort the items into "Smaller Gears" or "Larger Gears."

Items	
Needs less force	Easier to pedal uphill
Needs more force	Turns more quickly
Harder to pedal	Turns more slowly
Smaller Gear	**Larger Gear**

Name: _____ Mark

Sort the items into "Smaller Gears" or "Larger Gears."

Items	
Needs less force	Easier to pedal uphill
Needs more force	Turns more quickly
Harder to pedal	Turns more slowly
Smaller Gear	**Larger Gear**

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Smaller Gear	**Larger Gear**

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Items	
Needs less force	Easier to pedal uphill
Needs more force	Turns more quickly
Harder to pedal	Turns more slowly
Smaller Gear	**Larger Gear**

PREVIEW

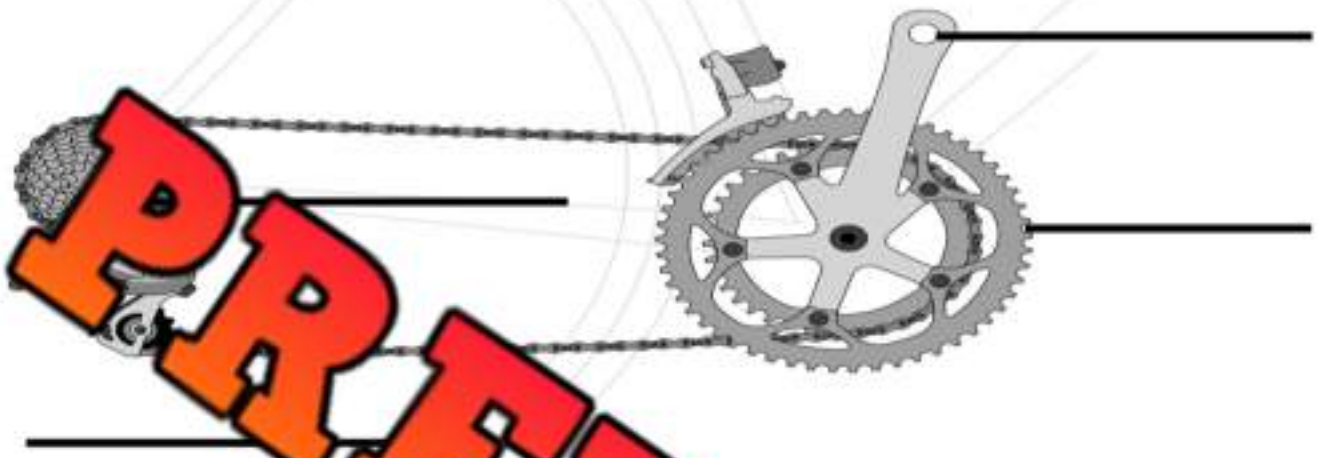
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Name: _____ 35

Curriculum Connection
D2.1, D2.2

Bicycle – Diagram

Word Bank			
Gears – Back Wheel	Chain	Gears - Pedal	Pedal



PREVIEW

Components of a Bicycle	at Does It Do?
Gears – Back Wheel	
Chain	
Gears – Pedals	
Pedals	

Question Support your answer with what we have learned.

How do gears improve a bicyclist's ability for speed and mountain biking (uphill)?
_____ _____ _____

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Name: _____ 36

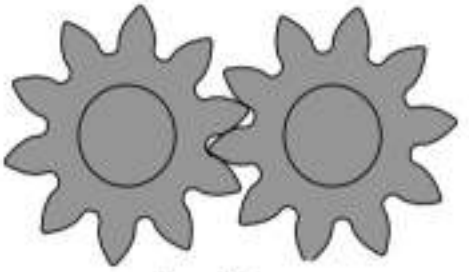
Curriculum Connection
D2.1, D2.2, D2.3

Spur Gears and Idler Gears

Gears Operating in One Plane

Gears operate in one or two planes. Operating in one plane means they go vertical or horizontal, not both. When we put two or more gears together, we call it a **gear train**. Gear trains transfer the motion of one gear into the next gear.

The gear that drives the gear train is called the **driver** and the gear that is at the end is the **driven**. When the motion goes forwards and backwards, we say it is operating in one plane.



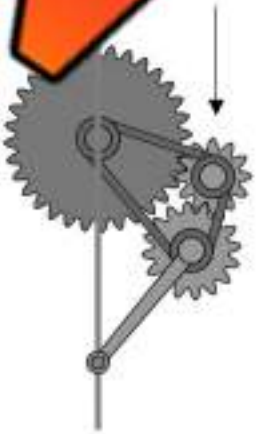
Spur Gear

Spur Gear – Parallel Shaft

The most common gears are the spur gear. **Spur gears** move in one plane and are commonly used in toys and machinery. Spur gears belong to the **parallel** shaft gear group because both shafts are parallel to each other. Parallel means they are moving in the same direction.

Spur gears are used to provide a mechanical advantage to increase or decrease the speed of a device or by transferring motion and power from one shaft to another through a gear train.

Idler Gear – Parallel Shaft



An **idler gear** also belongs to the parallel shaft gear group because the gears are all facing the same direction. The idler gear is important because it is used to change the direction of the gear. The idler gear is the gear that is between the driving gear and the driven gear.

If the driving gear is moving clockwise, the driven gear will move counter-clockwise. If the need of the device is to get the driven gear to move the same direction as the driving gear, we use an idler gear because It will change the direction again to clockwise.

PREVIEW

Name: _____ 37

Curriculum Connection
D2.1, D2.2, D2.3

True or False Circle whether the statement is true or false.

1) The driver gear is the gear at the end of a gear train.	True	False
2) The driven gear is affected by how much force goes into the driver.	True	False
3) If I turn the driver gear clockwise in a two gear train, the driven train will rotate counter-clockwise.	True	False
4) An idler gear is used to change the direction of the rotation.	True	False
5) Gears t[illegible]ve horizontally and vertically operate in one plane.	True	False

Quest[illegible] [illegible]questions below using evidence from the text.

1) What is a g[illegible] do [illegible]ork?

2) What is the purpose of an idler gear[illegible] do we [illegible]?

PREVIEW

Draw Draw a diagram of a spur and idler gear. Label the gears: driv[illegible]en, idler.

Spur Gear	**Idler Gear**

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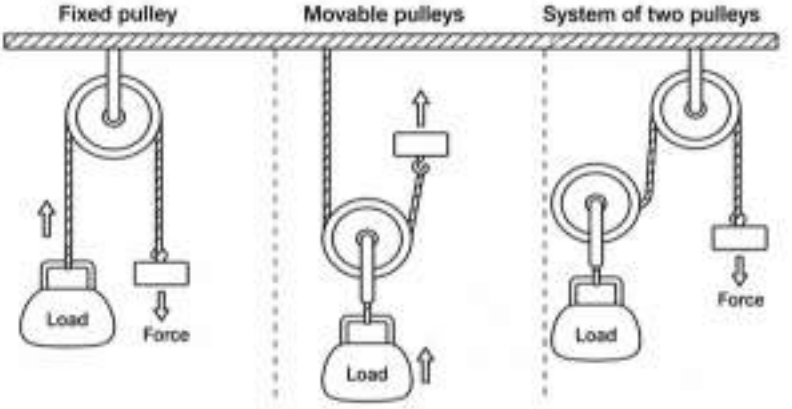
Curriculum Connection
D2.1, D2.2, D2.4

Types of Pulleys

Types of Pulleys

There are three main types of pulleys.

1) Fixed Pulley
2) Moveable Pulleys
3) Syste Two Pulleys –
   Com ers



PREVIEW

Fixed

A **fixed pulley** is sim place, meaning the pulley does not move. Usually, the pulley is fixed t or a w you pull down on the rope or cord, the same amount of force is ap up. A fixed pulley does not make the effort easier, it only changes the

A fixed pulley is great whe ou w direction of your force. Since it is easier to pull down than pull up, fixe eys are ng things up into the air. A flag pole uses a fixed pulley. When you pull the own, s up. This is much easier than climbing high into the air and pulling th

Moveable Pulley

A **moveable pulley** moves with the load. It does not change the direc but it does increase your force by two times. This means if you want to m p, you will still need to pull upwards, but the load will feel half as heavy.

Two Pulley System – Compound Pulleys

A **compound pulley** is a system of two or more pulleys. For a two pulley system that has a moveable pulley, your force will be multiplied by two. You can determine the advantage by counting the number of rope sections supporting the load.

In the diagram, you'll notice 2 rope sections supporting the load, so your force is multiplied by two. A three-pulley system could provide an advantage of 3 times if it has been arranged correctly.

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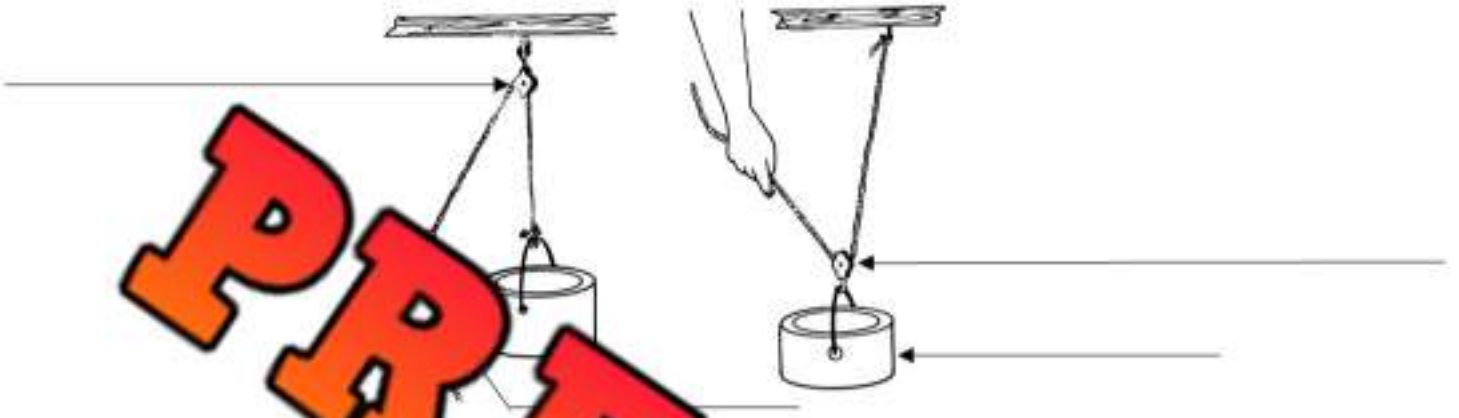
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Curriculum Connection
D2.1, D2.2, D2.4

Diagram

Label the diagram using the terms from the word bank.

Word Bank			
Effort	Load	Fixed Pulley	Moveable Pulley



PREVIEW

Definitions

What do e[illegible] te[illegible]?

Fixed Pulley	
Moveable Pulley	
Compound Pulley	

Question

What two advantages do pulleys give us?

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Curriculum Connection
D2.1, D2.2, D2.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Use the word bank to write the name of the correct place.

Ceiling	Moveable Pulley	Load	Fixed Pulley	Compound Pulley	Wall

	stays in one place while the rope moves.
	moves together with the load.
	uses two or more pulleys working together.
	is the object being lifted.
	is a place where a fixed pulley is often attached.
	is another place where a fixed pulley can be attached.

PREVIEW

Name: _____ Mark

Use the word bank to write the name of the correct place.

Ceiling	Moveable Pulley	Load	Fixed Pulley	Compound Pulley	Wall

	stays in one place while the rope moves.
	moves together with the load.
	uses two or more pulleys working together.
	is the object being lifted.
	is a place where a fixed pulley is often attached.
	is another place where a fixed pulley can be attached.

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Curriculum Connection
D2.5

Pulleys

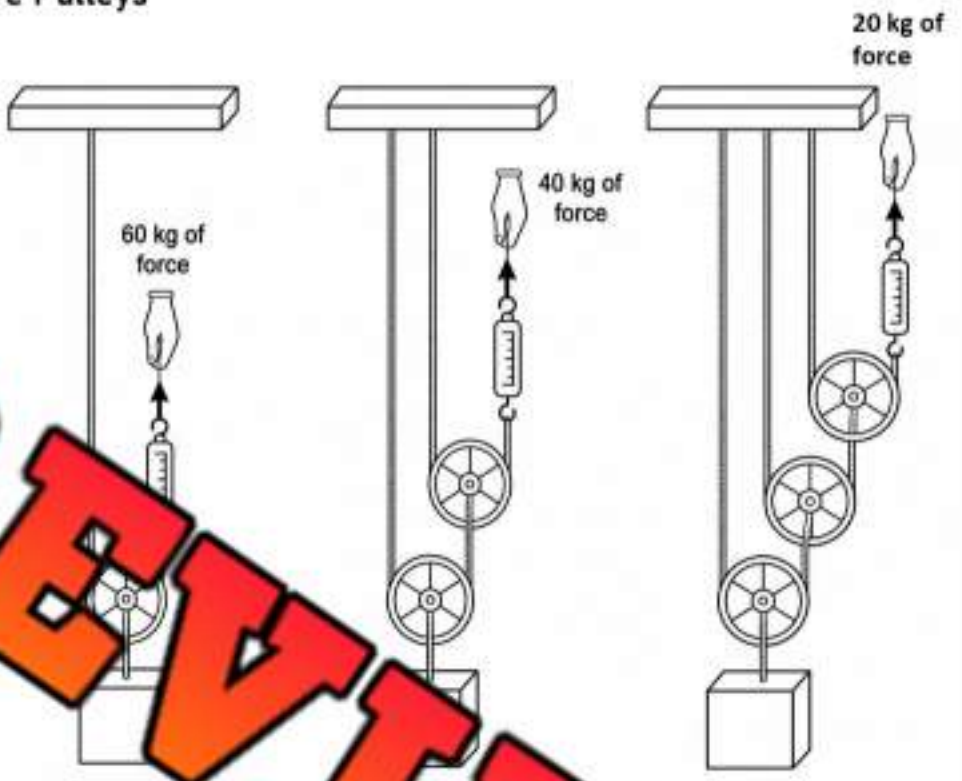
Compound Pulleys – 2 Or More Pulleys

When we use two or more pulleys together, we are multiplying the force even[illegible]

M[illegible]tage

is ho[illegible] times
is multiplied b[illegible]
pulley system we[illegible]ng.

We can calculat[illegible] mechanical advantage in a pulley system by counting the number of supporting ropes that are holding up the load.



PREVIEW

In the first example, two ropes are supporting t[illegible]oad. T[illegible]ans the mechanical advantage is 2 and the force needed will only be [illegible]g. T[illegible]r 60 kg of force is multiplied by 2, which is enough force to lift the 120 k[illegible]

In the second example, there are 4 ropes supporting the load. Ther[illegible] the mechanical advantage is 4 so the load is four times lighter. This means a force of 40 kg could lift the load.

In the last example, there are 6 ropes supporting the load. This creates a big mechanical advantage of 6, which means the load is 6 times lighter. A load of 120 kg could be lifted with only 20 kg of force. Imagine trying to lift something 600 kg. Using this pulley system would mean you'd only need to use 100 kg of force.

The pulley creates a mechanical advantage that is used frequently in sailboats, window blinds, rock climbing, and cranes.

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Name: _____ 49

Curriculum Connection
D2.5

True or False Circle whether the statement is true or false.

1) A fixed pulley has a mechanical advantage of 2.	True	False
2) A moveable pulley has a mechanical advantage of 2.	True	False
3) The more strings supporting the load, the higher the mechanical advantage.	True	False
4) To lift a 100 kg load with a mechanical advantage of 2, you'd need 25 kg of force.	True	False
5) To lift a [illegible]ad with a mechanical advantage of 5, you'd need 10 kg of force.	True	False

Questi[illegible] [illegible]uestions below using evidence from the text.

1) What does m[illegible]van[illegible] mean?

2) How does adding pulleys make work [illegible]?

PREVIEW

Draw Draw 2 different pulley systems that have the mechanical advantages stated.

Mechanical Advantage of 3	**Mechanical Advantage of 6**

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Name: _____ 50

Curriculum Connection
D2.5

Crossword Complete the crossword puzzle by using the clues to fill in the correct words about pulleys across and down.



Word Bank

PULLEY
ROPE
WHEEL
FORCE
LIFT
MACHINE
CRANE
ADVANTAGE
MULTIPLY
EFFORT

PREVIEW

Across	Down
4. A pulley is a simple _____.	1. Mechanical _____ means a machine helps make work easier.
6. The push or pull needed to lift an object.	2. Pulleys help _____ heavy objects.
7. A machine that often uses pulleys to lift heavy materials.	3. A pulley has a grooved _____ that the rope moves around.
8. It goes around the pulley wheel.	5. The amount of work needed to lift a load is called _____.
9. Two or more pulleys can _____ your lifting force.	10. A wheel with a rope that helps lift heavy objects.

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Name: _____ 53

Curriculum Connection
D2.5

Instruction	Check the pictures that show how people use a pulley in their everyday life.



PREVIEW

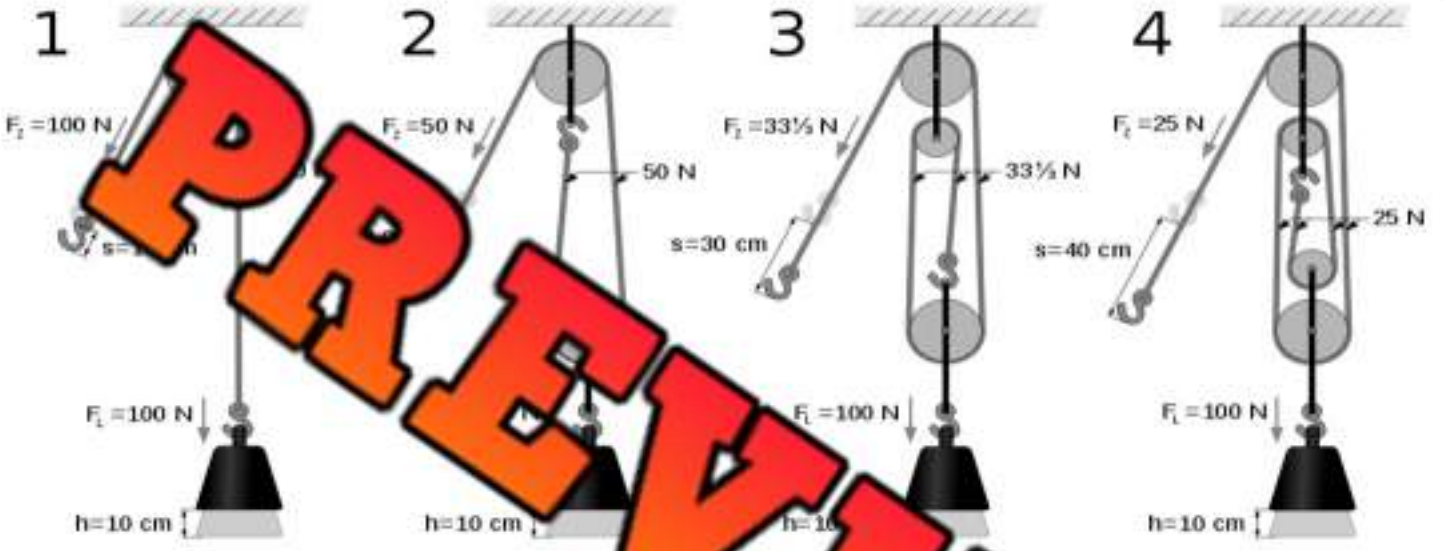
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Name: _____ 54

Curriculum Connection
D2.4, D2.5

Pulley System – Force/Distance Ratios

Force and Distance Ratio
Using a pulley system allows for a mechanical advantage to make a load easier to move. When we add a pulley, it changes the amount of force you need to apply into the pulley, however, it also changes the distance you need to pull. In the diagram below, the differences between using 1 pulley compared to 2, 3, and 4 are outlined.



PREVIEW

Questions Fill in the table below and answer the ques

# of Pulleys	# of Supporting Ropes	Load	Force (N)	Distance to Pull (cm)
1		100 N		
2		100 N		
3		100 N		
4		100 N		

1) What do you notice happens to the relationship between force required and distance to pull when you add a pulley?

2) When would you use extra pulleys? When would just one pulley be enough?

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Name: _____ 55

Curriculum Connection
D2.2, D2.5

Design Your Own Pulley System

Draw it! Draw pictures of the different pulley systems.

Design your own pulley systems. Include how much load there is in kg and the force needed to move the load in Newtons (N). Also include the distance needed to pull the load.

PREVIEW

Pulley #1 – Mechanical Advantage of 2		
	Load	
	Force	
	Distance	

Pulley #2 – Mechanical Advantage		
	Force	
	Distance	

Pulley #3 – Mechanical Advantage of 6		
	Load	
	Force	
	Distance	

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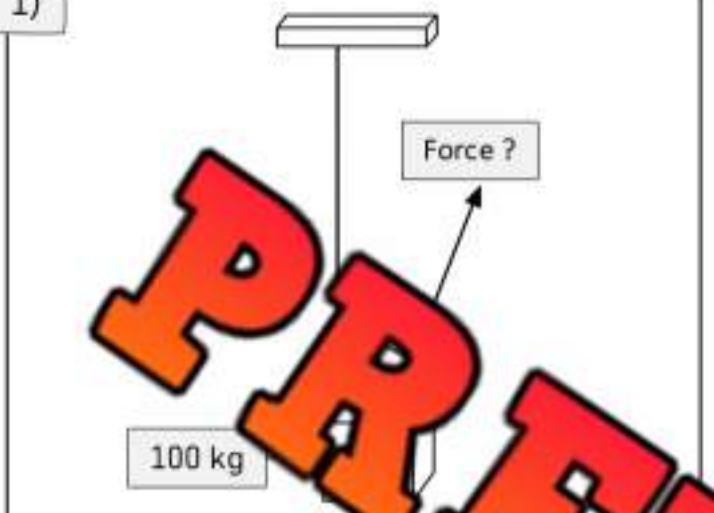
Name: _____ 56

Curriculum Connection
D2.2, D2.5

Pulleys – Mechanical Advantages

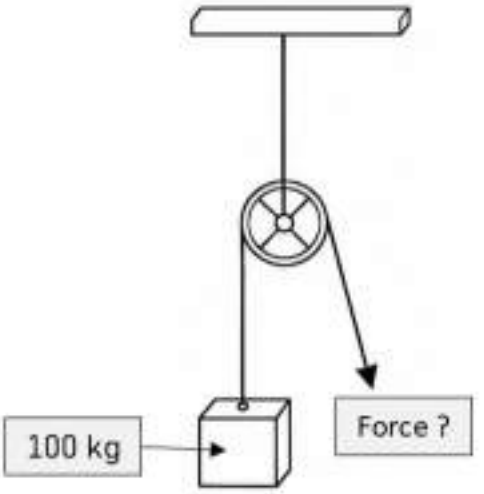
Direction Fill in the table by reading the diagrams.

1)



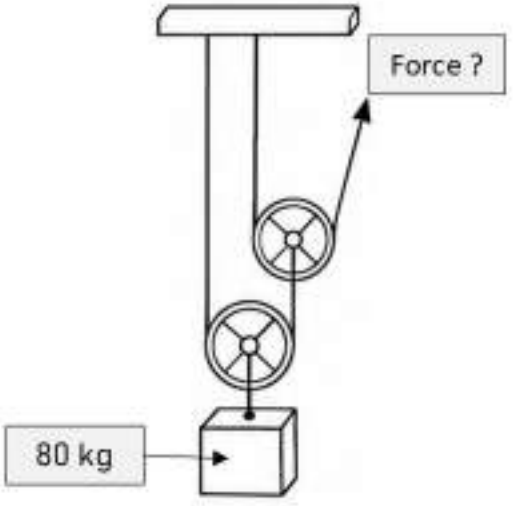
Supporting Ropes	
Mechanical Advantage	
Force Needed (N)	

2)



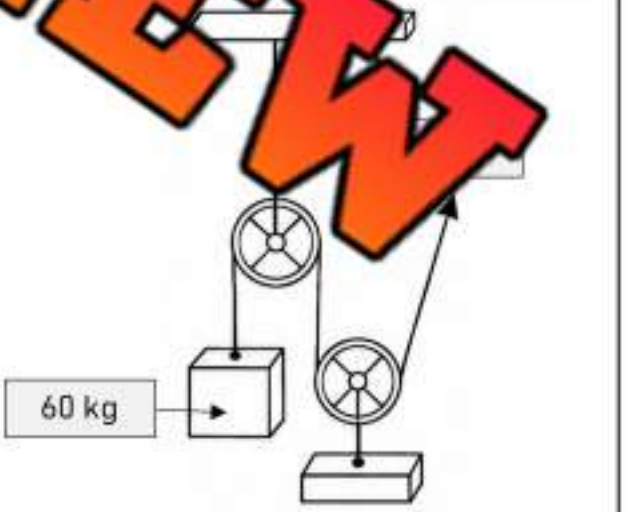
Supporting Ropes	
Mechanical Advantage	
Force Needed (N)	

3)



Supporting Ropes	
Mechanical Advantage	
Force Needed (N)	

4)



Supporting Ropes	
Mechanical Advantage	
Force Needed (N)	

PREVIEW

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Curriculum Connection
A1.3, A1.4, A1.5

Activity – Building a Pulley System

Experiment — What is this experiment all about?

Background

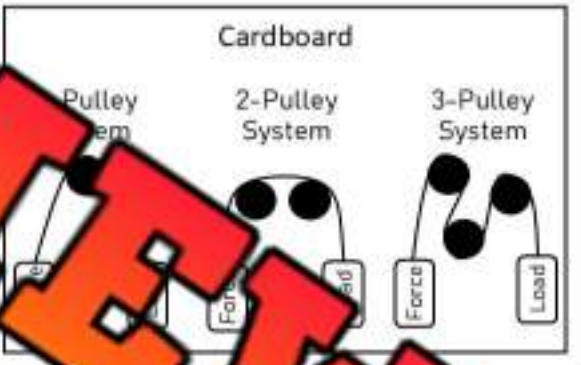
Simple machines are used to make work easier. Work can be defined as force multiplied by distance. Moving your book from one desk to another is work. You are applying force for a certain distance when you push the book to another desk.

Imagine you want to get the same amount of work done, but by using less force. This is done using simple machines, like a pulley.

PREVIEW

Materials — What you need to complete the activity?

- Large box or sheet of cardboard
- Cans of two difference sizes – cans
- Yarn or rope
- A bottle of water and small bucket
- Weights – Can be any objects – rocks or silver
- Hot glue



Procedure — How will you build the pulley system?

1) Hot glue the cans to the cardboard. Put them in positions where they can be used optimally as pulleys.
2) Attach one end of the string to the bucket and the other to the bottle of water.
3) Put the string around one can to mimic a one pulley system. Add some weight to the bucket. Record whether the weight moves the water bottle.
4) Put the string around a second can to mimic a two-pulley system. Record whether the same weight moves the bottle of water.
5) Put the string over a third pulley. Record whether it moves the water bottle.

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Name: _____ 59

Curriculum Connection
A1.3, A1.4, A1.5

Diagram

Draw your 1, 2, and 3 pulley systems.

1-Pulley S	2-Pulley System	3-Pulley System

PREVIEW

Observations

Pulley System	water bottle?
1 Pulley	
2 Pulleys	
3 Pulleys	

Results

What happened?

What happened? Did the pulley systems work differently? Did they affect how far the rope had to move? Explain.

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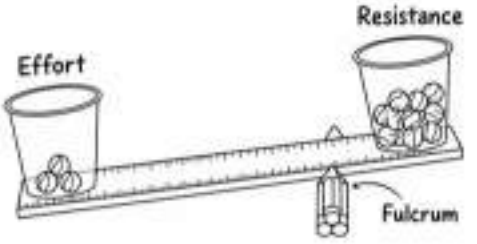
Name: _____ 62

Curriculum Connection
D2.1, D2.2, D2.4

Levers

What is a lever?

A lever is a simple machine that is used to make work easier by using leverage which multiples the force. Let's say you needed to move a box of heavy treats up to the top floor of your treeh[illegible]. You could carry the box, but that would be difficult. Y[illegible]make this task easier by using a lever.

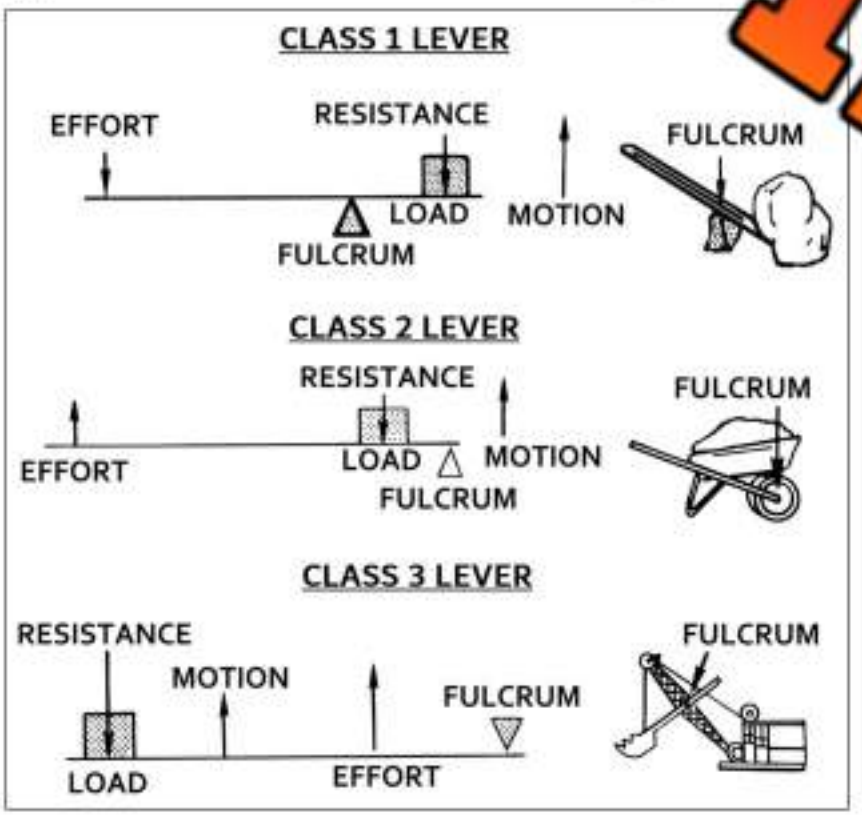


[illegible]ev[illegible]eed a long flat board, a fulcrum, and someone to apply a force. Yo[illegible]could [illegible]lat[illegible]ck as a fulcrum and rest the long board over top of it so that the rock is [illegible]dle. Y[illegible]place the box of treats on one end and push down on the other e[illegible]is [illegible]the air.

This is an example o[illegible]lever[illegible]crum is in the middle of the load and the force. Levers not only multip[illegible]a for[illegible]e the direction of a force.

PREVIEW

Types of Levers



[illegible]1	[illegible]fulcrum is [illegible]n the load [illegible]and [illegible]is
Class 2 Lever	The load is between the fulcrum and the effort
Class 3 Lever	The effort is between the fulcrum and the load

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Name: _____ 63

Curriculum Connection
D2.1, D2.2, D2.4

Questions

Answer the questions below using evidence from the text.

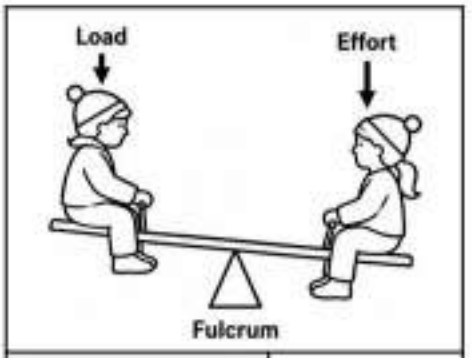
1) What is a lever and why do we use them?

2) When ha… used a lever? What class of lever was it?

PREVIEW

Examples

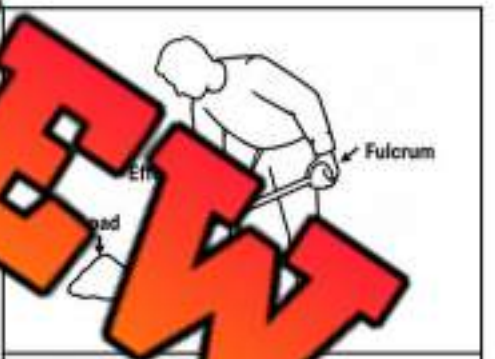
What type … th… showing?



Class of Lever



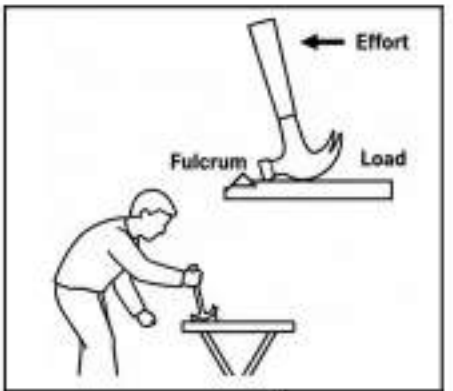
Class of Lever



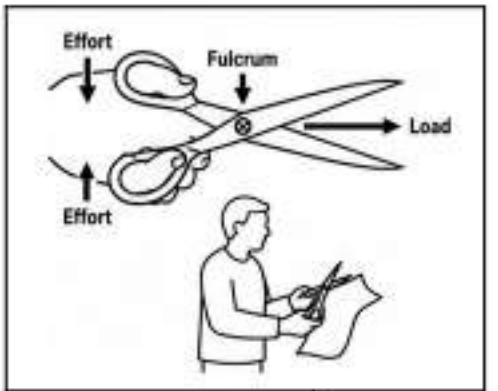
Class of L…



Class of Lever



Class of Lever



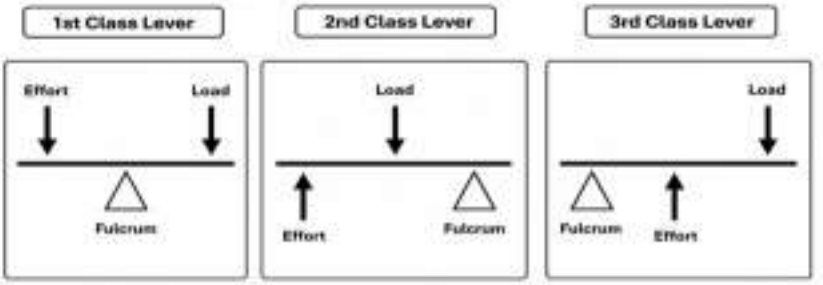
Class of Lever

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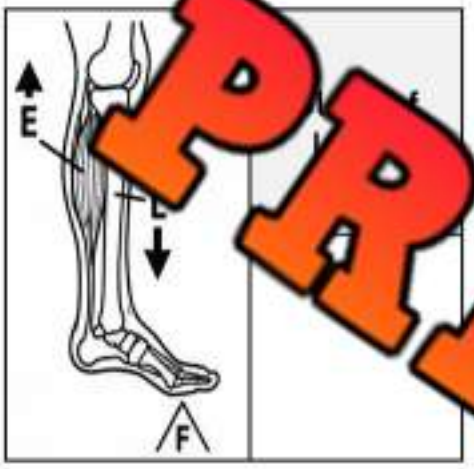
Name: _____ 65

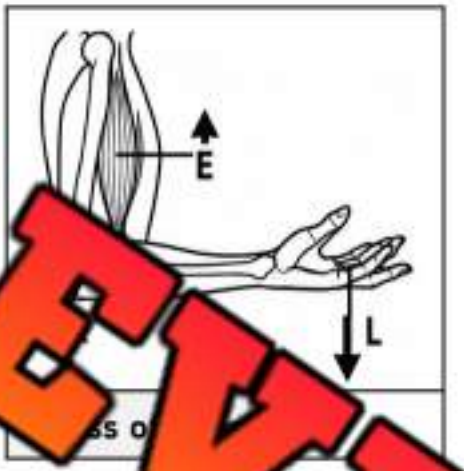
Curriculum Connection
D2.1, D2.2

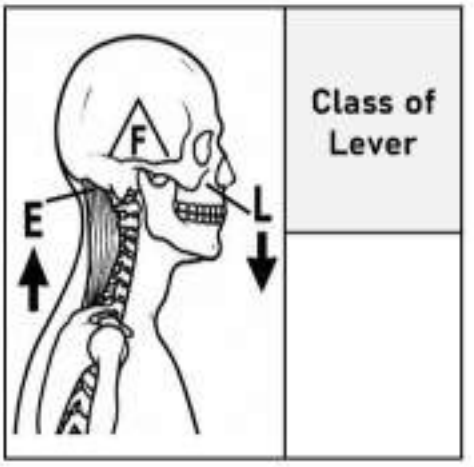
Levers



Examples What type of lever is the example showing?

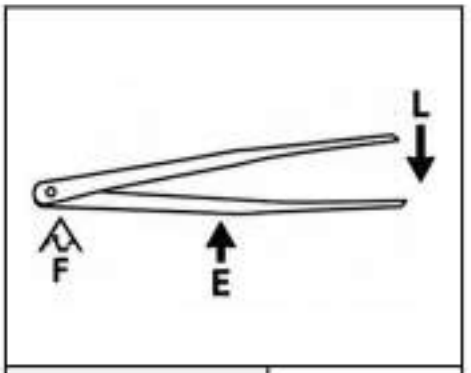




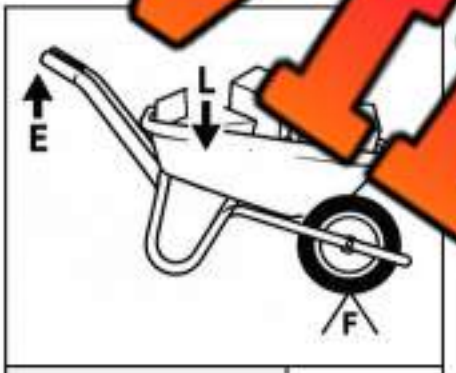


Class of Lever

PREVIEW



Class of Lever



Class of Lever



Class of Lever

Draw Draw examples of all three types of levers.

Class 1 Lever	Class 2 Lever	Class 3 Lever

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Name: _____ 67

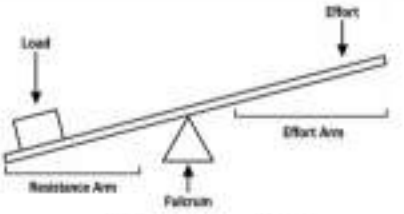
Curriculum Connection
D2.5

Calculating Mechanical Advantage – Lever

Calculating Mechanical Advantage Using a Lever

To calculate the MA of a lever, you will need to know the lengths of the effort arm and the load arm. The formula is:

$$\frac{Effort\ Arm\ (length)}{Resistance\ Arm\ (length)}$$



This will give you the MA, which you can then use to determine how much force will be outputted based on how much force you inputted.

Calculate the MA and output force in the examples below.

	Effort Arm	Load Arm Length	MA	Input Force	Output Force
1)	50			100 N	
2)	4 m			200 N	
3)	2 m			250 N	
4)	3 m			900 N	
5)	150 cm	50 cm			
6)	40 cm	10 cm			800 N
7)	6 m	2 m			600 N
8)	12 m		2		
9)		5 cm	4	600 N	
10)		6 m	3		900 N

PREVIEW

Word Problem Answer the questions below.

Steven uses a lever to pry a rock off the ground. He puts the fulcrum closer to the load to make it easier. The effort arm is 60 cm, and the load arm is 15 cm.	
a) What is the mechanical advantage?	
b) If Steven uses 200 N of input force, how much output force will he create?	
c) If the work requires 700 N of force, will he be able to move it? What could he change?	

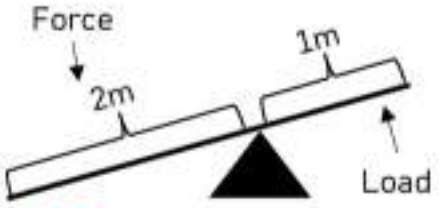
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Name: _____ 68

Curriculum Connection
D2.5

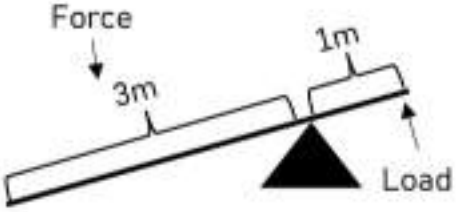
Calculate Calculate the MA and output force in the examples below.

1)



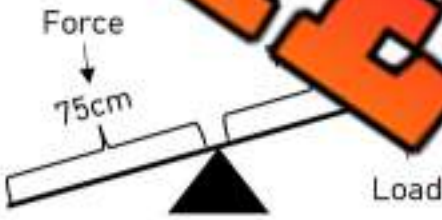
[illegible]	350 N
Output For[illegible]	

2)



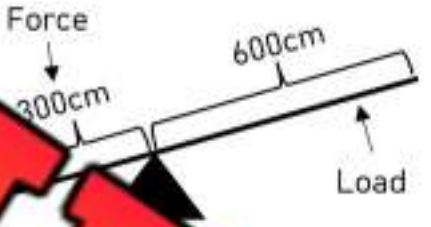
MA	
Input Force	220 N
Output Force	

3)



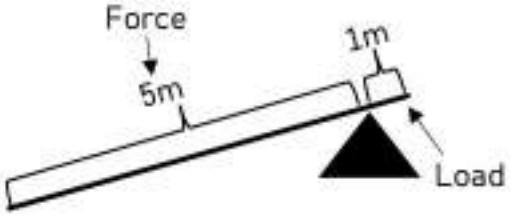
MA	
Input Force	442 N
Output Force	

4)



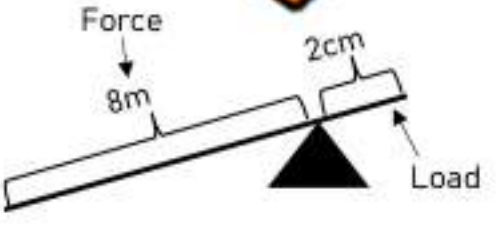
[illegible]	
Output Forc[illegible]	

5)



MA	
Input Force	300 N
Output Force	

6)



MA	
Input Force	
Output Force	800 N

PREVIEW

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Name: _____ 69

Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Testing Different Levers

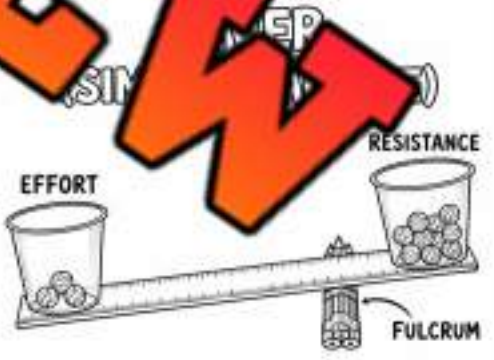
Research Question How does moving the fulcrum affect the force needed to lift a load?

Materials What you need for the experiment?

- ❑ Ruler
- ❑ Two cups
- ❑ Tape
- ❑ Weights – objects that a… s… (marbles, paper clips, etc.)
- ❑ Fulcrum – metal binder clip, pencils, … ser

Procedure How will you complete the exp…t?

1) Tape the cups to the ends of the ruler.
2) Decide which side will be the load. Put a reasonable amount of weight into the cup that will be the load.
3) Put the fulcrum in the centre of the ruler. Add weights into the cup on the effort side of the lever until the lever is balanced. Record the weight you added (number of marbles).



4) Empty the effort cup but leave the same weight in the resistance cup. Put the fulcrum closer to the effort side of the ruler. Complete the same steps as above and record how much effort was needed to balance the lever.
5) Lastly, empty the effort cup again and repeat the same steps as above, but move the fulcrum closer to the resistance cup. Record your results.
6) Answer the questions on the backside of the page.

PREVIEW

Curriculum Connection
A1.3, A1.4, A1.5

Observations

What did you notice as you completed the experiment?

Fulcrum Position	Fulcrum Position on Ruler – cm or mm	Weight in Load Cup	Weight in Effort Cup
In the Middle			
Close to Effort Cup			
Close to R ce C			

Results

Answ estions below.

1) What position the le t of force to move the load? Explain why this was the case.

2) Was there a relationship between the number of m d the t of weight needed to move the load? Explain.

3) What distance from the load on the ruler gave a mechanical advantage of 2 (you needed half as much weight to lift the load). What distance provided an MA of 3 and 4?

MA of 2	
MA of 3	
MA of 4	

PREVIEW

Name: _____ 71

Curriculum Connection
D2.1, D2.2, D2.5

Inclined Plane

Inclined Plane

An inclined plane is a simple machine with no moving parts. It is simply a sloping surface where one end is higher than the other. This allows an object to slide down the surface which helps us move objects easier.

Whe[illegible]need to lift an object upwards, we can carry it or slide it along a ramp. This is mu[illegible]than picking up large and heavy objects. The Egyptians used inclined plane[illegible]when they built the pyramids. Sliding something down a ramp uses the[illegible]rce of[illegible]r advantage.



Tradeoff

An inclined plane always[illegible]o[illegible]zonta[illegible]and a vertical height. We can adju[illegible]hori[illegible] length which will affect the steepness [illegible] inclined plane.

If we make a shorter horizontal length, the inclined plane will be steeper. This will make the distance we need to push shorter but it will make us need more force to push.

If we make the horizontal length longer, we are creating a gentle s[illegible]at requires less force to push but a longer distance.

Picture this, you're standing at the edge of a moving truck that is 2 m tall. You want to move a box up to the opening of the truck. You would only need to lift it 2 m if you lifted it straight up. But, if the box is too heavy, you could use an inclined plane to increase your force acting on the box. If the ramp needed to reach 2 m tall, you could create a mechanical advantage of 2 by making the ramp 4 metres long.

$$MA = \frac{length\ of\ slope}{height\ of\ slope} = \frac{4}{2} = 2$$

PREVIEW

Name: _____ 72

Curriculum Connection
D2.1, D2.2, D2.5

Examples How do the examples of inclined planes help move objects easier?

Roof	
Ramp	
S	
Slide	
Ladder	

PREVIEW

Questions Answer the questions below using evid m th

1) How does using an inclined plane make moving objects easier?

_____

_____

_____

2) If you were carrying a heavy object, would you want a gentle or steep slope? Explain.

_____

_____

_____

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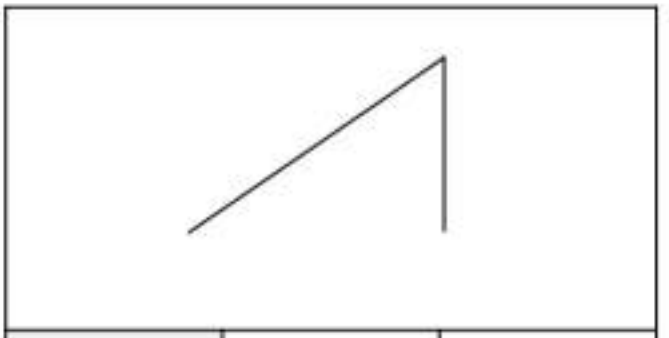
Name: _____ 73

Curriculum Connection
D2.1, D2.2, D2.5

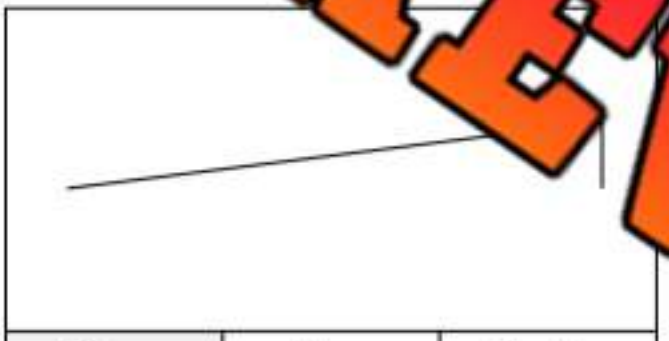
Describe Circle the descriptions of the inclined planes below.



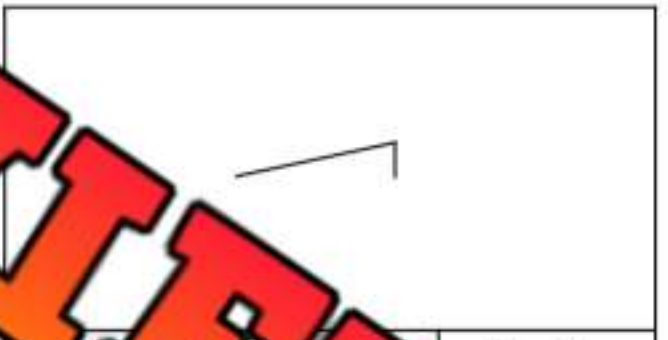
Slope		Gentle
		Heavy
Distance		



Slope	Steep	Gentle
Effort	Light	Heavy
Distance	Far	Short



Slope	Steep	Gentle
Effort	Light	Heavy
Distance	Far	Short



		Gentle
Distance		

PREVIEW

Multiple Choice Circle the best answer.

1) Horizontal means...	Side-to-side	Up-and-Down
2) Vertical means...	Side-to-side	Up-and-Down
3) A _____ ramp makes the load feel lighter.	Longer	Shorter
4) Using a longer ramp makes the distance	Closer	Further
5) Using a shorter ramp makes the load feel	Lighter	Heavier

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Name: _____ 74

Curriculum Connection
D2.5

Calculating Mechanical Advantage – Inclined Plane

Calculate Calculate the missing values in the tables below.

	Length of Slope	Height of Slope	MA
1)	60 cm	30 cm	
2)		1 m	
3)		2 cm	
4)			
5)	12 m		

	Length of Slope	Height of Slope	MA
6)	100 cm	25 cm	
7)	200 cm	50 cm	
8)	150 cm	30 cm	
9)	60 cm		3
10)	10 m		5

PREVIEW

Word Problem Answer the questions below.

1) Hilary can produce 200 N of force to she needs to lift onto a ledge is 2 m tall. She will need to be able to pro N o o move the box. If she uses a ramp, how long should her ramp be so she can ?

2) Jack needs to move a bag of dirt onto a cliff. The cliff is 3 metres high, so he can't reach it. He knows he can exert 250 N of force, but it will take 1000 N of force to move the bag up 3 metres. How long should the ramp be?

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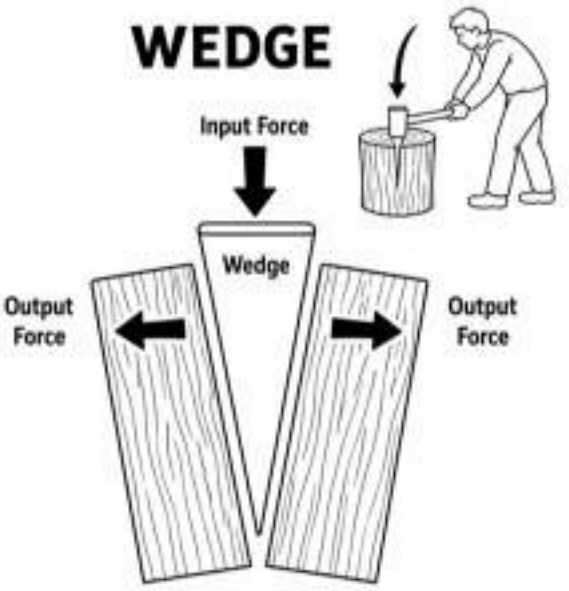
Name: _____ 75

Curriculum Connection
D2.1, D2.2

Wedge

Wedge

A wedge is a triangular tool that is often made from metal, wood, plastic, or stone. It is thick on one end and narrow on the other to form a sharp edge. A wedge is a [illegible]on of an inclined plane (or two inclined [illegible] It is often attached to a handle. Wedg[illegible] millions of years to hunt with, cut and trim [illegible] more.



PREVIEW

How do they work?

When we apply a force to [illegible]side o[illegible], it overcomes the resistance of the object that we are forcing the [illegible] int[illegible] above, we can drive a wedge into a piece of wood to split the wood. [illegible]e appl[illegible]nward pushing force into the wedge, the wedge creates a side to side force into [illegible]wood causes it to split. An example of a **single wedge** [illegible]isel example of a **double wedge** is an axe.



Tradeoff

When we use a longer and thinner wedge, it is sharper which allows it to travel further with less force. The only issue is that this may not cause enough side to side force. If the wedge is shorter and has a wider angle the tip (not as sharp), we will need to apply more force to do the work. Depending on what work we are doing, we will vary which type of wedge we use.

Examples of wedges

A wedge can be used in the following different ways: to cut (knife), to split (axe), to tighten, to hold back (door stop), to scrape (blades), and to hold together (nail).

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Name: _____ 76

Curriculum Connection
D2.1, D2.2

True or False

Circle whether the statement is true or false.

1) A chisel is a single wedge.	True	False
2) A double-sided axe is a single wedge.	True	False
3) A downward input force creates outward forces.	True	False
4) Longer and thinner wedges are not as sharp.	True	False
5) Longer and thinner wedges are sharper allowing it to travel further.	True	False

Questi

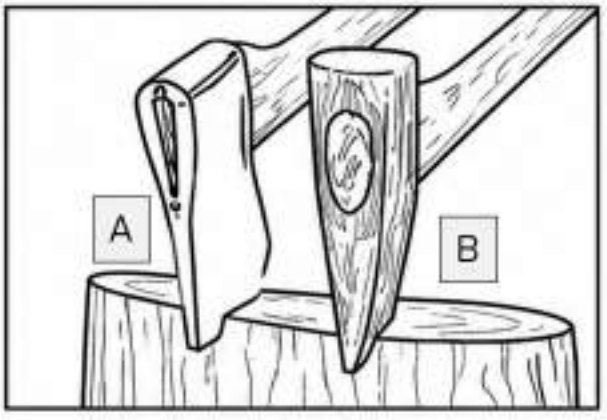
estions below using evidence from the text.

1) What is a w do the

2) What are some of the functions that a wedge ca form

Explain

Which axe is a wood splitting axe, and which is used to cut down trees.



PREVIEW

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Curriculum Connection
D2.1, D2.2

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____
Circle Yes or No for each question.

Mark

1) Is a wedge a simple machine?	Yes / No
2) Does a wedge help split or cut materials?	Yes / No
3) Is an axe an example of a wedge?	Yes / No
4) Does a wedge have a sharp edge?	Yes / No
5) Is a wedge shaped like a circle?	Yes / No

Name: _____
Circle Yes or No for each question.

Mark

1) Is a wedge a simple machine?	Yes / No
2) Does a wedge help split or cut materials?	Yes / No
3) Is an axe an example of a wedge?	Yes / No
4) Does a wedge have a sharp edge?	Yes / No
5) Is a wedge shaped like a circle?	Yes / No

Name: _____
Circle Yes or No for each question.

Mark

1) Is a wedge a simple machine?	Yes / No
2) Does a wedge help split or cut materials?	Yes / No
3) Is an axe an example of a wedge?	Yes / No
4) Does a wedge have a sharp edge?	Yes / No
5) Is a wedge shaped like a circle?	Yes / No

PREVIEW

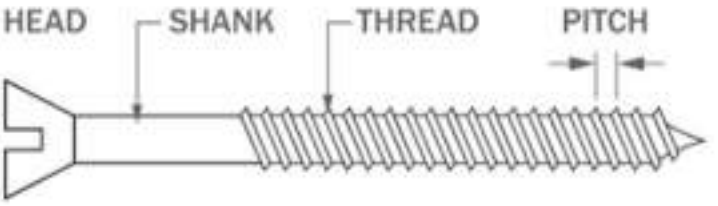
Name: _____ 80

Curriculum Connection
D2.1, D2.2

Screw

Screw

A screw is another type of inclined plane that is in the shape of a cylinder. It has a head at one end and a pointed tip at the other. A screw is different than a nail because it [illegible]reads below the **shank** of the screw [illegible] of the threading is calle[illegible]



Scr[illegible]ws ar[illegible] for [illegible]olding things together. When we turn a screw into a surface, we twis[illegible]d. The[illegible] the screw are positioned to allow the screw to go deeper into the su[illegible]. [illegible]ficult to pull out as the threads won't allow it to slide out.

Screws are used often in o[illegible] ever[illegible] top lids on jars keep the lid secured to the jar. Light bulbs also use[illegible]ws to tw[illegible]tion. Augers use a screw to dig deep into the ground[illegible]s ca[illegible]



PREVIEW

Types of Screws

A **bolt** is a type of screw that does not have a pointed tip. [illegible]ns [illegible] cannot be drilled into place. Instead, it is placed into a pre-dri[illegible]ed h[illegible] and a **nut** is placed on the other end of the screw to hold things toge[illegible]er.

A **drill bit** is a type of screw that makes holes in objects. A drill bit h[illegible]a pointed end and threads that allow the bit to go deeper into the surface. Some examples of other screws are bottle tops, light bulbs, faucet taps, cork openers and guitar tuners.

Mechanical Advantage



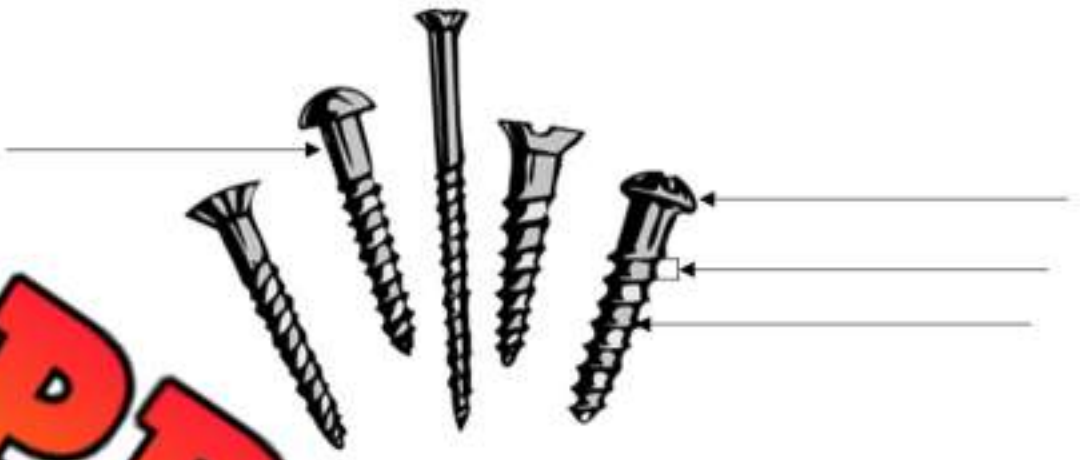
When designing a screw, we can make the mechanical advantage stronger by making the pitch closer together. This will make it easier to twist the screw, but it will require more twists. If we make the pitch wider, it will be more difficult to twist but will require less turns.

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Name: _____ 81

Curriculum Connection
D2.1, D2.2

Diagram Label the diagram using the following terms: pitch, shank, head, thread.



Questions Answer the questions below using evidence from the text.

1) What are screws used for? Name a screw you use daily?

2) If you were weak, would you rather have a longer or shorter pitch? Explain.

Making Connections When have you used a screw before? Explain.

PREVIEW

Name: _____ 82

Curriculum Connection
D1.1, D2.1

Identifying Simple Machines

Label Which simple machine(s) is in the picture?

1)



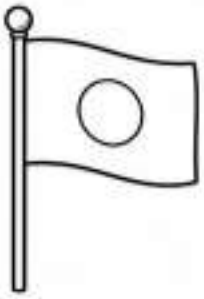
2)



3)



4)



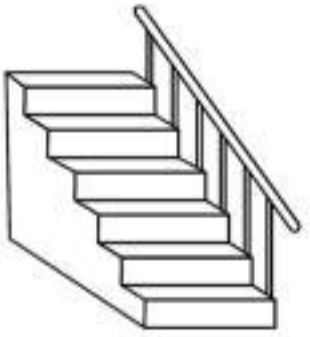
6)



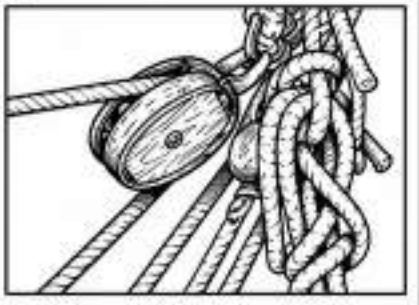
7)



8)



9)



PREVIEW

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Name: _____ 85

Curriculum Connection
D1.1, D2.1

Memory Game: Simple Machines

Objective

What are we learning about?

To help students identify and describe different types of simple machines through a fun and engaging memory game.

Materials

What will you need for the activity?

- Me y gam ovided) with the terms on one set a itio nother set.
- A flat surface like t he fl lay out the cards.



Instructions

How will you complet the acti

1) Divide the class into groups of 3 or 4. Give d set o mory Game cards. (Provided)
2) Have each group lay all the cards face down in a grid n a
3) The students take turns flipping over two cards at a time, tryin a matching term and its definition.
4) If a student finds a match, they remove those cards from the grid and keep them.
5) If the cards do not match, they are turned back over, and the next student takes a turn.
6) The game continues until all the cards have been matched.
7) After the game, review the terms and definitions with the class.
8) Discuss why these terms are important to understand and how they relate to simple machines used in everyday life.

PREVIEW

Name: _____ 86

Curriculum Connection
D1.1, D2.1

Cards | List of terms related to simple machines

Term	Definition
Lever	A bar that pivots on a point (fulcrum) to lift or move loads.
Wh[illegible] Axl[illegible]	A wheel with a rod through its center; turning the wheel moves the axle.
Pulley	[illegible] rope around [illegible] objects.
Gear	A wheel with tee[illegible] hat fit into another gear's teeth to change speed or direction.
Inclined Plane	A flat, slanted surface used to raise objects with less effort.

PREVIEW

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Name: _____ 87

Curriculum Connection
D1.1, D2.1

Cards | List of terms related to simple machines

Term	Definition
Screw	An inclined plane wrapped around a cylinder, used to hold things together.
Blade	A piece of material with a sharp edge that is used to split objects apart.
Fulcrum	The pivot point of a lever.
Load	The object being moved or lifted by a simple machine.
Effort	The force applied to make a simple machine work.

PREVIEW

Name: _____ 88

Curriculum Connection
D1.1, D2.1

Cards | List of terms related to simple machines

Term	Definition
Mechanical Advantage	The benefit gained by using a simple machine to make work easier.
[illegible]	A push or pull that makes an object move.
Friction	[illegible]e when one [illegible] another.
Resistance	The force that [illegible]poses motion in a machine.
Tension	The force in a rope or string when it is pulled tight.

PREVIEW

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Name: _____ 89

Curriculum Connection
D1.1, D2.1

Cards | List of terms related to simple machines

Term	Definition
Balance	The state of being steady and not falling over.
[illegible]sm	The force that attracts or repels certain metals.
Gravity	[illegible]e that pulls ob[illegible]ard the [illegible]rth.
Torque	A twisting f[illegible]e that causes rotation.
Compression	The act of pressing something into a smaller space.

PREVIEW

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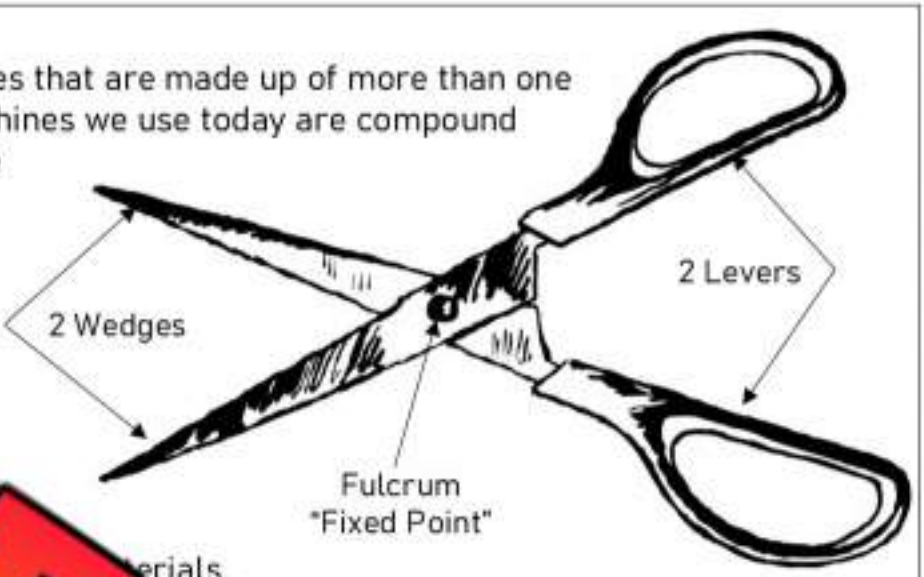
Name: _____ 91

Curriculum Connection
D2.1, D2.2

Compound Machines

Compound Machines

Compound machines are machines that are made up of more than one simple machine. Most of the machines we use today are compound machines that use more than one of the simple machines we have learned about.



Each simple machine has their own advantages. Compound machines take advantage of each machine, making a powerful machine capable of creating strong forces.

Scissors use wedges to cut materials. The wedges are named which are the blades.

Each blade is like a lever since scissors are compound machines, they also take advantage of levers. The lever has a fulcrum in the middle, between the force and the load. The load is placed between the blades allow a strong force to be applied by the user's hands. The force is then transferred to the fulcrum which multiplies the force into the load. This allows scissors to cut materials.

PREVIEW

Questions Answer the questions below using information from the text.

1) What is a compound machine? Why are they useful?

2) Why are scissors considered compound machines? Explain how they work.

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Curriculum Connection
D2.1, D2.2

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

2 Truths and a Lie – Can you find the one that's not true?

	Compound machines are made of two or more simple machines.
	Compound machines are made from only one simple machine.
	Compound machines make work easier by combining simple machines.

Name: _____ Mark

2 Truths and a Lie – Can you find the one that's not true?

	Compound machines are made of two or more simple machines.
	Compound machines are made from only one simple machine.
	Compound machines make work easier by combining simple machines.

Name: _____ Mark

2 Truths and a Lie – Can you find the one that's not true?

	Compound machines are made of two or more simple machines.
	Compound machines are made from only one simple machine.
	Compound machines make work easier by combining simple machines.

PREVIEW

Name: _____ 94

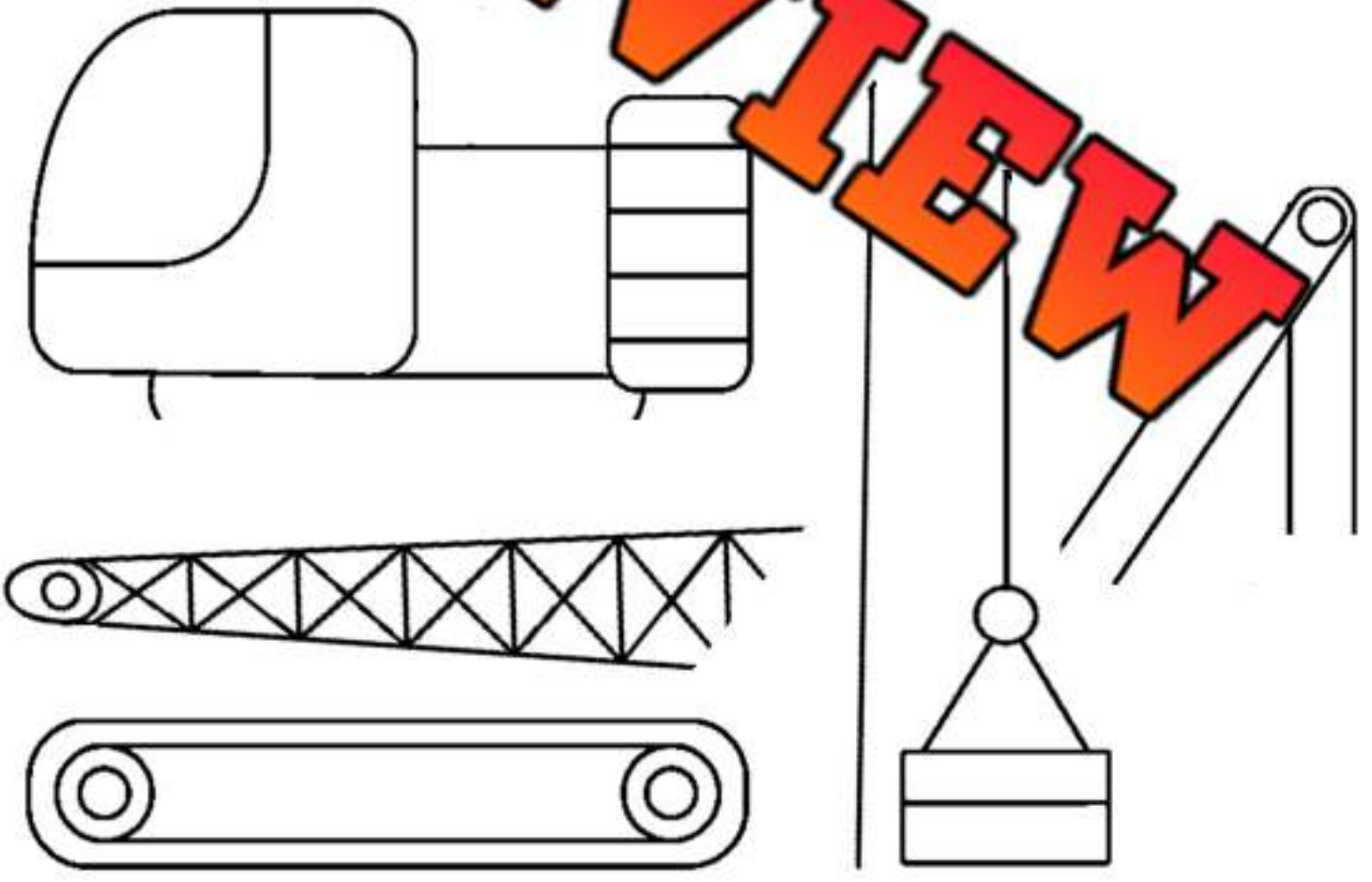
Curriculum Connection
A2.1

Coding – Making Compound Machines

Directions Follow the code to design a tower crane.

run program
cut out all the shapes
paste the operator cabin onto the track base
paste the 45-degree angle side of the tower onto the operator cabin with the pulley pointing toward the window side
paste the hanging weight vertically off the end of the tower pulley
paste the beam between the operator cabin with the shorter part connecting to the opposite side of the cabin.

PREVIEW



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Name: _____ 95

Curriculum Connection
A2.1

Coding – Making Compound Machines

Directions Follow the code and paste the parts to make the tower crane.



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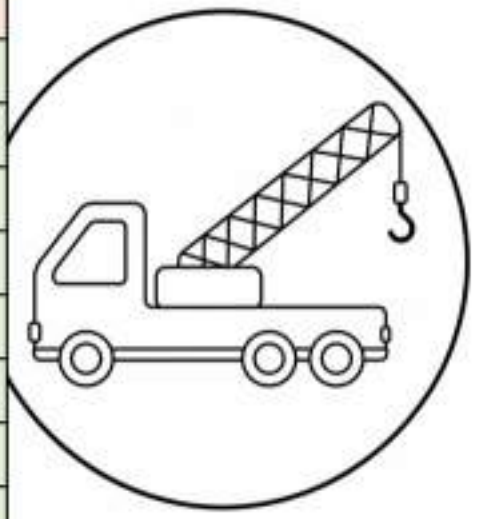
Name: _____ 96

Curriculum Connection
A2.1

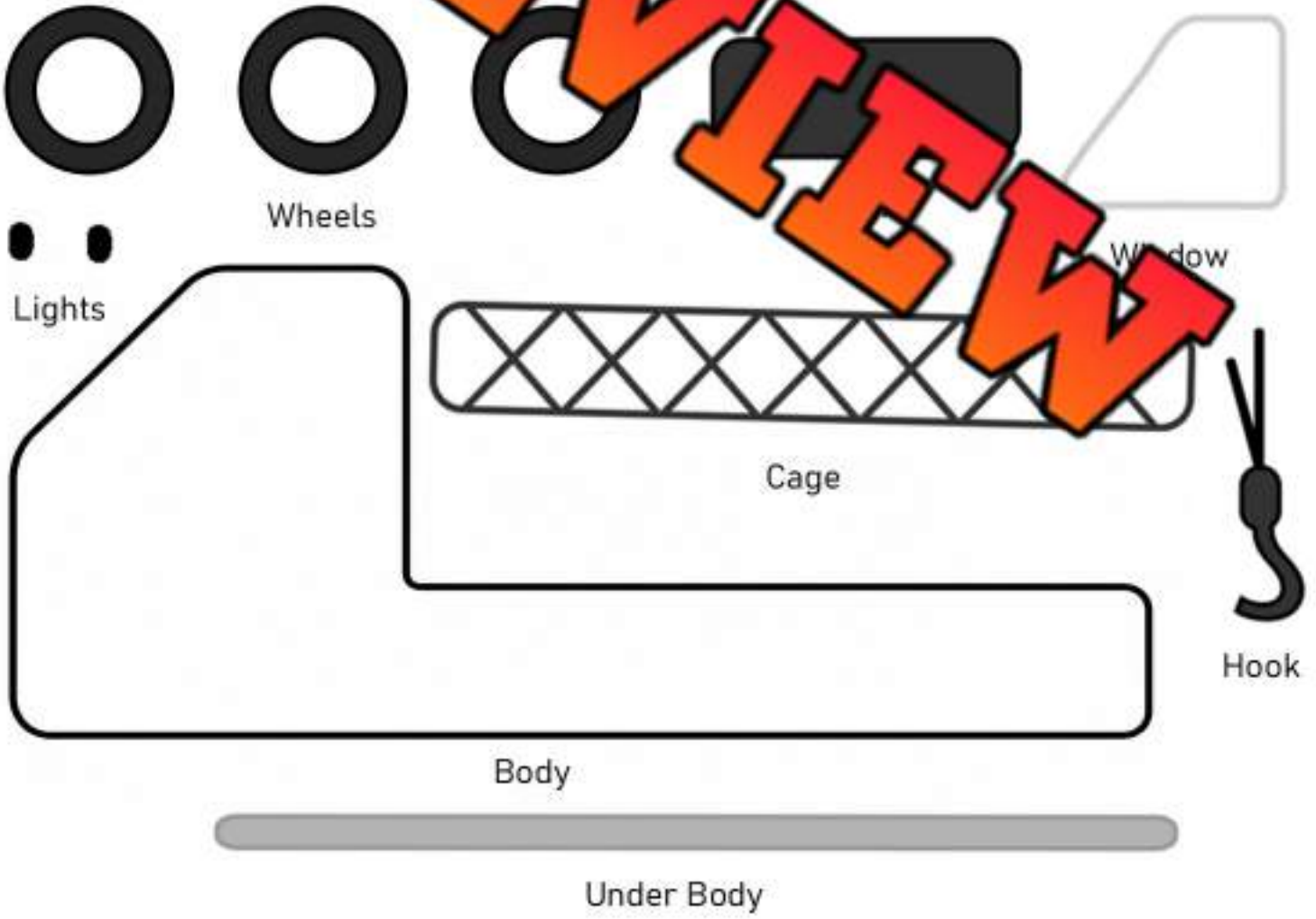
Coding – Making Compound Machines

Directions Follow the code to design a crane truck.

run program
cut out all the shapes
paste the underbody on the bottom of the body
paste the wheels on the bottom of the body
paste the cage on the front and back of the body
paste the window on the front of the body
paste the hook on the back of the body
paste the hook on the end of the cage
paste the cage on the body



PREVIEW



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Name: _____ 97

Curriculum Connection
D1.1, D2.1, D2.2

Muscular-Skeletal System – The Lever

Muscular-Skeletal System – The Lever

The muscles and bones in our bodies act together to form levers. Remember, a **lever** is a rigid bar that rests on a fulcrum that allows us to push down on one end to send the other end upwards. There are four parts to a lever – lever arm, fulcrum, effort, and load.

- Bones act as lever arms
- Joints act as fulcrums
- Muscles provide the effort to move loads
- Lo[illegible]an be things we are lifting, or it can be the weight in our body parts.

PREVIEW

Diagram [illegible]e questions below using evidence from the text.

Lever arm	Fulcrum	Effort	Load



Questions Answer the questions using the info[illegible]abov[illegible]

1) What levers do you have in your body?

2) Draw your knee joint and label it using the following key terms:
lever arm, fulcrum, effort, load

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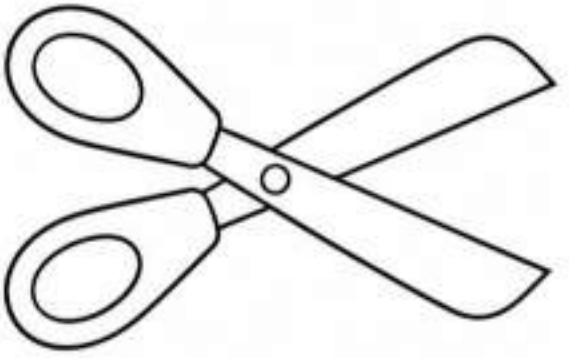
Name: _____ 99

Curriculum Connection
D1.1

Importance of Machines

Everyday Uses of Machines

We all use simple machines in our day to day lives. Below are some examples of simple machines you may have used today.



- Scissors – wedge and lever
- Windo[illegible]d – pulley
- Stair[illegible] plane
- [illegible]ter – screw
- Knif[illegible] wedg[illegible]
- Vehicles – [illegible] axles [illegible]o shift gears, pulleys connecting engine parts

PREVIEW

Importance of Machines

Now imagine living without th[illegible]nes[illegible]day. Spreading jam on toast would be a lot messier without a knife. Lifting [illegible]ut of [illegible]y would be harder than turning a handle. Climbing up to a higher [illegible]ea is m[illegible]ffic[illegible] taking smaller steps up a staircase.



Some tasks would be impossible without the use of machines. For example, a backhoe uses levers, wedges, screws, pulleys, wheels and axles, and inclined planes to apply massive forces that can do important work. Backhoes are used to dig foundations and move heavy loads of rocks that allow us to build the sturdy buildings we live in. An average sized backhoe can lift 3200 kg (7055 lbs).

Cranes use each of the simple machines as well, but they rely on pulleys to change the direction of the force needed to lift the load. They also use long wires to distribute that force over a longer distance, which makes the load lighter. We use cranes to lift heavy building materials to the top of buildings, like skyscrapers.

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Curriculum Connection
D1.1

True or False

Circle whether the statement is true or false.

1) Cranes rely on levers to lift heavy materials high in the air.	True	False
2) Backhoes use all types of simple machines.	True	False
3) Without backhoes or similar machines, humans could lift the same loads.	True	False
4) Without cranes, people could lift heavy materials to build skyscrapers.	True	False
5) We use[illegible]e machines everyday.	True	False

Questi[illegible]estions below using evidence from the text.

1) Why do sim[illegible]a[illegible]s ma[illegible]everyday life easier?

2) Without compound machines, like a crane or ba[illegible], co[illegible]uild the structures we have today? Explain.

PREVIEW

Making Connections

When have you used a simple machine before? Explain.

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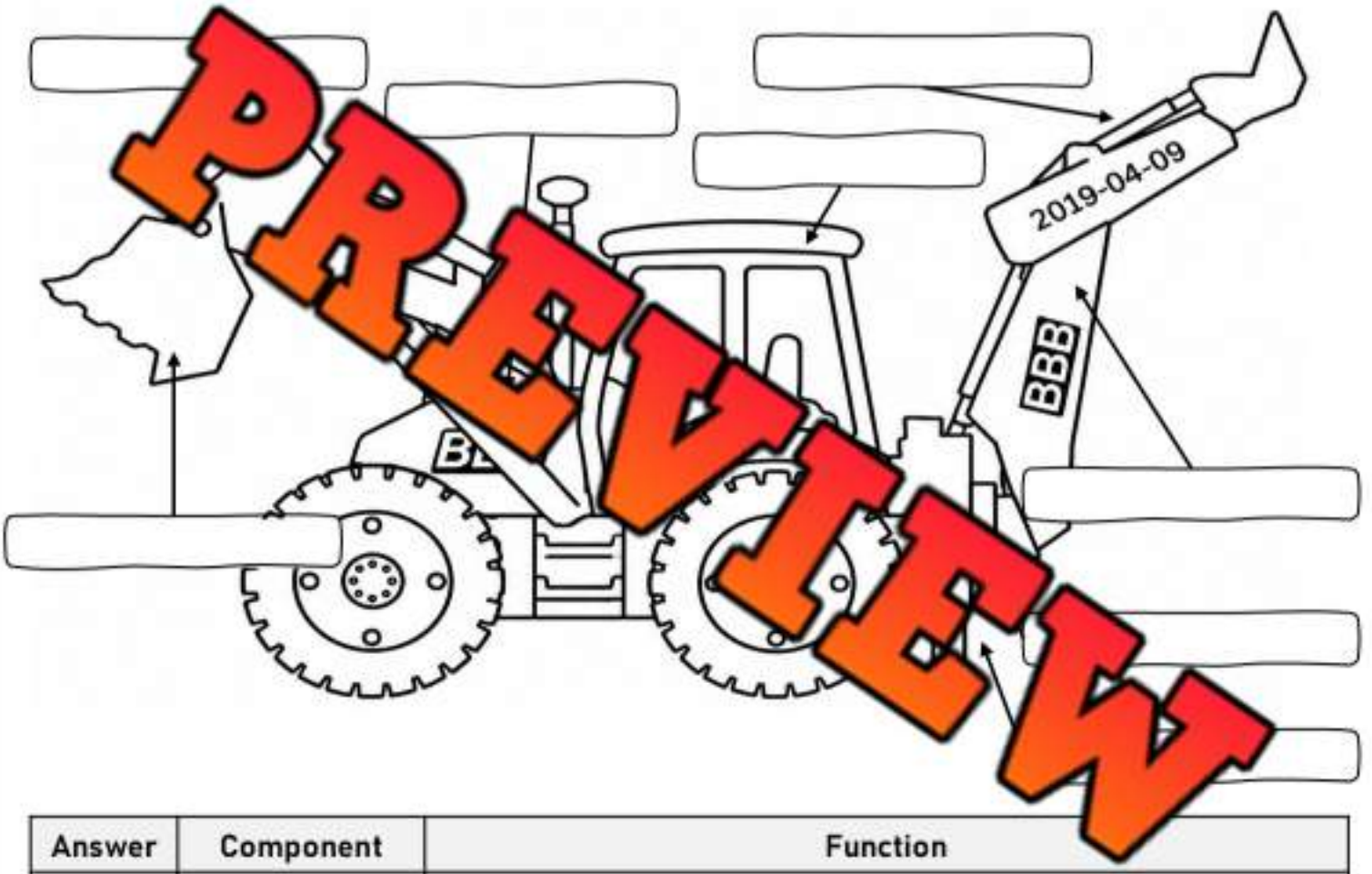
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Curriculum Connection
01.1

Research Activity – Backhoe

Diagram Label the diagram of the backhoe using the components from the word bank.

Stabilizer	Swing Tower	Boom	Engine
Linkage	Bucket Loader	Hydraulics	Cab Enclosure



PREVIEW

Answer	Component	Function
	Stabilizer	a) Creates power for the backhoe
	Swing Tower	b) Long arm that is used to move and lift the bucket
	Boom	c) Allows the front bucket to move up and down
	Engine	d) Gives the backhoe more support preventing it from flipping
	Linkage	e) Provides even more power to the front and back buckets
	Bucket Loader	f) Allows the backhoe to turn
	Hydraulics	g) Protects the driver from weather or falling debris
	Cab Enclosure	h) Used to scoop up materials and hold them to be dumped

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Curriculum Connection
D1.1

Questions Research answers to the questions below.

1) Describe how each simple machine is used in a backhoe?	
Lever	
Wedge	
Inclined Plane	
Screw	
Pulley	
Wheel/Axle	

2) What does a backhoe do?

_____

_____

_____

3) If there were no backhoes or similar machines, how would life be different for humans?

_____

_____

_____

PREVIEW

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Name: _____ 104

Curriculum Connection
D1.1

Four Corners – Which Machine Would You Choose?

Objective What are we learning about?

Students will learn about simple machines by listening to questions, choosing between four options, and explaining how machines help people in everyday life.

Mate Wh u need for the activity?

- A list of q
- Labels for each Corner 1", "Corner 2", "Corn "C



Instructions How will you comple activi

1) Label four corners of the room as Corn 3 and Corner 4. Make the labels clear for everyon
2) Explain that they will listen to questions about simple choose the corner that matches their opinion.
3) Read one question aloud and tell students what each corner represents. Students will think about their answer and move to the corner that matches their choice.
4) Once in their corners, students will talk to others about why they made their choice.
5) After discussing, bring the class together to share their ideas as a group.
6) Repeat the activity with the next question to explore more places.

PREVIEW

Name: _____ 105

Curriculum Connection
D1.1

Question	A	B	C	D
Which machine would be the most helpful for moving a pile of soil across a school garden?	Wheelbarrow	Crane	Backhoe	Scissors
Which machine would you choose to lift heavy steel beams onto a tall building?	Wheelbarrow	Crane	Backhoe	Scissors
Which ma ld you use to dig a new play	Wheelbarrow	Crane	Backhoe	Scissors
Which machin best choice for per t make classroom de ons?	lbarrow	Crane	Backhoe	Scissors
Which machine do you think would save the most time when building a new house?	Whe	rane	Backhoe	Scissors
Which machine would be the most useful for helping clean up after planting flowers?	Wheelbarrow	Cr	e	Scissors
Which machine would you choose to move heavy rocks at a park?	Wheelbarrow	Crane		sors
Which machine would you use if you had to lift a large air conditioner onto the roof of a building?	Wheelbarrow	Crane	Backhoe	Scissors
Which machine would be the most useful for digging a pond?	Wheelbarrow	Crane	Backhoe	Scissors
Which machine would you use to cut pieces of fabric for an art project?	Wheelbarrow	Crane	Backhoe	Scissors

PREVIEW

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Name: _____ 106

Curriculum Connection
D1.1

Question	A	B	C	D
Which machine do you think helps workers the most on a construction site?	Wheelbarrow	Crane	Backhoe	Scissors
Which machine would you choose to carry vegetables from a garden to a shed?	Wheelbarrow	Crane	Backhoe	Scissors
Which ma ld you use to lift a fter a storm	Wheelbarrow	Crane	Backhoe	Scissors
Which machin best choice for trench for water pipes?	lbarrow	Crane	Backhoe	Scissors
Which machine would you us most often during a classroom craft activity?	Whe	rane	Backhoe	Scissors
Which machine do you think makes the hardest jobs much easier?	Wheelbarrow	Cr	e	Scissors
Which machine would you choose to move bags of soil around your backyard?	Wheelbarrow	Crane		sors
Which machine would you use to place a large statue in a town square?	Wheelbarrow	Crane	Backhoe	Scissors
Which machine would be the best choice for removing an old tree stump from the ground?	Wheelbarrow	Crane	Backhoe	Scissors
If you could only keep one of these machines to help your community, which one would you choose?	Wheelbarrow	Crane	Backhoe	Scissors

PREVIEW

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Curriculum Connection
D1.2

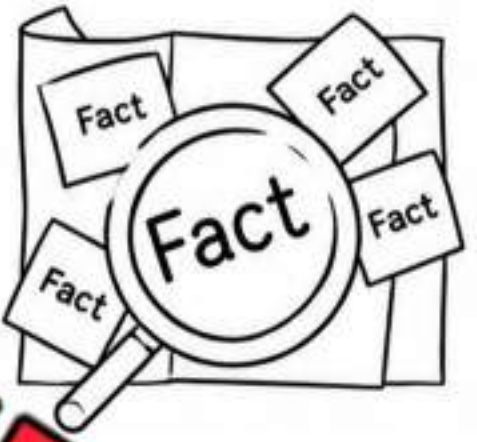
Fact or Fiction – Simple Machines

Objective What are we learning about?

To help students distinguish between true and false statements about simple machines through an interactive and engaging game.

Materials t will you need for the activity?

- A [illegible] of state[illegible]ut Simple Machines
- A 'Fact' si[illegible]ction [illegible]o distinguish the two sides [illegible] roo[illegible]
- Designated areas in [illegible]assroom [illegible]e the 'Fact' and 'Fiction' sign[illegible]ng [illegible] students to move to either [illegible]de



PREVIEW

Instructions How will you complete the ac[illegible]

1) Your teacher will read statements. Pay close a[illegible]s ea[illegible]tement is shared.
2) Consider carefully whether you think the statement is true[illegible]fa[illegible]
3) If you decide the statement is true, walk to the 'Fact' side of the room.
4) If your guess is that it's not true, move to the 'Fiction' side of the room.
5) Stay on your chosen side and listen attentively for the correct answer to be revealed.
6) When the right answer is announced, return to your seat, ready for the next round.
7) Have fun getting up and moving!

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Name: _____ 113

Curriculum Connection
D1.2

Fact or Fiction | Read the statements to the class.

#	Statement	Fact or Fiction
1	A pulley can help lift heavy objects with less effort.	Fact
2	Gears are only used in bicycles and nowhere else.	Fiction
3	An in[illegible]ed plane makes it easier to move objects to a higher level.	Fact
4	Lev[illegible]t useful for lifting heavy objects.	Fiction
5	[illegible]a[illegible]ype of simple machine that can make movement [illegible]	Fact
6	A screw i[illegible]of [illegible]ple machine that can hold things together.	Fact
7	A wedge can be [illegible]rt.	Fact
8	Simple machines canne[illegible]bi[illegible]omplex machines.	Fiction
9	Pulleys are never used in constru[illegible]es.	Fiction
10	The handle of a manual pencil sharpener i[illegible]of le[illegible]	Fiction
11	A gear system can change the direction of a [illegible]	Fact
12	Using a lever reduces the amount of force needed to [illegible]bje[illegible]	Fact
13	Inclined planes increase the amount of force needed to move[illegible]	[illegible]tion
14	Simple machines are rarely found in everyday objects.	Fiction
15	A door hinge acts as a type of lever.	Fact
16	A wedge cannot be used to cut or split things.	Fiction
17	An inclined plane is also known as a ramp.	Fact
18	A wheelbarrow is an example of a compound machine using a lever and wheel and axle.	Fact
19	Gears can only make objects move slower.	Fiction
20	A pulley system can be used to draw water from a well.	Fact

PREVIEW

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Curriculum Connection
D1.2

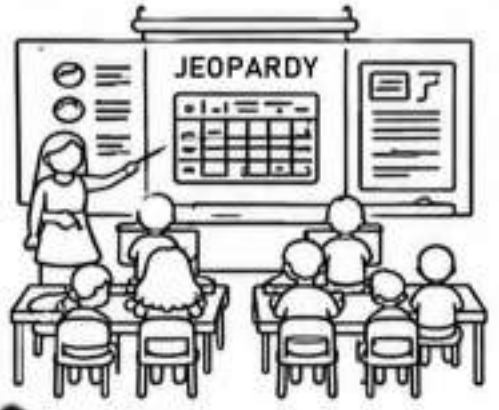
Activity – Uses of Simple Machines Jeopardy

Objective What are we learning about?

To help students compare devices that use variations of simple machines to accomplish similar tasks through a fun and engaging Jeopardy game.

Materials What will you need for the activity?

- Jeopardy board
- Buzzer or bell



Instructions How will you complete the activity?

1) Print the Jeopardy board on the next page.
2) Divide the class into two teams.
3) Ask one team to go first by selecting a point value.
4) Read the question aloud from the point value.
5) The first team to ring the bell or buzzer gets to answer.
6) If they answer correctly, award them the points. If not, another team can answer.
7) Continue the game until all questions have been answered.
8) Tally the points to determine the winning team.
9) Conclude by discussing what they learned about the topics in the questions.

PREVIEW

Name: _____ 119

Curriculum Connection
D1.2

Jeopardy Question | Ask students the questions below.

1 Points	2 Points	3 Points	4 Points	5 Points
What is a wheel and axle example? (**Bike**)	What simple machine is in a pump? (**Lever**)	Which bike is for speed? (**Racing**)	What does a long-handled pump reduce? (**Effort**)	What do gears in a bike change? (**Speed**)
Name a machine that uses gears. (**Clock**)	...ike ...rough ...rrai... (...)	Name a ...achine that ... pulley. (...le)	Which pump uses less force? (**Long-handled**)	What machine uses both a wheel and axle? (**Car**)
What does a lever do? (**Lift**)	What simple machine is in a bike? (**Gear**)	Name a t... of lev... (**See-saw**)	...t is re... ...plane ...t)	Which machine uses an inclined plane? (**Ramp**)
Name a machine with an inclined plane. (**Ramp**)	What do pulleys lift? (**Loads**)	Which pump uses a lever? (**Short-handled**)	What machine helps move heavy objects? (**Wheelbarrow**)	...t machine ...has a spiral inclined plane? (**Screw**)
What do gears have? (**Teeth**)	What simple machine is in a wheelbarrow? (**Wheel and axle**)	What machine uses an axle? (**Car**)	What machine is used to lift heavy objects? (**Pulley**)	What does a wedge do? (**Split**)

PREVIEW

Name: _____ 124

Curriculum Connection
A2.1

Coding – Robot Lawn Mower

This is a self-driving lawn mower	Right makes it turn right	Left makes it turn left	Forward makes the car move forward by the number shown
			
It unde…	**Right**	**Left**	**Forward 2**

PREVIEW

Directions W… get …n mower to cut the field of grass.

Codes – Forward, … Left, Tur…
Line 1
Line 2
Line 3
Line 4
Line 5
Line 6
Line 7
Line 8
Line 9



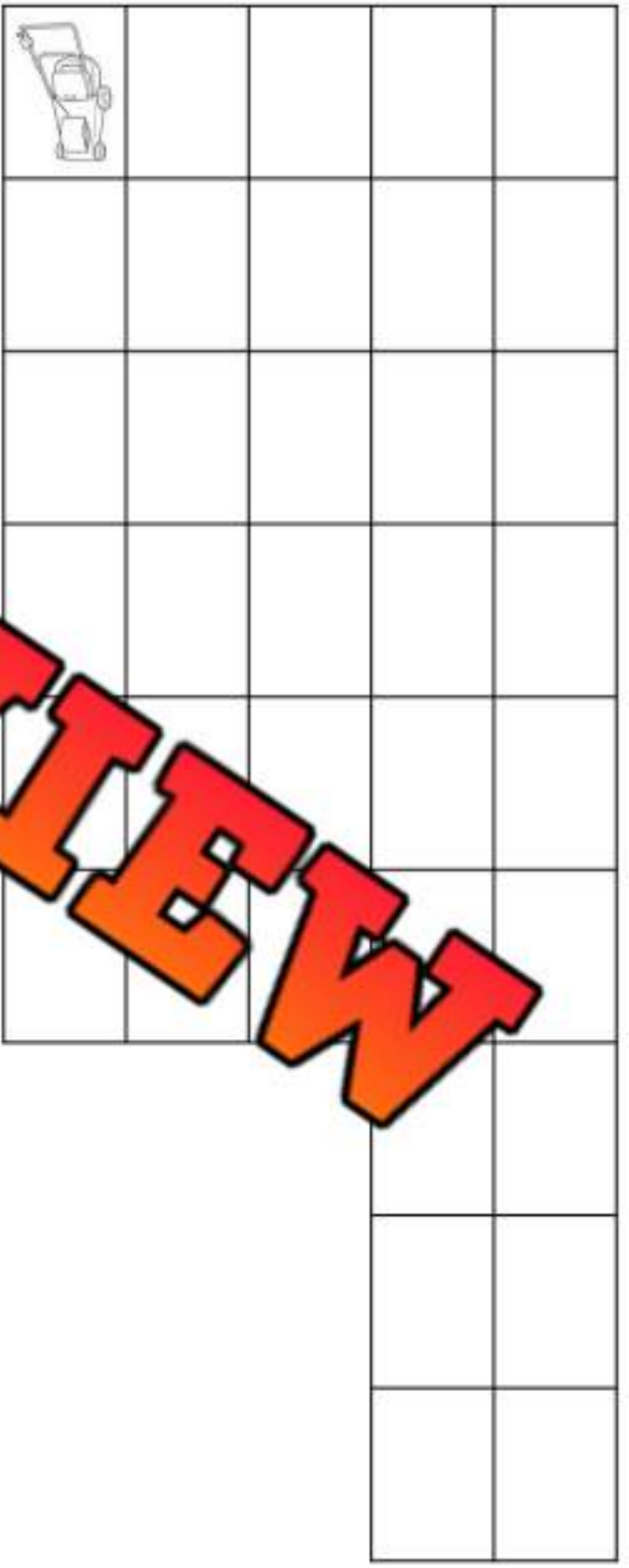
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Curriculum Connection
A2.1

Directions Write code to get the lawn mower to cut the field of grass.

Codes – Forward, Turn Left, Turn Right	
Line 1	
Line 2	
Line 3	
Line 4	
Line 5	
Line 6	
Line 7	
Line 8	
Line 9	
Line 10	
Line 11	
Line 12	
Line 13	
Line 14	
Line 15	
Line 16	
Line 17	
Line 18	
Line 19	
Line 20	
Line 21	



PREVIEW

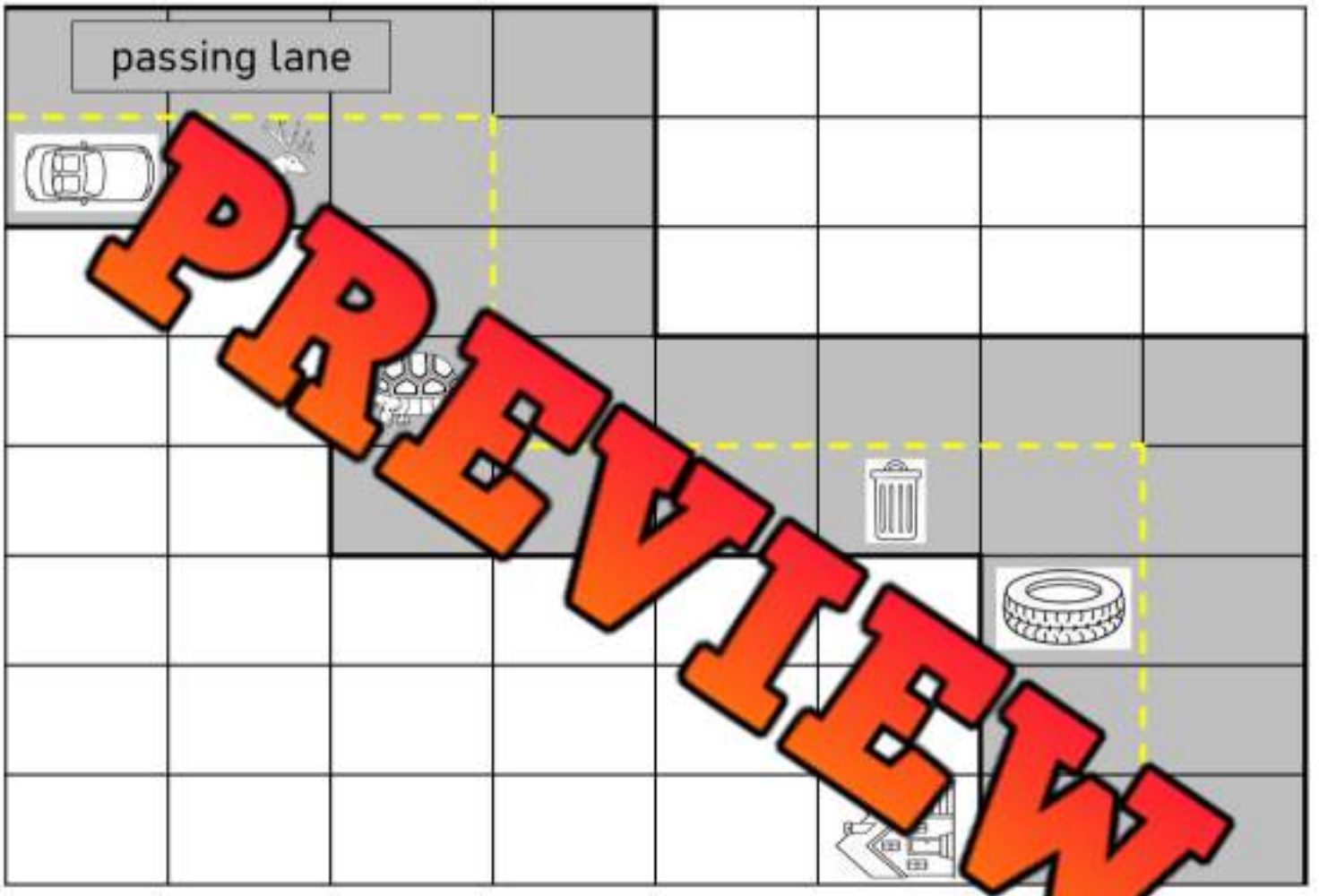
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Curriculum Connection
A2.1, A2.2

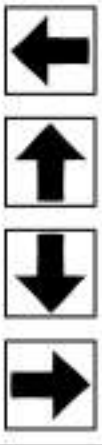
Coding – Self Driving Car

Self-driving cars use codes to drive around obstacles. Many self-driving cars are on the road now. By 2030, it is possible that we all enjoy safe, self-driving cars.



PREVIEW

Direction Code the car around the obstacles.
The car can only be in the passing lane for 3 spaces in a row.



1	2	3	4	5	6	7	8	9	10

11	12	13	14	15	16	17	18	19

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Name: _____ 133

Unit Test – Machines and Mechanisms

Multiple Choice /10

1) A type of gear that we use to change the plane from horizontal to vertical a) Idler b) Spur c) Bevel d) All of th ve	2) A type of gear that is used in the middle of 2 gears to change the direction of the rotation. a) Idler b) Spur c) Bevel d) All of the above
3) When em uses 2 or more gears a) Gea n b) Gear Train c) Gear Compone d) Gear Setup	4) A function of a pulley is to... a) Change the direction of the force b) Make a force stronger c) Make a load lighter d) of the above
5) Which of the following is a e of a gear? a) A can opener b) A flagpole c) Rock climbing equipment d) Weightlifting equipment	f the following is an example of a A flag b) A ener c) A ve d) Hand dri
7) A lever can lift a heavier load by moving the fulcrum closer to which end? a) Load b) Force c) Middle d) None of the above	8) A staircase is a amp e machine? a) Wedge b) Inclined Plane c) Wheel and Axle d) Lever
9) A knife is an example of which type of simple machine? a) Wedge b) Lever c) Inclined Plane d) Wheel and Axle	10) A bottle top is an example of which type of simple machine? a) Wedge b) Pulley c) Inclined Plane d) Screw

PREVIEW

Definitions (1 marks each) **/3**

Term	Definition (what does it mean)
Mechanical Advantage	
Compou Machin	
Pulley	

Short Answer Questions (2 ma h)

1) Why do we need simple machines? H hey h

2) How does lengthening an inclined plane affect how we use it?

3) What does multiplying a force mean? How do simple and compound machines help us multiply a force?

PREVIEW

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Long Answer Questions **/10**

1) Describe a gear or pulley system that you have seen. Why is it used? What are the mechanical advantages of the machine?

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2) What simple machines do you use each d[illegible]t 5 t[illegible]arks.

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Ontario Science Curriculum
Light & Sound– Grade 4

3-Part Lesson Format

Part 1 – Minds On!
- Learning Goals
- Discussion Questions
- Quotes
- And More!





Part 2 – Action!
- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!
- Exit Cards
- Quizzes
- Reflection
- And More!



Ontario Science Curriculum
Light & Sound– Grade 4



Ontario Science Curriculum
Light & Sound– Grade 4



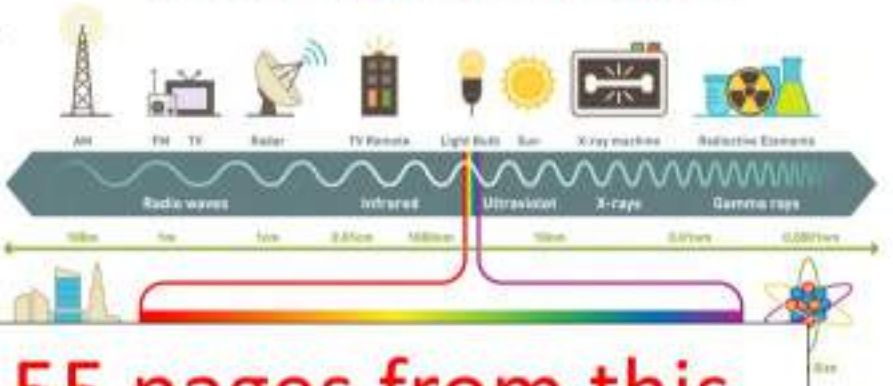
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Curriculum Connection
C2.3

Let There Be Light!

What is Light?

Light has no mass and is not considered matter. We can see it, but we can't feel it. **Light** is a kind of energy called, "electromagnetic radiation". It travels in straight lines, called light rays.



The light rays we see are only a small portion of the types of light that exist. All the light rays are measured on the electromagnetic spectrum, however, the human eye only

spec

How

Ligh

take

this

Preview of 55 pages from this product that contains 138 pages total.

If you tried to drive to the Sun at 100km/h, it would take you 177 years to get there! Another cool fact is that in one second, light can go around the Earth 7 times!

You've seen how fast light travels when you turn on a light. You've probably noticed that you can't see the light waves moving. All you see is the room lit up as soon as you flip the switch.

Interesting Facts About Light

- Space does not have any light. We can see things in space because of light from the sun and stars bouncing off objects in space.
- Infrared light has a wavelength that is too long for the human eye to see
- Light that we see from the Sun actually left the Sun 8 minutes before we see it
- Sunlight is powerful! It can penetrate the oceans up to 80 metres deep! Beyond 80 metres, the oceans are dark.

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Curriculum Connection
C2.3

Let There Be Light!

True or False

Circle whether the statement is true or false

1. Light travels at 300,000km per hour	True	False
2. It takes sunlight 8 minutes to travel from the Sun to the Earth	True	False
3. Sunlight [illegible] be seen up to 80 metres deep in the oceans	True	False
4. Space h[illegible]hat can be seen in the form of stars and sunlight	True	False
5. So[illegible]n see more types of light than we can see	True	False

Questions

[illegible] qu[illegible]s below using evidence from the text

1) How fast is light? [illegible]

2) What did you find most interesting about lig[illegible]

Visualizing

Draw what you were picturing while you were reading. Explain the picture

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Curriculum Connection
C2.1

Light Sources - Natural vs Artificial

What is Light?

Light is a type of energy that allows us to see the world around us. Without it, many of us would live in fear, because it is human nature to need light. That is why many children and even adults are afraid of the dark. Light comes from many different light sources, but we can categorize them into natural light sources and artificial light sources.





PREVIEW

What Are Natural Light Sources?

Natural light sources are sources of light energy that come from our environment and are naturally occurring. The sun, stars, and fireflies are all examples of natural light sources because they occur naturally in our environment and do not produce them.

The sun provides us with the most powerful energy source in the world. The sun is a nuclear fireball spewing light energy in all directions. Even the light from the moon is actually just the sun's light reflecting off the moon's surface. The moon is not a natural light source because it isn't a light source at all.

Artificial Light Sources

An **artificial light source** is any source of light that is created by humans. Artificial because it does not occur naturally in our environment, therefore, it is human-made light. Examples of artificial lights include: candles, fireworks, and light-bulbs.

Imagine living without artificial light. Having no light after the sun sets would be terrifying for many people and would also lower the functionality of our society. We rely on artificial light after dark in our businesses, at home, and on our streets. Having the ability to change the lighting around us has led to a much higher quality of life.



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C2.1

Light Sources - Natural vs Artificial

Questions

Answer the questions below using evidence from the text

1) What is the difference between artificial and natural light sources?

2) W... ...or you if we didn't have artificial light? Explain.

PREVIEW

Making Connections

What ... read... ...ind you of?

True or False

Circle whether the statement is true or false

1. Fireflies are an example of an artificial light source	True	False
2. Candles are an example of an artificial light source	True	False
3. The sun is the largest producer of light on our planet	True	False
4. Light is a type of energy that allows us to see the world around us	True	False
5. It is human nature to need light to survive	True	False

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Curriculum Connection
C2.1

Light Sources - Natural vs Artificial

Natural light is light energy made without humans.
Artificial light is made by us.



Natural or Artificial Circle whether the picture is natural or artificial light

PREVIEW

 Natural / Artificial	 Artificial	 Natural / Artificial
 Natural / Artificial	 Natural / Artificial	 Natural / Artificial
 Natural / Artificial	 Natural / Artificial	Natural / Artificial
 Natural / Artificial	 Natural / Artificial	 Natural / Artificial

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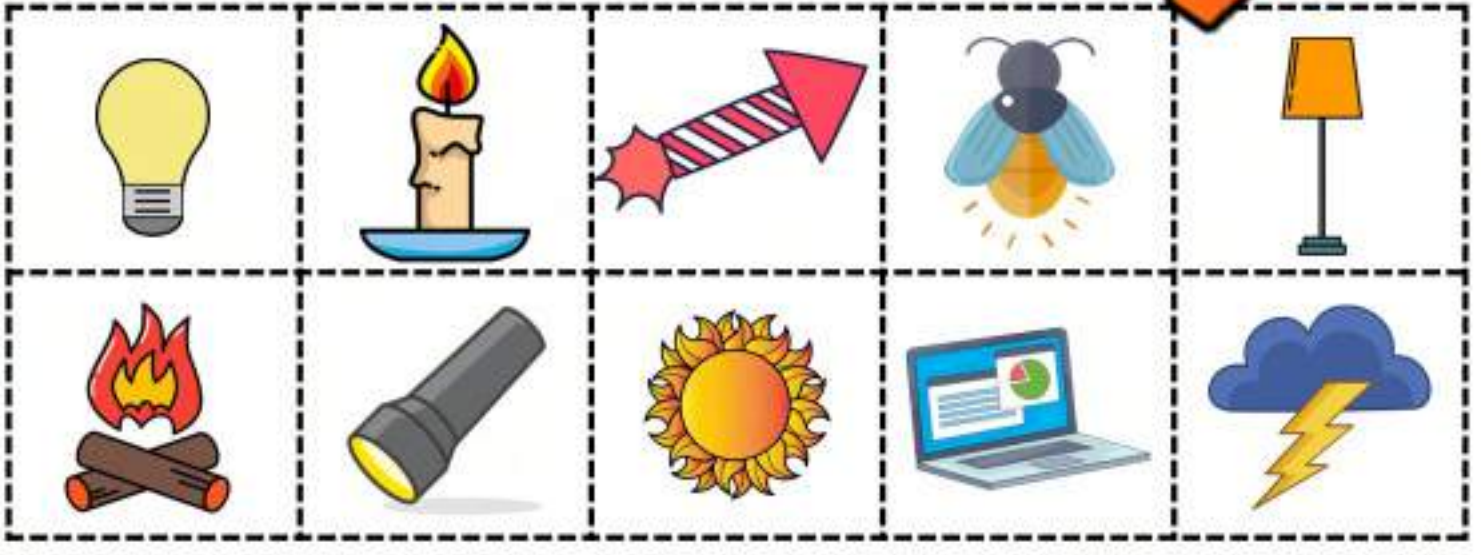
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C2.1

Light Sources - Natural vs Artificial

Questions Cut and paste the light sources putting them in the right category

Natural Light	Artificial Light

PREVIEW



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Curriculum Connection
C2.2

Emitting or Reflecting Light?

Emitting Light vs Reflecting Light

Light sources that create light for us to see are **light emitters.** Emitting light means they create light instead of just reflecting light from another source.

Have you ever seen a black light show at a bowling alley and noticed that if you're wearing a white shirt, you will stand out? This is because your white shirt is reflecting the light, which gives you an appearance of glowing. Your white shirt is the perfect example for reflecting the UV light in the black light.

Examples of Light Emitters



The sun, stars, campfires, and light bulbs are all examples of light emitters because they are all sources of light. They all create light instead of just reflecting light. They do not require any other light source to initially create light.

Examples of Light Reflectors

The moon, safety reflecting vests, and mirrors are all examples of light reflectors. The moon is a light reflector that reflects light from the sun. That is why you can stare directly at the moon, but not at the sun. Staring at the sun can cause blindness because it is such a powerful light emitter, but the moon won't cause you damage because it is not creating any light.



Safety reflecting vests are usually coloured because they reflect more light than darker colours. Dark colours absorb more of the wavelengths from the sun, while white, yellow, orange, and light green colours reflect most of the wavelengths. Some minerals in rocks reflect more light than others.

Shiny Materials - Lustre



Lustre is a property of minerals that tells us how much of the mineral reflects light. Platinum is a mineral that has more lustre than any other mineral. Platinum is a very shiny metal that reflects a lot of light. It looks like it is glowing!

On the other hand, non-metallic minerals have hardly any lustre. They look dull or waxy instead of shiny. Examples of non-metallic minerals that have no lustre are earthy rocks found in the soil.

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C2.2

Emitting or Reflecting Light?

True or False

Circle whether the statement is true or false

1. A light emitter is a light source that creates light	True	False
2. A light emitter only reflects light and does not create it	True	False
3. Stars, th[illegible], and light bulbs are light emitters	True	False
4. The mo[illegible]t emitter	True	False
5. Lig[illegible]ght reflectors and dark colours absorb light	True	False

Questioning

[illegible] do you have after reading the information?

1)	
2)	

Questions

Use information from the tex[illegible]rt yo[illegible]wer

1) What is the difference between a light emitter and a light re[illegible]

2) What are some examples of light reflectors you see in your day-to-day life? Which colours are they?

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C2.2

Emitting or Reflecting Light?

Which Type? Is the picture an example of a light emitter or light reflector?



Emitter | Reflector



Emitter | Reflector



Emitter | Reflector



Emitter | Reflector



Emitter | Reflector



Emitter | Reflector



Emitter | Reflector



Emitter | Reflector



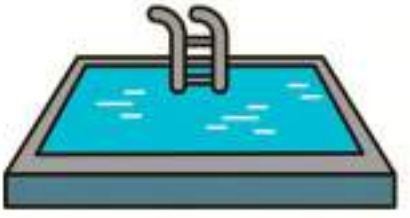
Emitter | Reflector



Emitter | Reflector



Emitter | Reflector



Emitter | Reflector

PREVIEW

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Curriculum Connection
C2.3

Properties of Light

Four Properties of Light

The properties of light explain how light works and provides us with important information about how we can use light for different purposes.



1. Light Travels in a Straight Path

Once light has been produced, it will travel in a straight line until it hits something else. We can witness this by examining a shadow. An object blocks light and can't reach the surface where the shadow is. Light could bend, it would go around the object.

2. Light Can Be Absorbed

When light hits an object, it sometimes is absorbed, which means it does not reflect the light. Wood is an example of material that absorbs light instead of reflect light. When the light waves are absorbed by a material, it means that the waves in the light energy are captured by the matter in the object. Darker colours absorb more light, while lighter colours reflect light.

3. Light Can Be Reflected



Light will reflect off some materials like the Earth. This is why the sky is blue, as the light from the Sun hits the Earth's surface and the blue light is reflected more than the other colours because it travels in shorter, smaller waves. The angle of the light hitting a material affects its ability to bounce off the material.



4. Light Can Be Refracted

When light hits an object, it can sometimes go through the object and bend at an angle. An example of this is when light hits a diamond or water. The light will go through the material and bend out of the other side.

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Curriculum Connection
C2.3

Properties of Light

True or False

Circle whether the statement is true or false

1. When light bounces off a material it means it is refracted	True	False
2. Light will reflect off a surface depending on the angle it hits at	True	False
3. Light always travels in a straight path	True	False
4. Light never stops moving – it continues forever	True	False
5. When light hits glass or water, it reflects off the surface	True	False

Questions

Answer the questions below using evidence from the text

1) Which colours absorb light the most? Why do you think it? When would you want to reflect light?

2) What does it mean for light to be refracted? When have you seen this in your life?

PREVIEW

Visualizing

Draw what you were picturing while you were reading. Explain the picture

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C2.3

White Light

White Light

Did you know that all of the colours we can see come from white light? **White light** is defined as the complete mixture of all of the wavelengths that are visible to us.



Thinking about it, we can see many things in our environment because of the natural light coming from the sun. Why does sunlight allow us to see different colours? It is just white light. The reason is because that white light is made up of all the different colours mixed together.

PREVIEW

How Do We See Colour?

When the sunlight shines on a tomato, the part of the sunlight is reflected off the while all the other colours are absorbed or soaked into the tomato, which is why we don't see them.



The same goes for a brown book. Light from sunlight or lightbulbs begins its journey as white, but is reflected in different colours.

So why is a tomato red and why is that book brown? It's because of the atoms inside each object. A tomato is red because when the light shines on the tomato's skin, the atoms inside the tomato get excited and produce photons.

Photons are a form of energy that our eyes can see as light. Our eyes are complex devices that figure out what colour different photons are. That is why some people see different colours and why some people can't see certain colours. It's because some people's eyes don't process certain photons the same way other people do.

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Curriculum Connection
C2.3

White Light

True or False

Circle whether the statement is true or false

1. All the colours we can see come from white light	True	False
2. Sunlight comes in more than one colour, not just white	True	False
3. We see colour because our eyes can see photons in objects	True	False
4. Everyone sees colour the same way because our eyes all work the same	True	False
5. All light is made up of the same as white light, not coloured light	True	False

Questions

Answer the questions below using evidence from the text

1) What is white light?

2) Why is a tomato red and not blue?

Summarize

Summarize the reading by writing the important information

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Curriculum Connection
C2.3, C2.6

Light Interacting with Materials

Light Interacting with Materials



We have learned that light reflects off some materials and is absorbed by others. Sometimes light will even go through materials and bend so that the light rays go in a different direction. This is called re... Depending on the material, light mi... or be absorbed.

Materials that Ref...

- Water – wate... reflec... stance, although some light is absorbed into the water. The shallow ...od... more light it will reflect. A pond will reflect much more light than an...
- Mirrors – one of the best surfa... tha... me mirrors are perfect, which means they reflect... light a... and do not absorb or refract any of it.



Materials that Absorb Light

- Dark clothing - dark colours absorb more energy from ... han... w... light colours. That means your black shirt will absorb more sunlight tha... te shirt and you'll be a lot warmer!
- Metals – most metals absorb light well, especially darker metals. That is why metal is often hot on a warm day.

Materials that Refract Light



- Diamonds – diamonds are sparkly because of the way they refract and bend light. Experts can tell if a diamond is real based on how much light they refract.
- Glass – high quality windows use glass that allows almost all light to refract through it. Lower quality windows produce reflected light that causes a glare.

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Curriculum Connection
C2.3, C2.6

Light Interacting with Materials

Questions

Answer the questions below using evidence from the text

1) How does light interact with materials?

2) W[illegible] has been out in the sun warmer than a white car?

PREVIEW

Making Connections

What [illegible] mind you of?

True or False

Circle whether the statement is true or false

1. Dark colours reflect more light than light colours	True	False
2. Water can reflect and absorb light	True	False
3. Lower quality glass windows reflect more light which causes glare	True	False
4. Metals absorb light which often makes metals in the sun very hot	True	False
5. Quality mirrors refract light and do not reflect or absorb any light	True	False

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Curriculum Connection
C2.7

Light and Heat

Sources of Light that Provide Heat

A source of light is something that creates light for our environment. Some sources of light also provide heat as well. The Sun is the most obvious example, as it has a surface temperature of over 10,000 degrees Fahrenheit.



Candles are another example of a source of light that also produces heat. Approximately one quarter of the energy created by the burning candle is given off as heat radiating from the flame in all directions. The remaining three quarters of energy is light energy that is emitted into the environment. This means that candles are an inefficient source of heat and a better source of light.

An incandescent light bulb produces heat even though it has been designed to provide us with only light. The heat produced by lightbulbs make it an inefficient light source as the heat that comes from the bulb is unwanted. It can produce 90% of its energy as heat and only 10% as light.



Sources of Light that Provide No Heat

LED lights are the most efficient form of light because they produce much less heat than other light bulbs. In fact, they can be cool to touch even after operating for a long time. This means all the energy emitted from the bulb is in light form, without the wasted heat energy.

Fireflies produce light through a chemical reaction called chemiluminescence. For fireflies, 100% of the energy they produce goes into making light, and none go towards heat.



Another source of light that provides no heat are glow sticks. A glow stick works through a chemical reaction, much like with fireflies. This reaction causes a bi-product that is light without heat.

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Curriculum Connection
C2.7

Light and Heat

True or False

Circle whether the statement is true or false

1. Incandescent light bulbs are very energy efficient providing just light	True	False
2. LED light bulbs are inefficient, providing too much heat	True	False
3. The sun is over 100,000 degrees Fahrenheit	True	False
4. Glow sti because of a chemical reaction	True	False
5. Firefl d no heat	True	False

Questions

Answer the questions below using evidence from the text

1) List some sourc ght t eat and some that do not.

2) Do you think it is good that some sources of rodu the heat be unwanted sometimes? Explain.

PREVIEW

Visualizing

Draw what you were picturing while you were reading. Explain the picture

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Curriculum Connection
C2.3

Shadows

What are Shadows?



The Sun sends light rays that travel in a straight line at nearly 300,000 kilometers per second. Eight minutes later, these rays will hit whatever is in their path on Earth. If the object they hit is opaque, a shadow forms.

Remember, opaque means that light cannot pass through the object. A **shadow** is an absence of light, meaning it is a dark area on a surface produced when an object is blocking the Sun's light rays.

PREVIEW

Light Sources and Shadows



There are many sources of light, such as, light bulbs, flashlights, and computer screens are examples. The light produced by these sources travels in straight lines until they hit something.

All of these sources of light can produce shadows if the light rays are blocked by an opaque object. Some sources of light produce light that the shadows are really visible, whereas other sources of light may produce shadows at close distances.

Size and Shape of Shadows



The shape of the opaque object that is blocking the light rays will always determine the shape of the shadow. However, the size of the shadow can change based on the position of the light source.

The Sun's changing position in relation to the Earth affects shadows. When the Sun is low on the horizon, the shadows are long. When the Sun is high in the sky, the shadows are much shorter. The same effects can be seen with a flashlight. If you change the position of the light source, the shadow will also change.

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Curriculum Connection
C2.4

Sound - Interesting Facts

What is Sound?

Sound comes from vibrations that create sound waves. These sound waves move through the air, water, and solid objects until they reach our ears. Our ears vibrate in similar ways to the original source of the vibrations, which allows us to hear many different sounds.



Interesting Facts about Sound

Animals and Sound

- Dogs can hear sounds at a higher frequency than humans, which gives them the ability to hear noises that we can't
- Sound is used by animals to communicate. This allows them to hear predators that might be planning an attack on them
- Dolphins use sound to detect the size, speed and shape of objects hundreds of metres away. They can understand the difference between a golf ball and a ping-pong ball just by their sound waves bouncing off the objects
- Sound cannot travel through space because there is no medium for the sound waves to travel through



Speed of Sound

- Sound travels at a speed of 1,230 km per hour.
- Sound is much, much slower than light. Light is 900,000 times faster!
- Sound travels 4 times faster through water than through air
- When you crack a whip, the loud sound occurs because the tip is moving so fast, it breaks the speed of sound!



Study of Sound

- The scientific study of sound waves is called acoustics
- Music is the pleasing arrangements of sounds

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Curriculum Connection
C2.4

Sound - Interesting Facts

Questioning What questions do you have after reading the information?

1)	
2)	

True or Fa hether the statement is true or false

1) Sounds moves faste	True	False
2) Cracking a whip breaks the of	True	False
3) Sounds come from vibrations that n und w	True	False
4) Music is the study of sound waves	True	False
5) Dolphins use sound to understand the world ar	True	False

Questions Answer the questions below using eviden om

1) What is sound? How do animals hear sounds differently than humans?

2) How fast does sound travel? What else did you learn about the speed of sound?

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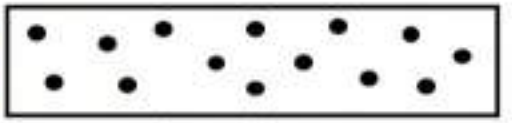
Curriculum Connection
C2.5, C2.6

Sound Travels Through Matter

Sound Travels Through Matter

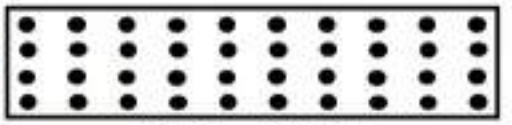
Sound vibrations will not travel if there is no matter for them to travel through. In deep space, there is no matter. There is no air, liquids, or solids in deep space between the planets. This means there is no matter for sound vibrations to travel through, which means there is no [illegible]. Sound travels differently through [illegible] and solids.





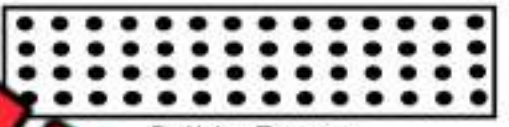
Gas - Slowest





Liquid - Medium





Solid - Fastest

Gases

Most of the sou[illegible]r trav[illegible]h gases in the form of a[illegible] made up of mostly 2 gases [illegible]an oxygen. Sound vibrations travel s[illegible]wly through the air. The particles in the air [illegible] farther apart, so it takes the vibrations more ti[illegible]ass o[illegible] particle to another.

Liquids

Sound will travel through water, as you may have noticed wh[illegible]you [illegible] and heard a friend call "Marco". The particles in liquids are closer toget[illegible], which means the sound actually travels faster in liquids.

The vibrations can move from particle to particle quicker.



Solids

Some sounds we hear travel through solids. If you put your ear on the table and someone taps their pencil on the table, you can hear the tapping through the table. These sound waves travel very fast because the particles are so close together that the sound vibrations can travel quickly from particle to particle.

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Curriculum Connection
C2.5, C2.6

Sound Travels Through Matter

Questions Answer the questions below using evidence from the text

1) Why does sound travel faster through solid than gas?

2) Wh[illegible]talk, how are the sound waves traveling to our ears?

PREVIEW

Summarize Summarize the re[illegible]wri[illegible]he important information

True or False Circle whether the statement is true or false

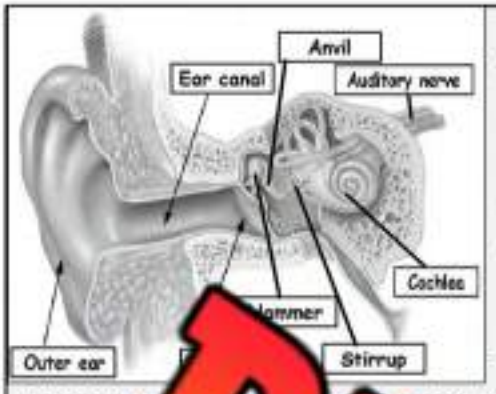
1. Sound can travel through solids, liquids, and gases	True	False
2. Sound can travel in space because space has air in it	True	False
3. Sound travels fastest through air	True	False
4. You can't hear sound when you are underwater	True	False
5. Sound vibrations travel through particles in solids, liquids, and gases	True	False

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Curriculum Connection
C2.8

Sound - How We Hear



Hearing – The Human Ear
The ear allows us to hear the environment around us. Sound is funneled through the outer part of the ear and into the ear canal. The sound then enters the eardrum as sound waves. The eardrum is made of a thin sheet of connective tissue that vibrates when sound waves strike it.

Middle Ear
The vibrations from the eardrum travel to the middle ear where th… …end vibrations to the cochlea. The cochlea translates the vibra… …ulses that travel to the brain via our auditory nerve.

PREVIEW

Experimen… Wh… …ou hear?

Close your eyes or use … …t see. Have your friend use various supplies to make a noise. For example… …a bal… …pling a paper. See if you can guess the noise. Try doing 5 noises.

1. How did you do? Was this challenge ea… …rd?

2. How does our sight and hearing work together to allow … …ronment?

True or False

Circle whether the statement is true or false

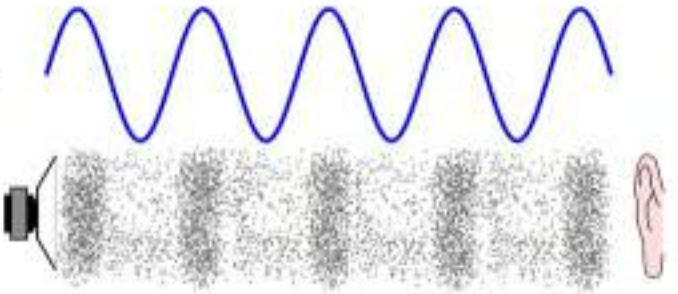
1. Sound is funnelled through the outside part of the ear	True	False
2. Sound waves turn into vibrations in our eardrum	True	False
3. The eardrum is made of a thin sheet of connective tissue	True	False
4. The 3 bones in our inner ear send electrical impulses to the brain	True	False
5. The auditory nerve sends electrical impulses to the brain	True	False

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Curriculum Connection
C2.4

Properties of Sound



Properties of Sound
The properties of sound tell us how sound works. The main properties of sound is that it travels in waves, can be absorbed, and can be reflected.

Sound Travels
Sound travels out of a source, like a musical instrument or a noisy machine, but it needs to have something to travel through (known as a medium), such as air, water, glass, or metal.

When you hear an alarm clock ringing, you're listening to energy making a journey. It starts inside the clock and travels through the air and eventually reaches your ears.

Sound is Absorbed and Reflected
Some materials can absorb the sound waves that come into contact with them. This means that the sound energy penetrates the material. Carpet and curtains will absorb sound waves, which make a room quieter. Hard surfaces do not reflect sound, as the sound waves do not bounce off these materials.

Other materials reflect sound waves, making a louder room. A loud room would have walls and hardwood or tile floors that allow the sound waves to bounce off the surfaces. Parts of the sound waves are absorbed by the surface, but most of the vibrations continue until they hit another surface.



Materials that Reflect Sound
We build rooms using certain materials if we need sound to travel loudly throughout. An example of this might be an auditorium where a presenter needs their voice to project to all areas of the room. The best materials to reflect the sound waves have smooth, hard, and flat surfaces, such as metal, wood, or brick.

The sound waves bounce easily off these surfaces and can sometimes even make the sound louder. You may even hear an echo in an empty room that has no soft materials in it if the room is large enough.

Materials that Absorb Sound
The opposite is true for materials that absorb sound. These materials are soft and sometimes jagged with hollow recesses in them so that sound waves can penetrate into the material.

Examples of these materials are sponges, cotton wool, and foam. If you yell inside an empty room that has hard surfaces, the sound will be very loud. When we add soft couches, chairs, and carpet, these surfaces absorb the sound waves, which will make the room much quieter.

A sound proof room would have foam inside the walls to absorb the sound waves.

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Curriculum Connection
C2.4

Properties of Sound

True or False

Circle whether the statement is true or false

1. A pillow reflects sound very well	True	False
2. A room with hardwood floors and nothing in it will reflect sound well	True	False
3. Sponges and foam materials are great at absorbing sound	True	False
4. A soundproof room should have thick carpet and not hardwood floors	True	False
5. A round mirror can reflect your sound to make it louder	True	False

Questions

Answer the questions below using evidence from the text

1) Why would you want a room soundproof? What materials would you use?

2) What kinds of materials reflect sound? Can you think of examples?

PREVIEW

Visualizing

Draw what you were picturing while you were reading. Explain the picture

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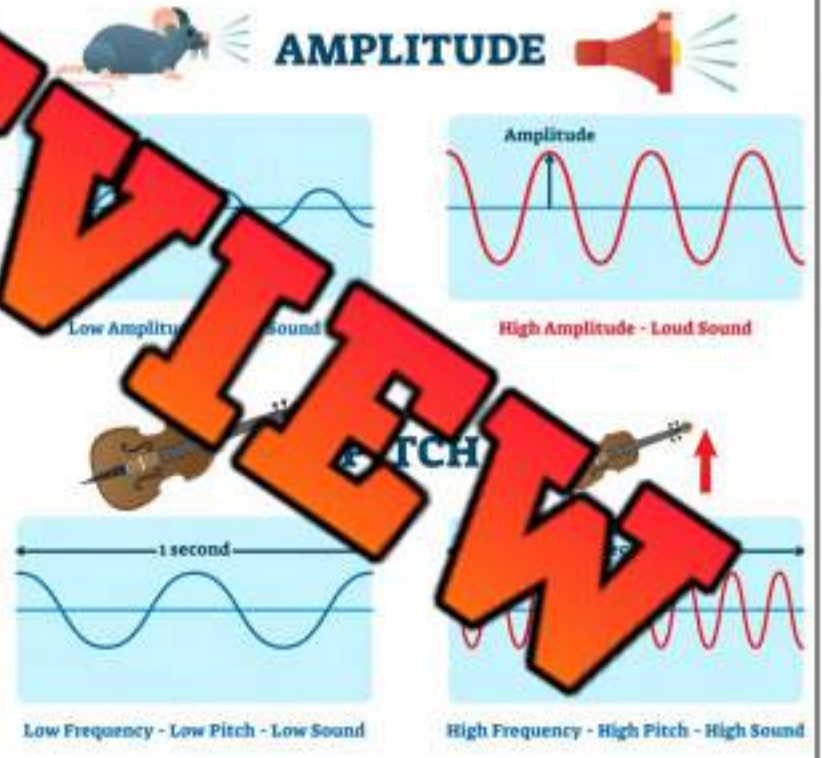
Curriculum Connection
C2.4, C2.5

Pitch, Frequency, and Amplitude

What is Pitch and Frequency?

Pitch is the frequency of a sound wave. **Frequency** is the number of times per second that a sound wave repeats itself. Therefore, **pitch** is the number of times a sound wave repeats itself. A high frequency has a lot of sound waves in one second. This means the pitch will [illegible].

This makes it possible to hear higher and lower sounds. A chirp of a bird has a [illegible] roar has a low pitch. A higher frequency sound has a higher pitch, and a lower frequency sound has a low pitch. The human ear can detect a range of frequencies that allow us to hear different sounds.



Amplitude and Loudness

Loudness refers to the volume of a sound. We can amplify a sound when we talk by transmitting more energy into our voice, which increases the vibrations we create. **Amplitude** is the strength of the sound. On a sound wave, a stronger amplitude will have taller sound waves.

A larger amplitude means we get a louder sound, while a smaller amplitude means we get a softer sound.

Loudness can also be affect by the sensitivity of our ears. Your grandparents might consider a sound quiet, while you think the sound is deafening! This is why many people prefer the sound on a TV or movie to be at different levels.

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Curriculum Connection
C2.4, C2.5

Pitch, Frequency, and Amplitude

True or False

Circle whether the statement is true or false

1) Pitch refers to the frequency of a sound wave	True	False
2) A bird chirp is a low pitch sound	True	False
3) A lion's roar is a low pitch sound	True	False
4) Sound w[illegible]t repeat many times in a second have a high frequency	True	False
5) The [illegible] is only based on how much sound energy there is	True	False

Definitions

[illegible] of the terms mean?

Pitch	
Frequency	
Amplitude	
Loudness	

PREVIEW

Draw

Draw the sound waves below

High Pitch, Low Amplitude	Low Pitch, High Amplitude	High Pitch, High Amplitude

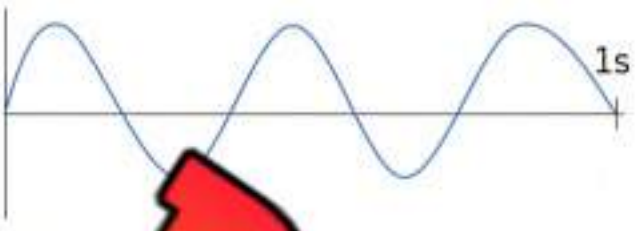
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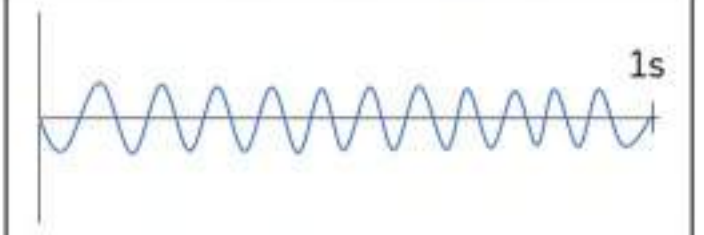
Curriculum Connection
C2.4, C2.5

Pitch, Frequency, and Amplitude

Describe Describe the frequency, pitch, and amplitude of the sound waves



Fre	and one half)
Pi	Lo
Amplitude	Hi



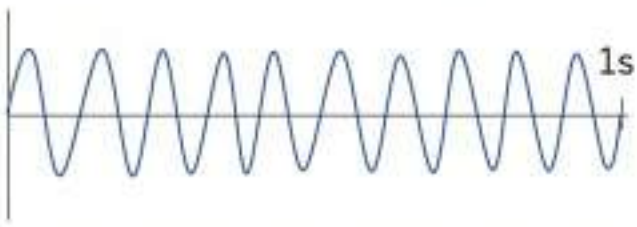
Frequency (#)	
Pitch	
Amplitude	



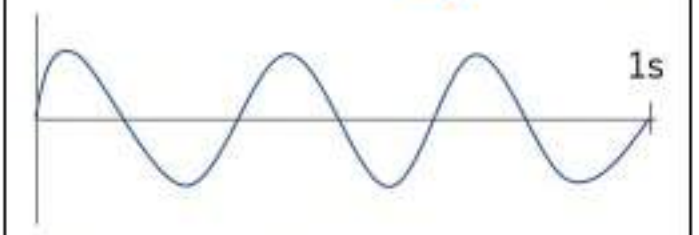
Frequency (#)	
Pitch	
Amplitude	



Fre	
Pitch	
Amplitude	



Frequency (#)	
Pitch	
Amplitude	



Frequency (#)	
Pitch	
Amplitude	

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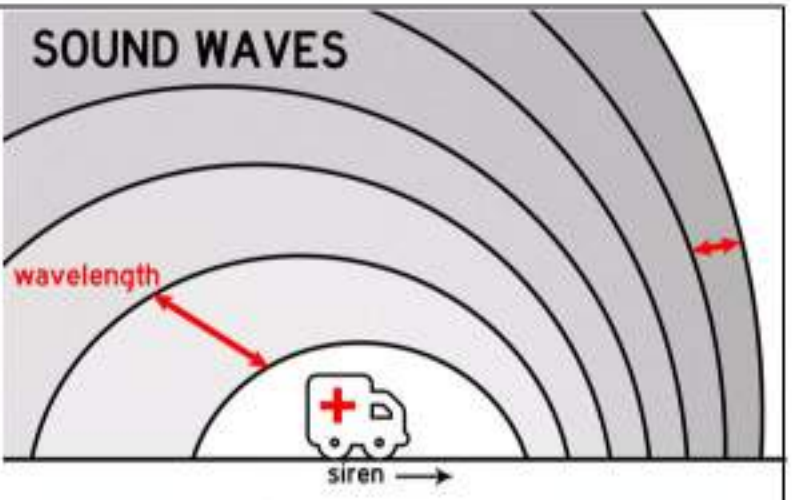
Name: _____ 46

Curriculum Connection
C2.5

Vibrations Causing Sound

How Does a Vibration Make Sound?

A sound wave is a transfer of energy that travels away from the vibrating source. Your voice is the vibrating source as you create vibrations that travel through the air for others near you.



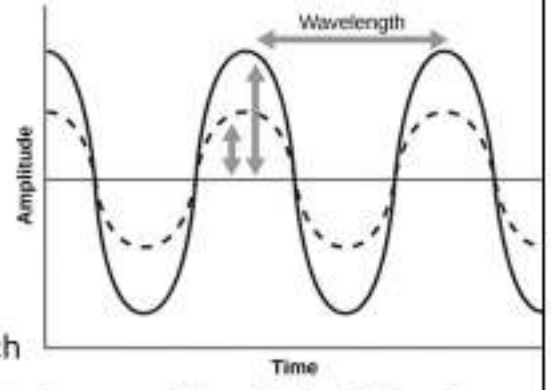
short wavelength → high frequency → high pitch
long wavelength → low frequency → low pitch

The sounds themselves need a medium to travel through. A medium can be a solid, liquid, or gas. Most sounds are heard through metals, water, or air. When the source of sound is struck, it causes it to leave the vibrating source and cause the surrounding medium to vibrate. As the sound waves move through the medium, particles are pushed forwards and backwards.

The volume of the sound depends on the sound wave. The more energy that is put into the sound wave, the louder it will be. If you hit a drum with a lot of energy, the vibrations will be stronger.

The farther the sound wave needs to travel affects the volume as well. This is because the sound wave spreads out and weakens. That is why it is difficult to hear something from further distances.

Sound vibrations can differ in strength and speed. If a sound is made that is loud and slow, it will have a large amplitude and low pitch. An example of this is a bass drum hit with a soft mallet. If the vibration is weak but fast, like a bird chirp, the amplitude will be soft and high pitched.



Wavelengths

A **wavelength** is the distance between the peak of one wave to the peak of the next wave. If soundwaves have a high frequency, the wavelengths will be short and the pitch will be high. If the frequency is low, the wavelengths will be long and the pitch will be low.

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Curriculum Connection
C2.4

Classifying Sounds

Classifying Sounds

Sounds are all different based on the vibrations that the source of the sound is making. That is why you sound different than your classmates. You are the source of sound vibrations and you make different sound waves than your friends.



We can classify different sounds into groups. Sounds can be soft, loud, pleasant, unpleasant, musical, audible, and inaudible. Research different types of sounds and provide examples of each type.

Research the following sounds and fill in the table below

Type of Sound	What does it sound like?	Examples
Soft		
Loud		
Pleasant		
Unpleasant		
Audible		
Inaudible		

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Curriculum Connection
C2.4

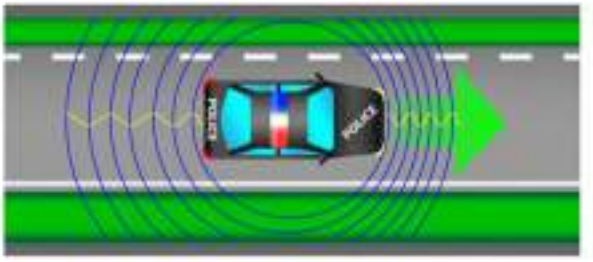
Doppler Effect - Sound

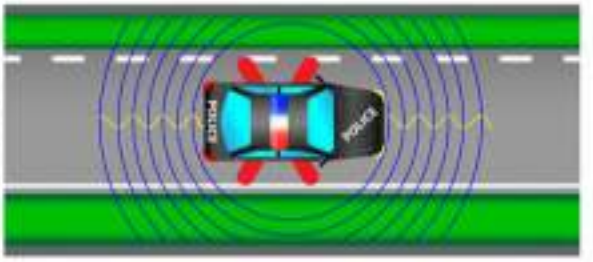
What is the Doppler Effect?

The **doppler effect** is a change in frequency and wavelength in a sound wave.

It is caused by the change in distance between the source of the sound (causer) and whoever is hearing (observer) the sound wave.







When the source of sound moves in relation to you, it changes. If it isn't moving, the frequency will be the same all around the source of the sound. If it is moving, the frequency of sound waves increases as it gets closer. As the source gets further, the frequency gets lower.

Example

In the photo below, person A (observer) is closer to the source of the sound waves (causer) than person B. You can see that the pitch changes as the sound wave gets further from the source.



The frequency of the sound wave becomes lower and more spread out. This affects how we hear the sound. The human ear only hears sounds at a certain frequency. If the frequency becomes too low, it cannot be heard.

In the photo, you can see the waves getting further and further apart which means person B is not hearing the sound as well as person A. You will also notice that as the distance from the source of the sound gets longer, the sound wave gets longer (larger) which means it is more spread out. This makes the volume of the sound quieter to anyone hearing it.

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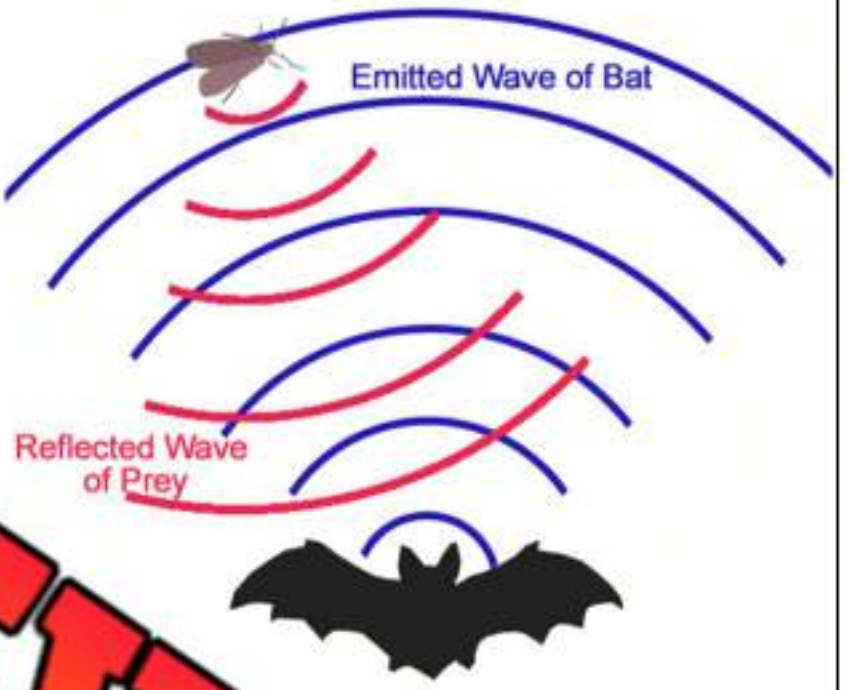
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Curriculum Connection
C2.4

Echolocation

What is Echolocation?

Echolocation is how animals emit calls out to the environment and listen to the echoes of those calls when they bounce off various objects ne



s to tell them w they a elp them navigate ees. A animal can tell how ey a from an object by measur y long it takes for the sound they to em.

The relative intensity of the soun used nem where their surroundings are. This means if they make a loud sound, if a qui nd re them, then the object is further away. Echolocation allows animals to th so vision.

PREVIEW

What Animals Use Echolocation?

The most notable animal that uses echolocation are bats. Other animals like toothed whales and dolphins also use echolocation. It is mainly used by birds and more specifically, cave dwelling birds.



Humans also use echolocation, but we need machines to do it as our ears and brains cannot process the calculations. When humans use echolocation, we call it **sonar**. Sonar devices are often used on boats to detect fish, structures, and anything under the boat. Sonar is used to detect things that have fallen to the bottom of oceans, such as aircrafts and sunken ships.

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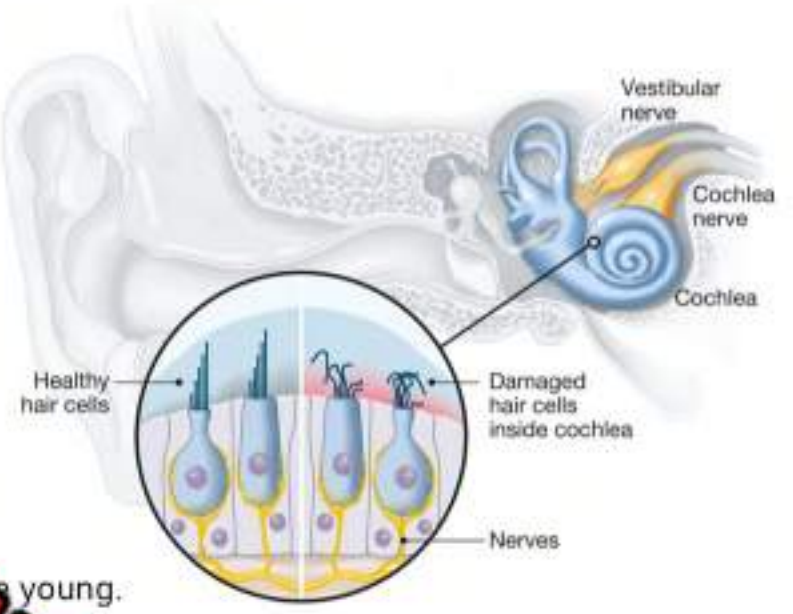
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Curriculum Connection
C1.1, C2.8

Protecting Your Ears and Hearing

Why Protect Your Ears?

Your ears are what allow you to hear the world around you. At your young age, it can be difficult to understand the importance of protecting your ears. But u[illegible]nd this, once your hearing is [illegible] it gone for good. You c[illegible]ces[illegible]our hearing, like a hearing ai[illegible]t g[illegible]our hearing back to w[illegible]s whe[illegible]e young.



Why We Lose Hearing

As you get older, your hearing [illegible]wo[illegible]pens because loud noises and aging cause wear and tear on the hairs or nerv[illegible]the[illegible]e. These hairs and nerve cells send sound signals to the brain. When the[illegible]are dam[illegible]or m[illegible], the signals aren't sent as well, which results in hearing loss.

Turn the Volume Down

According to the World Health Organization, 1.1 billion teena[illegible]and worldwide are at risk for noise-induced hearing loss from listening t[illegible]loud using headphones. Earbuds can be the most dangerous because they fit di[illegible]next to the eardrum. The better option is to use over-the-ear headphones instead.

Use Earplugs around Loud Noises



Approximately 15 percent of noise causing hearing loss happens because of loud work or loud music. Gardeners or autoworkers are often working with loud equipment like leaf blowers or lawnmowers.

Going to concerts where you have to shout at the person next to you is also hard on your ears. The repetitive loud noise is dangerous as it causes hearing loss. Use earplugs to dampen the sound and lesson the effects of the intense vibrations on your eardrum.

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Curriculum Connection
C1.1, C2.8

Protecting Your Ears and Hearing

Questions

Answer the questions below using evidence from the text

1) Why is it important to protect your ears? What can you wear to help?

2) W[illegible] damage your ears?

PREVIEW

Making Connections

What [illegible] mind you of?

True or False

Circle whether the statement is true or false

1) Hearing loss happens as we get older	True	False
2) We can slow down hearing loss by not listening to loud noises	True	False
3) If we lose our hearing young, doctors can get it back for us	True	False
4) Listening to loud music while we are young is okay	True	False
5) The cochlea sends sound signals to the brain	True	False

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Curriculum Connection
C2.6

Materials That Transmit Sound

Materials that Transmit Sound
Some materials are excellent at allowing sound to pass through them. Air is not great at transmitting sound because it is a gas, and the particles in air are not close enough together for the sound waves to easily travel through. Solids are the best transmitters of sound because the particles are so close together which allows the sound waves to easily travel from one particle to the next.

Research Research "materials that transmit sound" and write them below.

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	



Questions

1) What does transmitting sound mean?

2) What [illegible] of [illegible] good at transmitting [illegible]

3) When do we need to transmit sound? Give an example and explain what material you would use to transmit the sound.

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Curriculum Connection
C1.1, C2.8

Devices Using Sound and Light

Devices Using Sound and Light
Scientists and inventors have invented many different devices that take advantage of light and sound properties. These devices use light and sound to do extraordinary things. Without light and sound, these devices would not be able to work.

Research Research the following devices and learn how they use light or sound

Device	ght or Sound	How does this device use light or sound?
Telescope		
Microscope		
Motion Detector		
Hearing Aid		
Microphone		

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Curriculum Connection
C1.2

Light and Sound Pollution

Light Pollution

As technology improves, our use of light increases. Before electricity was invented, candles and oil lamps were the main sources of light. In today's wo[illegible]ht is everywhere!



Satellite photo of earth. Notice the technologically advanced countries produce more light pollution

If y[illegible]ly, you likely have street lights that keep people safe while walking in the d[illegible] ar[illegible] prevent crime and to make it easier to get around outside.

Light pollu[illegible] ver[illegible] of artificial light that causes problems for plants, humans and ani[illegible]t poll[illegible]ens in cities where there are too many sources of artificial light.

Problems With Light Pollut[illegible]

- Nocturnal animals that sleep during [illegible]tive at night get confused. This affects ecosystems as it changes pr[illegible]r-prey [illegible]
- Affects human's circadian rhythm, which is t[illegible]hm th[illegible] when we should be sleeping and when we should be awake. This ca[illegible] and other serious health problems, like headaches, stress, and [illegible]
- It is often a waste of energy that is causing climate change

Sound Pollution

New technologies also create more sounds, which is causing sound pollution. **Sound pollution** is the unwanted noise that affects humans or wildlife.

Transportation is one of the biggest causes of sound pollution. If you live near train tracks, you've heard sound pollution, which is that unwanted sound that comes from speeding trains. People that live near highways also deal with sound pollution from travelling vehicles. Lastly, passing airplanes create sound pollution as well. Factories also create sound pollution. These factories often run all day and night.

Sound pollution can cause high blood pressure, heart disease, sleep problems, headaches, and stress.

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STEM INVESTIGATION AND COMMUNITICATION SKILLS

Habitat and Communities

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Grade 4 Science Unit

Strand A - STEM Investigation and Communication Skills

	Curriculum Expectations	Pages That Cover the Expectations
A1.1	use a scientific research process and associated skills to conduct investigations	85
A1.2	use a scientific experimentation process and associated skills to conduct investigations	73 – 75
A1.3	engineering design process and associated skills to design, build, and test devices, models, structures, and systems	69 – 72, 76 – 79
A1.4	follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, equipment, and materials	69 – 79
A1.5	communicate their findings, using evidence, technology vocabulary and formats that are appropriate for specific audiences and purposes	69 – 79
A2.1	write and execute code in investigations that involve modelling concepts, with a focus on producing different types of output for a variety of purposes	81, 83 – 84, 85, 87
A2.2	identify and describe impacts of coding and of emerging technologies on everyday life, including skilled trades	85 – 87
A3.1	describe practical applications of science and technology concepts in their home and community, and how these applications address real-world problems	80 – 81, 85 – 87
A3.2	investigate how science and technology can be used with other subject areas to address real-world problems	80 – 82, 85 – 87
A3.3	analyse contributions to science and technology from various communities	82

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Curriculum Connection
A1.3, A1.4, A1.5

Experiment - Light Maze

Research Question

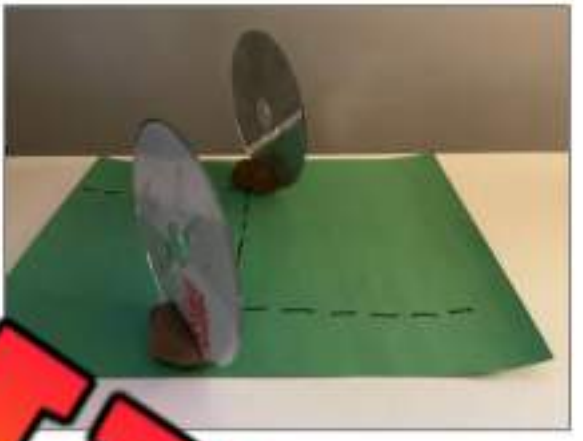
What are we learning more about?

Light travels in straight lines and it reflects on certain materials. Can we reflect light off multiple surfaces?

Materials

What do we need for our experiment?

1) [illegible]s/DVDs or [illegible]ight well
2) Play dou[illegible]to ho[illegible]irrors up
3) Marker
4) Paper to draw the maze
5) A flashlight



Method

How do we complete the [illegible]im[illegible]

1) Make a maze using the paper and markers. Make two turns if you have two mirrors and 3 turns if you have 3 mirrors
2) Make a ball of play dough for the mirror to sit in
3) Put the mirrors on the corners of the turns
4) Angle the mirrors so the light will reflect off one another
5) Turn off the lights so you can test your light maze. You might need to adjust the position of your mirrors in order for the light to travel through the maze.



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Curriculum Connection
A1.3, A1.4, A1.5

Experiment - Light Maze

Observations

What happened?

What happened? Write down what you observed as you tested your mirrors.

Results

Answer the questions below

1) Does light bend when it reflects off a surface?

2) Even if you had trouble with your maze, explain why a light maze should work.

3) Draw a diagram of your light maze. Label the mirrors and the beams of light.

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Curriculum Connection
A1.3, A1.4, A1.5

Experiment - Refracting Light

Research Question

What are we learning more about?

When light passes through a transparent (clear) material, it bends as it comes out the other side. The cause of refraction is because light travels at different speeds in different materials. What will happen to light as it passes through a glass jar with water in it?

PREVIEW

Materials

we need for our experiment?

1) Gla jar – rks the best
2) Water
3) Paper with designs
4) Measuring cup full of wate – en almost fill the jar

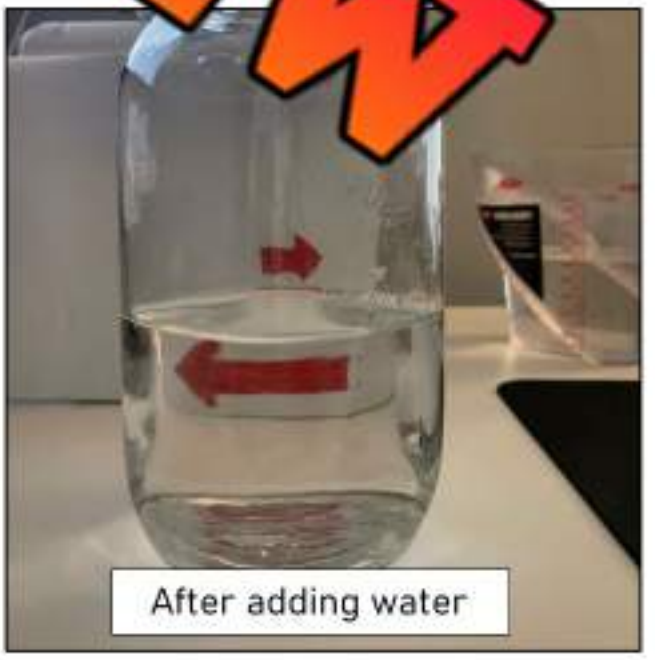


Befo ing water

Method

How do we complete the experimen

1) Get your paper ready with the designs you want to see change. We used red arrows drawn in the same direction.
2) Stand the paper up by leaning it against a wall or a book
3) Place the jar in front of the paper
4) Slowly add the water to the jar. You will might need to rotate the jar to show the effect.
5) Record your observation.



After adding water

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Curriculum Connection
A1.3, A1.4, A1.5

Experiment - Refracting Light

Observations

What happened?

What happened? Write down what you observed as you added water.

Results

Answer the questions below

1) What is refraction?

2) Why did the designs move as you added water?

3) When have you seen light refracted in your life? Explain.

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Curriculum Connection
A1.2, A1.4, A1.5

Activity - Transparent, Translucent or Opaque?

Activity

Which objects are transparent, and which are opaque?

We can determine if an object is transparent, translucent or opaque based on whether light can pass through them. If an object casts a shadow, the object is opaque. If the object does not cast a shadow, it means the light was able to go through t[illegible]t, which means it is transparent. If some light passes through and the sha[illegible]e, the object is translucent.

PREVIEW

Materials

[illegible]at d[illegible]need for this activity?



- Flashlight – light sou[illegible]
- Dark room
- Objects to test

Options: wax paper, cardboard, paper, pencil[illegible]book[illegible]wrap, plastic bottle

Method

How do you do this activ[illegible]

1. Start by filling in the table below under observations. Write [illegible]t the objects you will use. Then make a guess or prediction. Will the object be transparent, translucent, or opaque.
2. Point the flashlight at a wall
3. Put an object in front of the light source. Does it cast a shadow? Does some of the light come through? Or is there no shadow and all the light comes through?
4. Record your observations in the table
5. Answer the questions below



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Curriculum Connection
A1.2, A1.4, A1.5

Activity - Transparent, Translucent or Opaque?

Observations

What happened?

Object	Prediction	Transparent, Translucent, or Opaque

PREVIEW

Results

What kinds of materials are opaque, tra[illegible]are[illegible]t?

Opaque	
Transparent	
Translucent	

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Curriculum Connection
A1.2, A1.4, A1.5

Transparent, Translucent or Opaque?

Examine Circle whether the object is transparent, translucent, or opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Plastic Bag



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque



Transparent - Translucent – Opaque

Window



Transparent - Translucent – Opaque

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Curriculum Connection
A1.3, A1.4, A1.5

Lab - Making a Kaleidoscope

Information — What is a Kaleidoscope?

A **kaleidoscope** is an optical instrument that has two or more mirrors placed at an angle to each other. When light reaches one mirror, it is reflected to the other.



The instrument is usually a tube that also has loose coloured bi[ts] of material that change the colour of the light that enters [the tu]be. When you shake the tube, the light forms a s[ymmetri]cal pattern that changes as you move the loose [pieces]. [You] are looking through the instrument becau[se the] mirror[s] are to reflect the light back and forth.

PREVIEW

Materials — [Wh]at you [will] make a Kaleidoscope

- Pringles can – without [the] p[lastic] lid
- Shimmery scrap-book pa[per] [or] [alu]mi[num] foil
- Hammer and nail
- Clear glue
- Tissue paper, glitter, and sequins
- Clear contact paper – 2 squares – enough to [cover] the e[nd] of the Pringle's Can

Procedure — What are the steps to do to [make] this l[ens]

1. Roll a piece of the shimmery silver paper and put it inside the c[an] [to] see if it fits. Take it off. You can glue the paper to the inside or hope it fits well inside
2. Cover the outside of the can with coloured paper. Decorate it any wa[y you] would like!
3. Use a hammer and a nail to punch an eye hole in the sealed end of the can (the non-lid side)
4. Glue sequins on the inside of the Pringle's can lid. Then add glitter and colourful paper. The lid will be one of the colourful lenses.
5. You need to add a second colourful lens. Glue one of the squares of contact paper over the end of the can. Then add decorations – glitter and coloured paper. Then glue the other square of contact paper on top to seal it.
6. Cut the contact paper to fit your can perfectly. You will be putting the lid over this, so it needs to be a close fit
7. Let everything dry!
8. Take it outside and look up at the light. DO NOT look directly at the Sun. Turn the lid and you should see different patterns and colours.

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Curriculum Connection
A1.3, A1.4, A1.5

Lab - Making a Kaleidoscope

Observations

What happened?

1) What is a kaleidoscope?

2) W[illegible]pened [illegible]pointed the kaleidoscope at the light?

3) What happened when yo[illegible]he L[illegible]you think this happened?

Diagram

Draw a diagram of a kaleidoscope. Label [illegible]part[illegible]sun

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Curriculum Connection
A2.1, A2.2, A3.1, A3.2

Coding - Automatic Street Lights

Street lights make our cities safer. With the lights on at night, we can see better. This is helpful for us in many ways.



- ✓ Can drive at night more safely
- ✓ Can play outside longer
- ✓ Can prevent theft and crime

City lights are on timers. Codes are used to program these lights. The codi[illegible] the timer uses IF/ELSE statements.



if the time is between 7:00pm and 6:00am
urn lights (on)
n sta[illegible] (off)



PREVIEW

Fill in the Blanks

[illegible] words to fill in the blanks

Word Bank				
code	crime	safe[illegible]		timer

1) Lights make driving _____.
2) Street lights are turned on by a _____
3) A _____ is used on the timer to tell the lights whe[illegible]
4) Street lights stop _____.
5) Lights let us play outside _____.



Read the Code

Would the lights be on or off based on the time?

5:00 pm	On	Off
9:00 pm	On	Off
7:00 am	On	Off
5:30 am	On	Off

7:01 pm	On	Off
6:01 am	On	Off
6:50 pm	On	Off
2:30 am	On	Off

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Curriculum Connection
A2.1, A2.2, A3.1, A3.2

Writing Code - Lights In Your Room

Coding Write your own code for a timer that controls lights in your room



Read Code Would the lights be on or off based on the time?

7:00 pm			6:01 pm	On	Off
11:00 pm			8:01 am	On	Off
6:00 am	On		50 pm	On	Off
3:30 am	On	Off		On	Off
12:00 pm	On	Off	30 pm	On	Off

PREVIEW

Results Answer the questions below

1) Why did you program the timer for these times?

2) How could using coding/timers help you in your life?

3) What else could you put on a timer to help you in your life? Explain.

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Curriculum Connection
A3.1, A3.2, A3.3

History of Street Lights

History of Street Lights

In ancient Rome, wealthy citizens used vegetable oil lamps on the front of their homes to light up the streets. Special slaves were in charge of lighting, extinguishing and watching the lamps.

In the year 1417, the mayor of London, England made it the law that everyone had to hang lanterns outside of their homes after dark and in the winter.

In 18 omas Edison created the first lightbulb. These bulbs were used for s ts years later. Before lightbulbs, people burned oil to make a flame



PREVIEW

Colour C ghtbulb and the oil lamp, then draw your own versions





Lightbulb	il La

Questions Answer the questions below

1) Who invented the lightbulb?

2) Which is safer – a lightbulb or oil lamp?

Lightbulbs	Oil Lamps

3) How has the invention of coding and timers made our streets safer?

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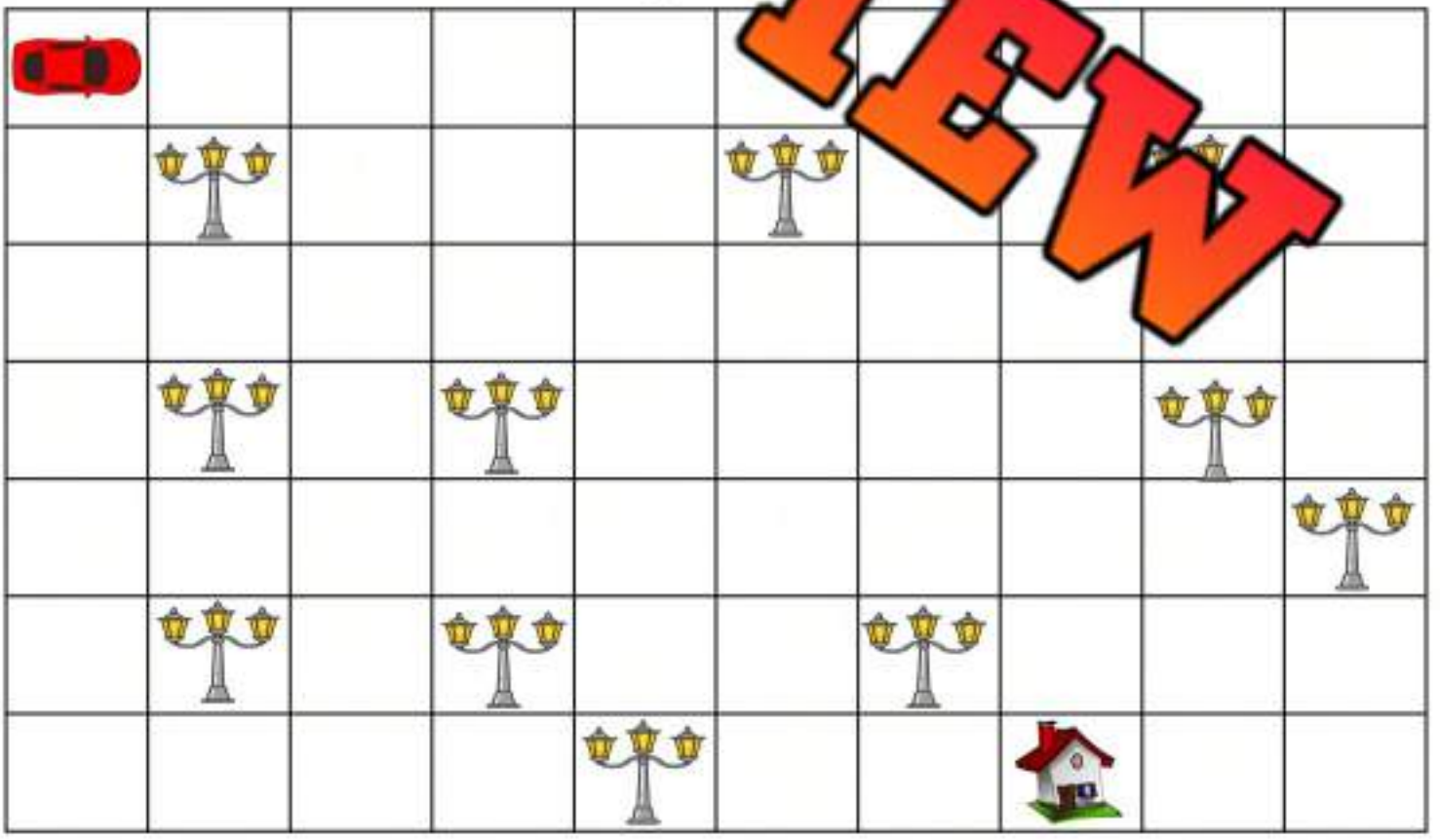
Curriculum Connection
A2.1

If Then Conditional Statements - Activity

Questions	Follow the if/then statements to move the car to its home

1)	If light curves when it travels	then	Move ↓ 2 spots
2)	If light travels in straight lines	then	Move → 2 spots
3)	If l flects off mirrors	then	Move ↓ 4 spots
4)	d by dark colours	then	Move → 2 spots
5)	If source so ke heat	then	Move ↑ 4 spots
6)	If the moo s lig	then	Move ← 2 spots
7)	If the sun emits lig	then	Move → 3 spots
8)	If a firefly is a natural source		Move ↓ 6 spots

PREVIEW



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Curriculum Connection
A1.1

Research - Automatic Lights



Research Ask your family about the automatic lights at your house

1) Do you have any automatic lights at your house?	
Yes	No

2) If yes, how do the automatic lights help your family?

_____

_____

_____

3) What time do the auto[illegible]hts [illegible] When do they turn off?

Turn On		[illegible]ff	

PREVIEW

Research Ask your family about the [illegible]ma[illegible] your street



1) Do you have any automatic lights at on your street [illegible]our	
Yes	N[illegible]

2) How do these lights help you and the people in your community?

_____

_____

_____

3) What time do the automatic lights come on? When do they turn off?

Turn On		Turn Off	

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Curriculum Connection
A2.1, A2.2, A3.1, A3.2

Coding IF/ELSE - Using Sound Devices

Sound Devices Using Code

When we use sound devices, like a sound recorder, code is used to follow our commands. A walkie-talkie also uses code as it follows our instructions. Many sound devices have three main functions – volume up, volume down, and a record button. Check out how the sound device could be programmed to follow the user's commands.

Did the user push the volume up button?

IF the u… …d the volume up button

ELSE

…N turn… …e up 1

Keep the volume the same strength

PREVIEW

Directions W… …e oth… …s for the volume down and record button



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Curriculum Connection
A2.1, A2.2, A3.1, A3.2

Coding Assignment - Walkie Talkie



Directions	Create a walkie-talkie that would be fun to use

1) What main functions can your walkie-talkie do?

2) Draw your w e. Incl uttons on the walkie-talkie.

PREVIEW