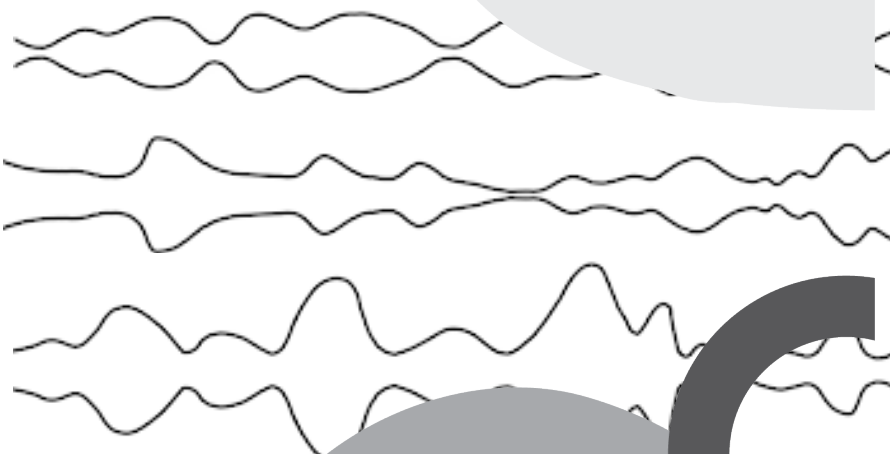


WISE Activity Booklets

A STEM activity booklet for fun on-the-go learning!
Made by WISE Kid-Netic Energy

DIY Activities
Puzzles
Challenges
... and more!



University
of Manitoba

WISE Kid-Netic Energy is a proud member of Actua

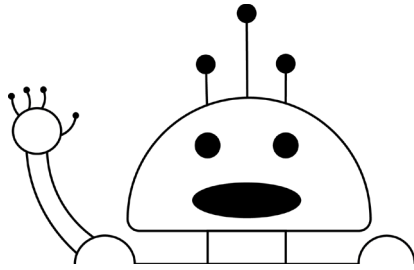
A network
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Youth · STEM · Innovation

With funding from
Canada

Grade 4
MAY 2020

Habitats & Communities - Light
Sound - Rocks, Minerals & Erosion



Hello there!

WISE Kid-Netic Energy is a not for profit STEM (Science, Technology, Engineering, and Math) outreach organization at the University of Manitoba. Our organization offers science and engineering workshops, clubs, camps and events to youth from Kindergarten to Grade 12 throughout the province of Manitoba. We reach on average 25 000 to 50 000 youth depending on funding levels. Our approach is simple – present STEM in messy, memorable and engaging ways so Manitoba youth feel motivated to learn more and more. We reach all Manitoba youth, and we particularly target underrepresented youth like girls, indigenous youth and youth facing socio-economic challenges.

All of us at WISE Kid-Netic Energy have been working hard to create these booklets to continue to bring our fun and educational STEM activities to Manitoba youth during these unprecedented times. We are disappointed that we cannot see you in person, and hope that these monthly booklets bring some STEM excitement to your life.

These booklets have been created by our student instructors who are all studying engineering, science, or in another STEM-related field at university. Peek the last page of this booklet to see who created the activities, experiments and recipes within.

All the activities in this booklet are based on the Manitoba Science curriculum. For any teachers viewing this booklet, all the SLO codes are listed at the bottom of each page.

If a link is listed at the bottom of the page, and you have access to the Internet, follow it to check out a video of the activity our instructors have created just for you.

We hope that you enjoy doing the experiments and activities as much as we loved creating them for you.

In this Grade 4 booklet, the science topics you will be exploring are: habitats and communities, light, sound, rocks, minerals and erosion, and more!

**Best of luck, and until we see you again,
the WISE Kid-Netic Energy Crew**

P.S. If you have any suggestions for activities or experiments you would like us to try, contact us through our website, or social media accounts that are listed on the last page of this booklet.

Meet our Amazing Authors!

Robyn is going into her fourth year of civil Engineering at the University of Manitoba. She enjoys riding her bike, soaking up sunshine and watching live music. Robyn also loves all things science and is pumped about a summer filled with STEM fun.

Robyn

Huda

Huda is in her first year taking general science courses and she's trying to decide between a degree in Microbiology or Genetics. She enjoys baking and cooking and her favorite activity is watching videos on YouTube!

Brandi just finished her first year in the Faculty of Science and plans to apply to the College of Pharmacy in the future. When she's not studying chemistry she loves to listen to music, hang with her cats, and nap!

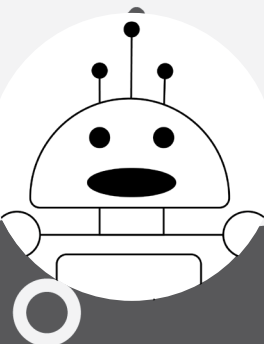
Brandi

Sophia

Sophia is in her second year of science and is planning on going into optometry in the future. She loves math and biology, and in her free time loves swimming, reading and trying new foods!

Esiw the Robot

Esiw is a friendly robot that loves to help kids learn about computers & coding! Esiw loves to do math, solve problems and make people laugh!



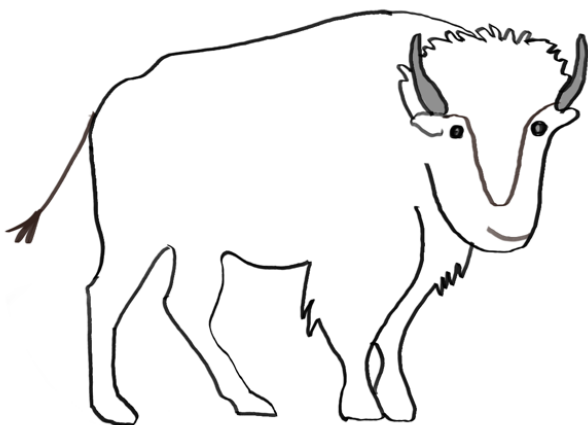
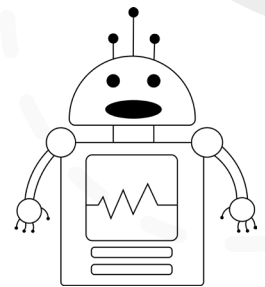
Bison Binary

Have YOU seen a bison?
How much do you know about them?
Are you ready to put your bison knowledge to the test?

For each fact about bison, shade in a 1 if you think the answer is true, or a 0 if you think the answer is false. After you're done, look at the answer key on page 19!

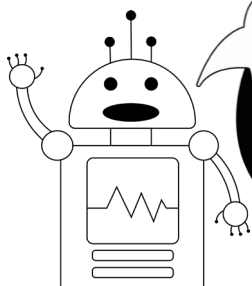
- | 1 | 0 | |
|-----------------------|-----------------------|---|
| <input type="radio"/> | <input type="radio"/> | Bison have paws. |
| <input type="radio"/> | <input type="radio"/> | Grown bison are small. |
| <input type="radio"/> | <input type="radio"/> | Bison are slow movers. |
| <input type="radio"/> | <input type="radio"/> | A baby bison is called a calf. |
| <input type="radio"/> | <input type="radio"/> | Although they are hefty in size, bison can swim! |
| <input type="radio"/> | <input type="radio"/> | Bison are the largest mammals found in Manitoba. |
| <input type="radio"/> | <input type="radio"/> | You can judge a bison's mood by the way its tail is swinging. |
| <input type="radio"/> | <input type="radio"/> | A bison gets all its nutrients from eating plants (bison are herbivores). |

To a computer, the world is understood in **binary**: everything must be broken down to either a "true" or a "false" statement. In computer language (binary code), a 1 means "true" and a 0 means "false".



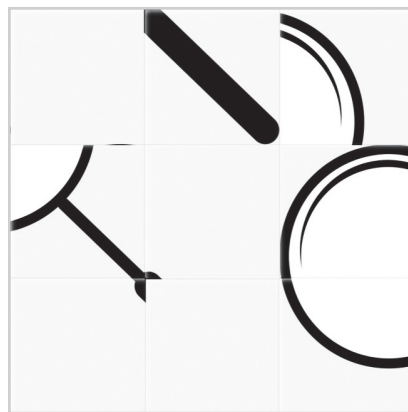
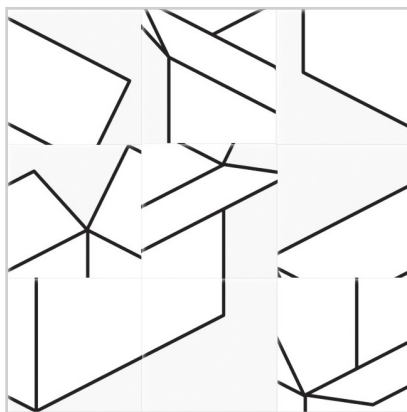
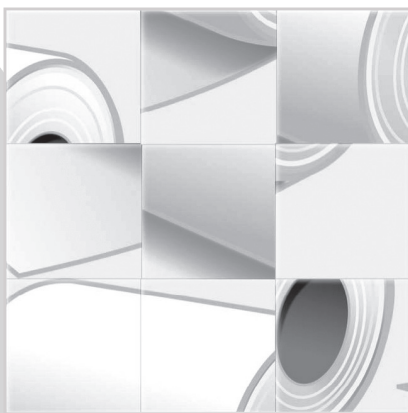
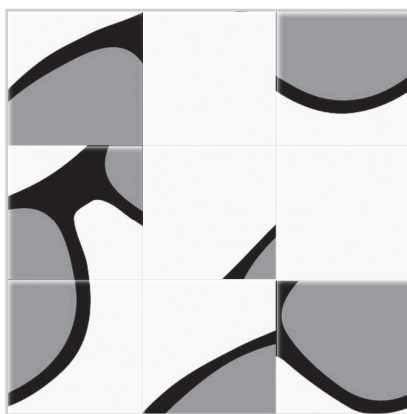
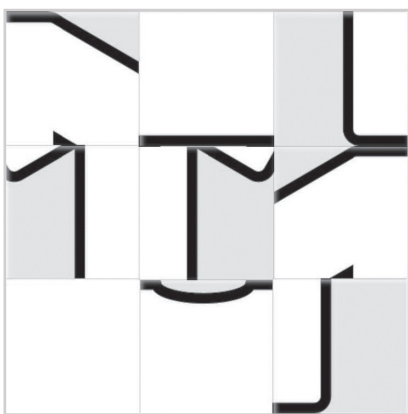
Bison have been very important to Indigenous peoples within Manitoba. They have been used as food, to create tools and other supplies, and even to make musical instruments!

Opacity Unscramble (page 1 of 3)

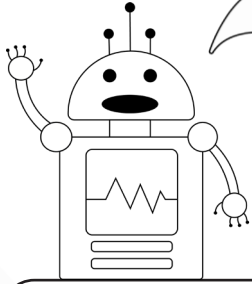


Hi, friend! Can you help me? I recognize digital images by storing information about the colour of each tiny piece of the image (called a **pixel**), but something went wrong with the way I saved these images! Can you help me unscramble them?

Using scissors, cut out each image, and cut out the squares that make up the image. Unscramble the image to find out what it is, then go to page 5 and glue it back together and place it in the correct category (opaque, translucent, or transparent).



This page is intentionally left blank, because the previous page is meant to be cut up.



Thanks for helping me unscramble my images! Now we have to sort them! Sorting helps computers like me store and retrieve information. We need human help to figure out how to sort things though. As you sort each object into a category, think about what steps you are taking to make each decision. That's what I call a "**sorting algorithm**".

OPAQUE: light may not pass through the object

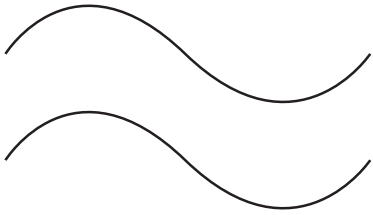
TRANSLUCENT: some light may pass through the object, but it is not clear

TRANSPARENT: all light may pass through the object, and it is very clear

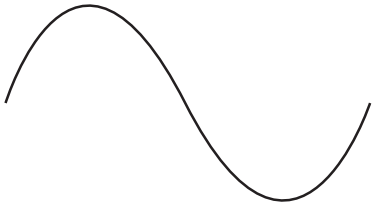
Wave Maze

Find your way through the sound wave maze, but watch out for destructive waves! If the waves are touching at any point that is a dead end.

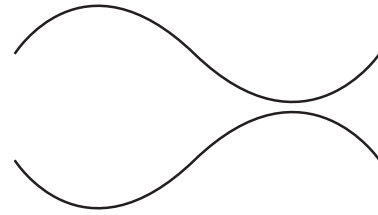
The waves are **constructive** if they are in the **same phase** (they line up):



This is like doing **wave addition**: the sounds add together, making the wave TALL and the music LOUD.



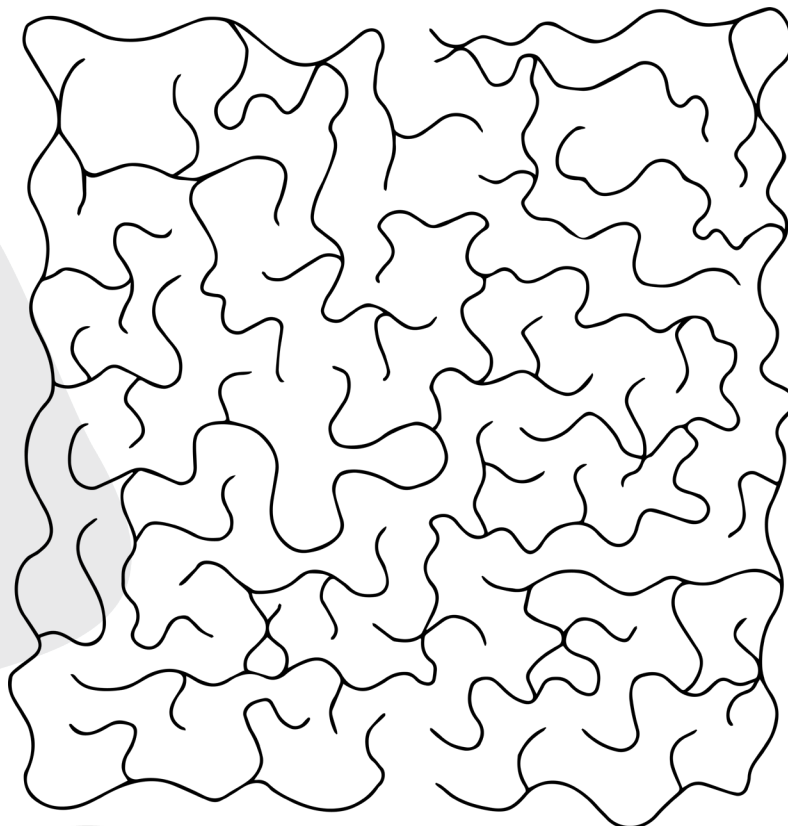
The waves are **destructive** if they are in **different phases** (they don't line up):



This is like doing **wave subtraction**: the sounds cancel each other out, making the wave small and the sound quiet. If the waves cancel completely, there will be no sound.



START



FINISH

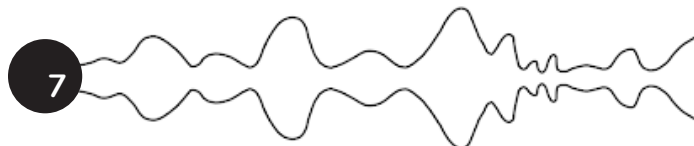
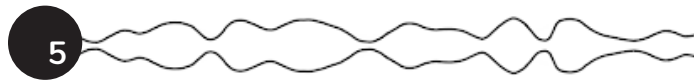
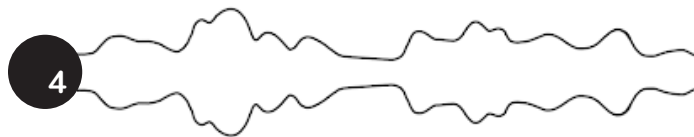
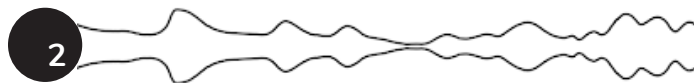
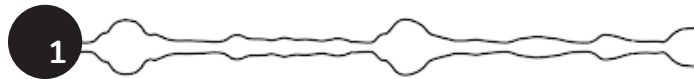
Seeing Sound

Sound waves can be visualized by looking at a “waveform”. Waveforms vary in size and shape depending on the volume, the instruments, voices, pitch, and more! Try to match the waveforms below with the genre of music they came from using the following qualities:

AMPLITUDE (height of a wave) tells us how loud the sounds are.

WAVELENGTH (width of a wave) tells us how long a sound is held or how smooth it is.

FREQUENCY (spacing of waves) tells us how quickly sounds are being made / how many there are.



Hip hop: fast vocals, lots of bass, drums, electronic sounds

Techno: usually repetitive, quick beats, electronic sounds, often no vocals

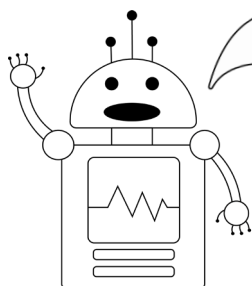
Folk: varies in style, but often quiet, slow and calming

Pop: often upbeat and repetitive, with vocals, guitar, bass, drums, piano

Rock: loud with strong chords/beats, vocals, electric guitar, drums and bass

Jazz: often smooth, uses brass, bass, and piano

Classical: varies in speed / volume, many instruments, strings, no vocals



Look at you using all kinds of computer science skills in this activity: you're problem-solving, matching, and using abstraction. **Abstraction** is all about focusing on the important details and forgetting the rest, which is exactly what you're doing when you're looking at those bumpy sound waveforms.

Design Your Animal

You have a budget of 100 “ADAPTI-POINTS” (AP) to design a brand new animal! You may only pick one item from the “habitat” section. You may pick as many adaptations as your budget allows.

HABITAT

DESERT HABITAT / 25 AP
These habitats are dry and do not receive rain. They can be very hot or very cold.

MARINE HABITAT / 25 AP
These habitats are underwater and salty. They include oceans, seas, salt marshes, estuaries, lagoons, mangroves and coral reefs.

FRESHWATER HABITAT / 25 AP
These habitats include rivers, creeks, lakes, ponds, and streams.

GRASSLAND HABITAT / 25 AP
These habitats receive some rain. They can be very hot or very cold. They are filled with grass, flowers, and herbs.

RAINFOREST HABITAT / 25 AP
These are wet habitats that receive lots of rain. Rainforests can be warm. There are many plant and animal species present.

POLAR HABITAT / 25 AP
Very dry with rare rain and very cold. There are only two seasons; summer and winter. In the summer some moss and grass may grow.

DIET

HERBIVORE / 25 AP
These animals only eat plants. Like rabbits and horses!

OMNIVORE / 25 AP
These animals eat plants and animals. Like humans!

CARNIVORE / 25 AP
These animals only eat other animals. Like lions!

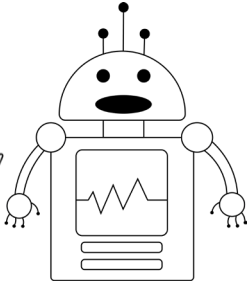
BUILD-YOUR-OWN ADAPTATION

..... / 12.50 AP each
If an animal lives in the habitat, then it needs

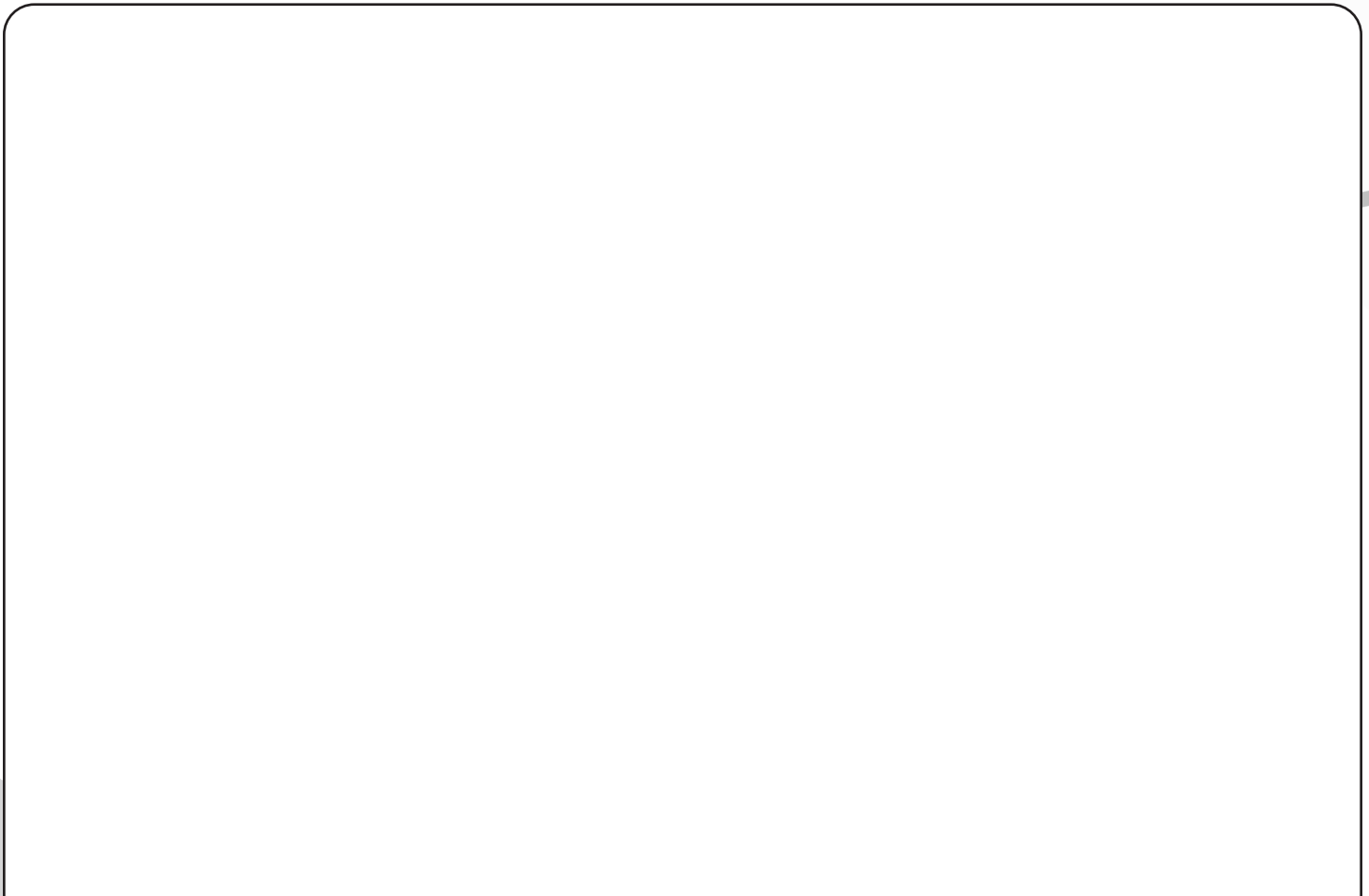
..... / 12.50 AP each
If an animal’s diet is, then it needs

for example:
LIGHT COLOR COATS / 12.50 AP
If an animal lives in the desert habitat, then it needs a light colored coat to stay cool!

Your adaptations are examples of “**conditional statements**”. A conditional statement uses a word like “if” to tell a computer to do an action only IF something is true. If the thing is true, then the computer will do an action. Else if the statement is not true, the computer will do something else.



In the space below, draw and color your animal. Be sure to include its adaptations and its habitat in your drawing (How does it fit in to its habitat? What sorts of things does it need nearby?)



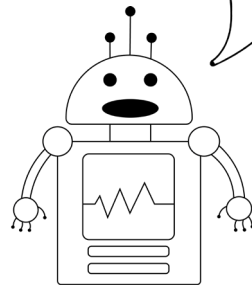
HABITAT:

DIET:

ADAPTATIONS:

Homemade Music

Did you know that your favourite musicians use coding to make their songs? The music we listen to follows a sequence - when the drums come in, when each note is played, or when each word is sung, this is all planned out in songwriting. You can think of a written song as a **“program”** that tells everyone in the band when to do what. When something is out of order or is not following the artist’s code, they recognize an error. In coding this error that the artist is recognizing would be considered a **“bug”** in their song or code.



Making musical instruments can be easier than you think. In this activity, we will explore a few different instruments we can make using household items. Try out a few or gather the people near you and start a band!

MEGAPHONE (let’s start with an easy one)



PAN-FLUTE



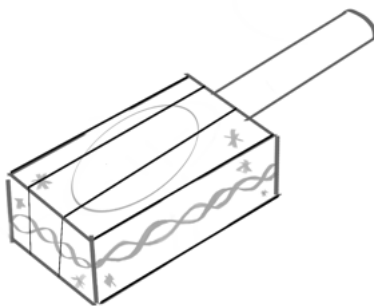
MATERIALS

- Six plastic straws
- Tape

DIRECTIONS

1. Ask an adult to help you cut the end of each straw, so each straw is about 5 centimeters shorter than the last
2. Lie the straws flat against a table, from smallest to tallest
3. Use a piece of tape to attach the straws together and then flip it over and do the same to the other side of the flute

TISSUE BOX GUITAR



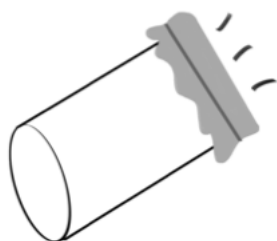
MATERIALS

- Empty tissue box (any small box from your recycling bin will work)
- Empty paper towel roll
- 2 rubber bands
- Tape

DIRECTIONS

1. Ask an adult to cut the plastic out of the tissue box
2. Place the paper towel roll onto one of the small ends of the tissue box and trace a circle
3. Cut the circle out of the box
4. Insert the empty paper towel roll into the hole and tape
5. Add a rubber band onto each side of the neck of your guitar
6. Decorate and rock your socks off!

KAZOO



MATERIALS

- Half a piece of card stock OR an empty toilet paper roll
- One elastic band
- A small sheet of wax paper
- Tape
- Hole puncher or scissors

DIRECTIONS

1. Decorate your card stock or toilet paper roll
2. If you are using the card stock, use a piece of tape and secure it into a roll shape
3. Use the hole punch and put a hole about a third of the way down the tube
4. Put the piece of wax paper over the end of your tube closer to the hole and attach the elastic band
5. Hum into the open end and make some music!

RAINMAKER



MATERIALS

- Empty paper towel roll
- One cup uncooked rice (you could use beans or even small stones)
- Tape
- Card stock paper

DIRECTIONS

1. Decorate the empty paper towel roll
2. Cover one end of the paper towel roll with card stock and secure with tape
3. Pour the rice into the open end of the tube
4. Cover the open end with card stock and secure with tape
5. Tilt the rainmaker slowly from side to side to hear the rain.

Create a Fossil

Fossils are formed when parts of plants or animals get preserved in the earth. Fossils are very important for helping us identify animals or plants from the past, and for understanding our planet's history. In this activity, you have the choice to make a trace or mold fossil. A **trace fossil** is something left behind by a living thing, like footprints, nests or tooth marks. A **mold fossil** is an imprint of the animal or plant that was left in the ground.

- 1 Find an object you would like to use for your fossil. This could be a small toy you have, or a cool leaf or rock you find on the ground. (If you are using a leaf, make sure not to pick it off of a tree!)
- 2 In one bowl, mix the salt, flour, water and oil with a spoon. Once the dough starts to form, use your hands to mix it more. It should feel like cookie dough or play dough.

3 Roll the dough into a ball.

4 Flatten out the ball with the palm of your hand, to about the thickness of a finger.

5 **If you are using a toy:** Make a trace fossil or a mold fossil! Use its feet to make footprints in the dough, or press the body halfway into the dough and then remove it.

If you are using a leaf: Make a mold fossil! Press the leaf into the dough using your palm for the best result, then pull the leaf out of the dough.

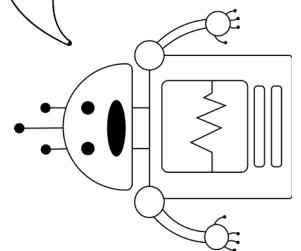
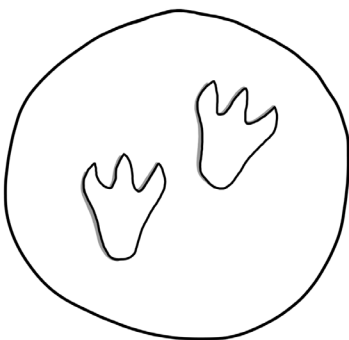
For any other thin object, use your palm. For harder objects, press it in using your fingers.

6 Leave the dough to dry for a few days, until it is hard. Congrats! You just made a fossil!

MATERIALS

- 1 tbsp salt
- 2 tbsp flour
- 3/4 tsp water
- 1/4 tsp oil
- An item to "fossilize"

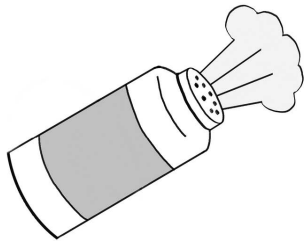
Coding challenge: Follow the instructions again, but this time pretend you are a robot following an **algorithm**. Try to rewrite the steps in a way that a robot would understand! Think of being more specific and straight to the point. Ask someone to listen to your coding instructions and to be as literal as possible. If you have a lot of trouble getting them to follow the instructions, write them out again!



Rocks and Minerals in Everyday Life

There are so many products we see or use in everyday life that are made of rocks or minerals.

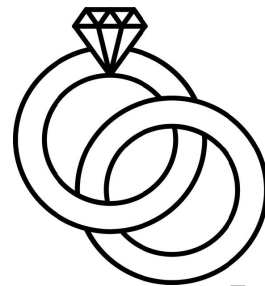
Can you identify which items are made from rocks or minerals and which are not?
Draw a line through the items that are not made with rocks or minerals.
Can you also figure out the missing letters to complete the word?



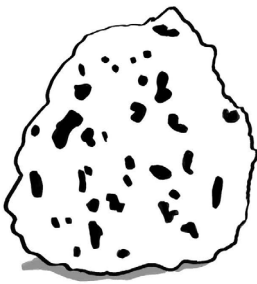
T _ l _



Cl _ t _



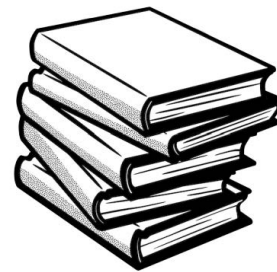
D _ _ m _ n d



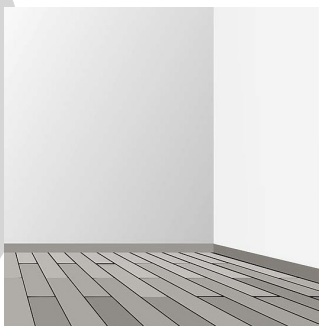
P u m i _ e S _ o n _



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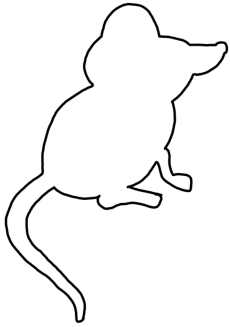


P l _ s _ _ c

Prairie Food Web (page 1 of 2)

Food webs help to visually explain the connections between organisms in their habitat. The diagram on the next page is an example of a food web. The arrows represent an exchange of energy. Energy gets transferred from the sun, to producers, to each animal that consumes another. Overall, the energy flows from prey to predator.

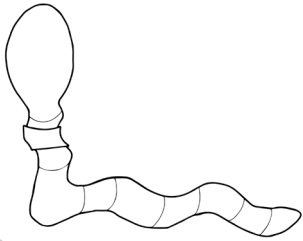
Using the information given below, figure out which of the following animals go into each box on the next page.



Grasshopper is a herbivore who only eats plants, like grass. Grasshoppers have to watch out for predators like birds, beetles, and mice!

Mouse is an omnivore and munches on things like seeds, grass, worms, and fruit. A mouse should beware of snakes, birds, and coyotes, which all might want to eat it up!

Rabbit is a herbivore who nibbles on plants like grass, leaves, and twigs. Rabbits can be dinner for animals like large birds and coyotes.



Worm is an omnivore who feasts on dead plant and animal material. Worms can be gobbled up by birds and mice.

Coyote is a carnivore who snacks on small animals like rabbits, and some larger animals too. Coyotes are lucky because there aren't many animals in the prairie food chain that eat them!

Prairie Chicken is an omnivore who pecks at insects, grains, and weeds. Chickens are delicious food for large birds and coyotes.



Bison is a herbivore who is happy eating grasses. Bison are also tasty to animals like coyotes.

Grass isn't even an animal, but it needs food too! Grass gets its food from the energy of the sun. Grass feeds animals like bison, mice, and rabbits.

DEFINITIONS

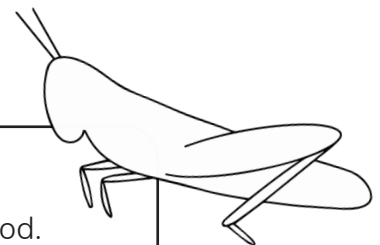
PRODUCERS: Organisms that use the sun's energy to make their own food.

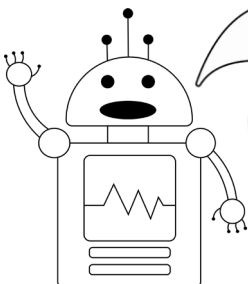
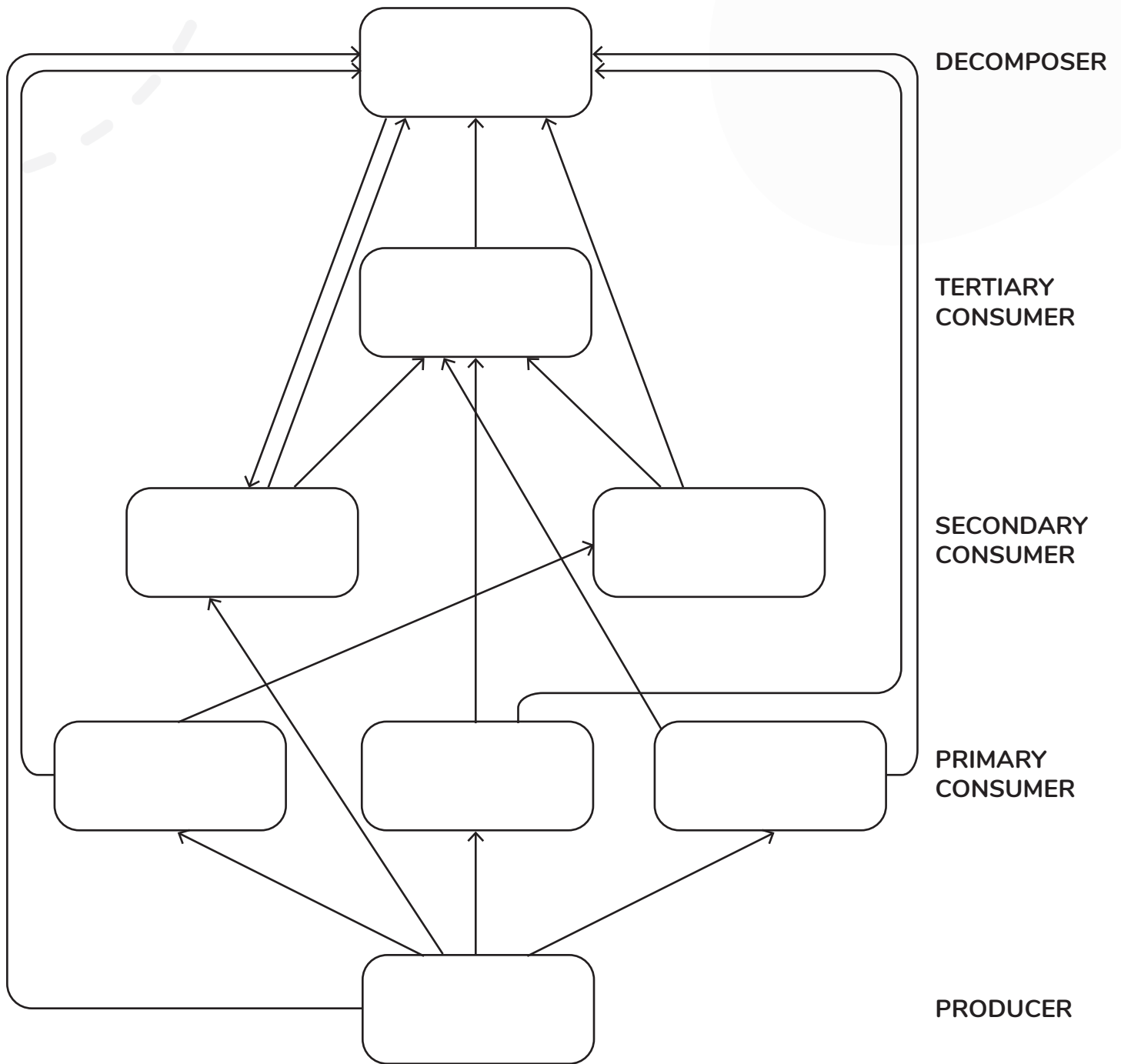
PRIMARY CONSUMERS: Organisms that eat producers for energy.

SECONDARY CONSUMERS: Organisms that eat primary consumers for energy.

TERTIARY CONSUMERS: Organisms that eat secondary consumers for energy.

DECOMPOSERS: Organisms that feed on dead organisms or waste.





This food web is like a **“program”** of how energy is transferred in a habitat. To complete the program, you are making use of **variables**. A variable is like an empty box with a label. Your job is to fill the box with something that fits the label! In our activity, you can think of words like “decomposer” or “primary consumer” as the labels, and things like “worm” or “chicken” as the specific instances of that variable (the things you put inside the box).

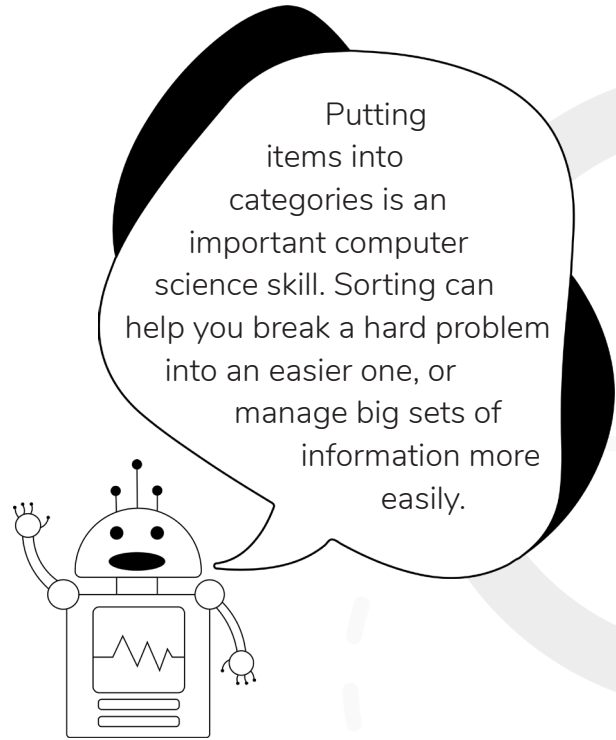
Habitat Hunt

Search for the items below in YOUR habitat / community, then sort each item into categories depending on whether you think it is human-made or not!

BONUS:

Take pictures of the 5 coolest items on the list and email them to wise@kidneticenergy.ca to win a special prize!

- Prickly pine cone
- Lamppost
- Bright red fire hydrant
- Maple leaf
- Birch tree
- Piece of litter
- Stinky garbage can
- Busy bus stop
- Park bench
- Basketball court
- Pine tree
- Body of water
- Fence
- Cedar bush
- Chirping robin
- Recycling bin
- Sweet smelling flower
- Funny street name
- Stop sign
- Unique rock
- Speedy car
- LOUD truck
- Tall tree
- Very small tree
- Swings
- Green grass
- Soccer field 200x the size of you



NATURAL

HUMAN-MADE

Answer Keys

3 - Opacity Unscramble

OPAQUE

	Book
	Cardboard Box
	Tree

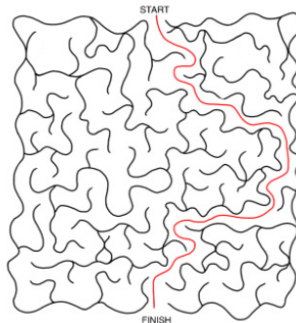
TRANSLUCENT

	Toilet Paper
	T-shirt (thin cloth)
	Sunglasses

TRANSPARENT

	Magnifying Glass
	Hourglass
	Glass

7 - Wave Maze



6 - Bison Binary

1	<input type="radio"/>	0	<input checked="" type="radio"/>
	<input type="radio"/>		<input checked="" type="radio"/>
	<input type="radio"/>		<input checked="" type="radio"/>
	<input checked="" type="radio"/>		<input type="radio"/>
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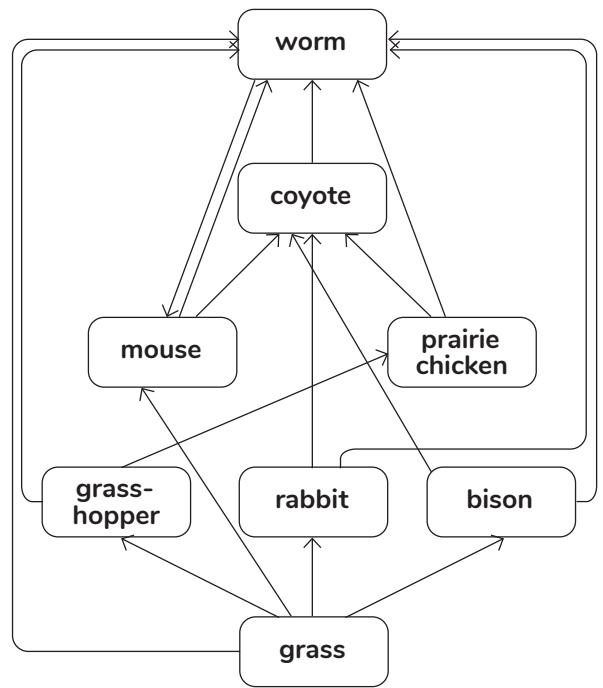
8 - Seeing Sound

- 4 Hip hop
- 1 Techno
- 6 Folk
- 3 Pop
- 7 Rock
- 5 Jazz
- 2 Classical

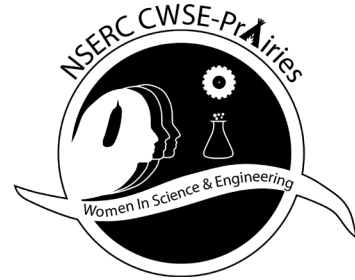
15 - Everyday Rocks & Minerals

Talc	Cloth	Diamond
Pumice Stone	Clay	Paper
Gypsum	Chalk	Plastic

17 - Prairie Food Web



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