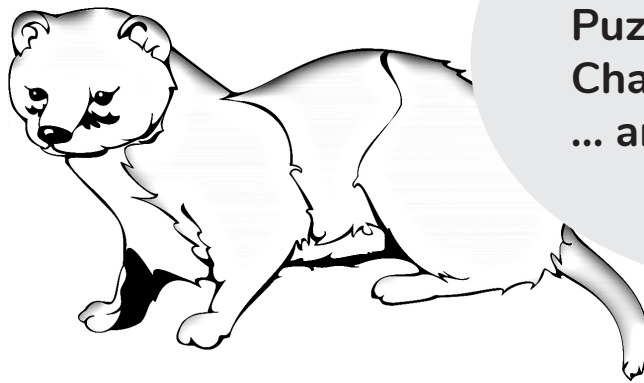


WISE Activity Booklets

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

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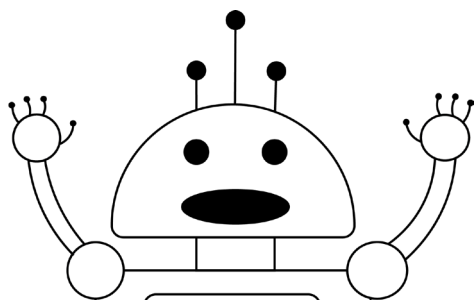
Youth · STEM · Innovation

With funding from

Canada

Grade 4 VOLUME 5 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 next 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.

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!

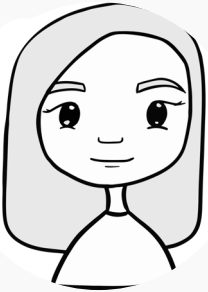
Huda

Huda is in her second 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!



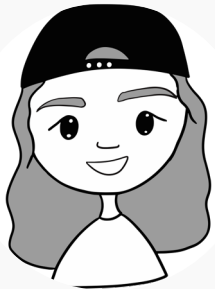
Sophia

Sophia is in her third year of science and plans to pursue a career in optometry. She loves math and biology, and in her free time loves reading, watching movies and trying new foods!



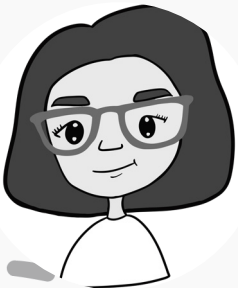
Toni

Toni is a graduate of the Faculty of Social Work at the University of Manitoba. She loves learning new things! In her spare time you can find her reading, painting or spending time with dogs.



Victoria

Victoria just finished her first year as a Science student at the University of Manitoba and is starting her second year in the Faculty of Nursing. She loves to cook, read and take care of plants in her free time!



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!

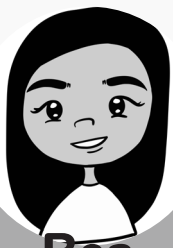


... and our Incredible Editors!

Alex



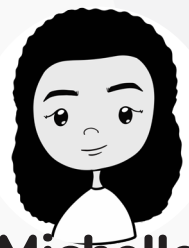
Bea



Mahalia

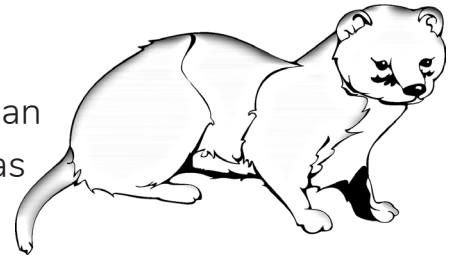


Michelle



Walley the Weasel

Walley the weasel needs a lot of food to survive! Can you help Walley go through this maze and collect as many meals as possible?



Here are some things that Walley eats:

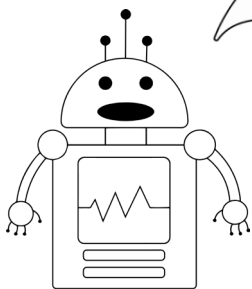
- Rats
- Mice
- Rabbits
- Frogs
- Birds
- Bird eggs



When you help Walley catch his meal, write down where his energy is coming from. Remember that Walley gets energy from his prey, but also from what his prey was eating.

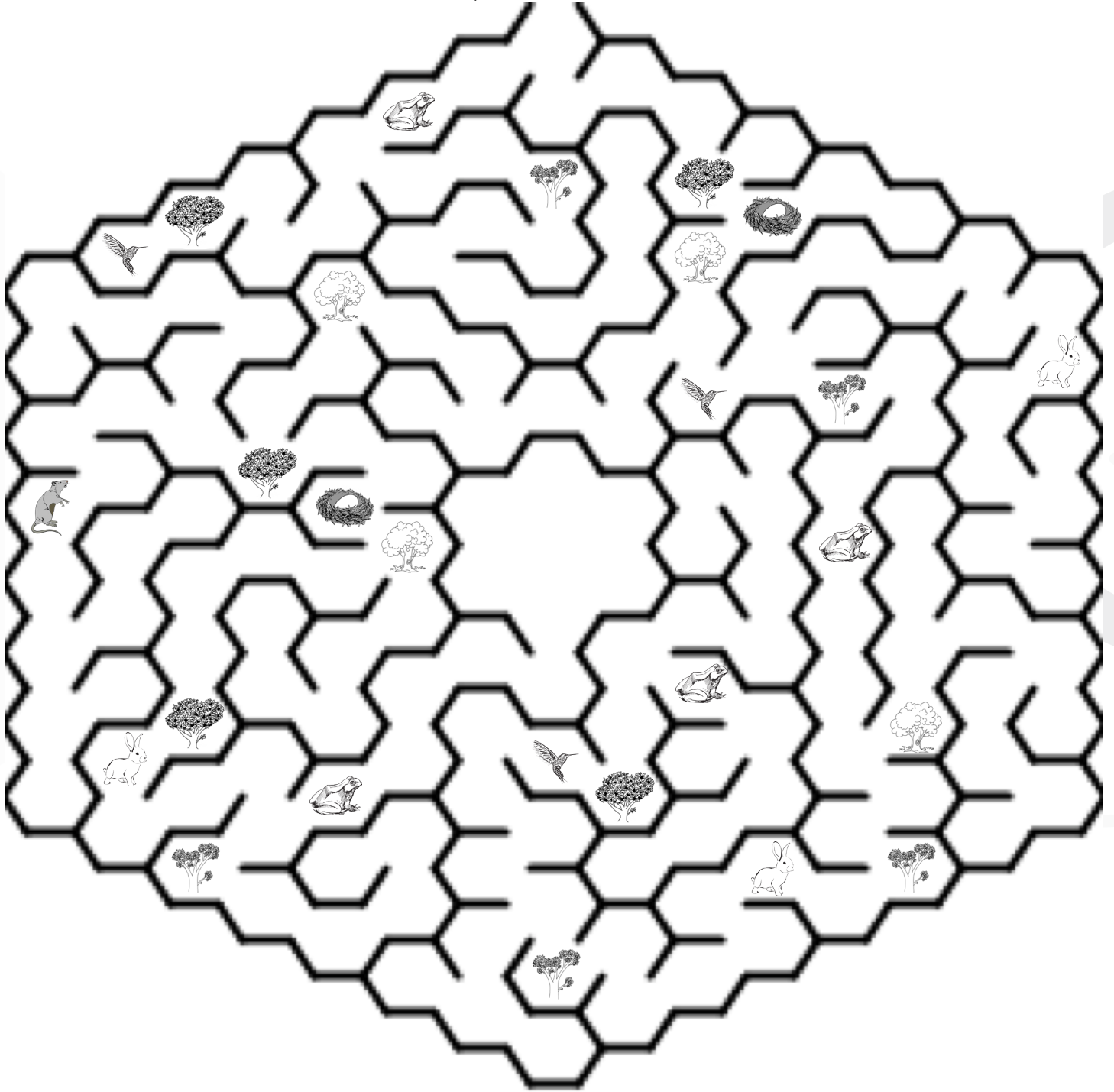
For example, if Walley eats a rabbit, he gets energy from **the rabbit**, **the plants** that rabbit was eating, and **the sun** that grew the plants.

As you go through the maze to end at the centre, you may have to go through different plants to get to Walley's food. This is because different animals use the plants around them to hide from predators. Keep track of all the plants that you go through, you'll need them for the next activity!



When you think about eating in order to get energy, we can compare that to inputs and outputs that are common in computers! An input is an action that leads to an output. In people and animals, the input would be to eat and the output is the energy you get from eating.

Can you guess what the input and output for a computer is when it comes to energy?



How many meals did you help Walley collect? Use the boxes on the next page to write out where Walley is getting his energy from each meal.

How many plants did Walley's path go through? _____

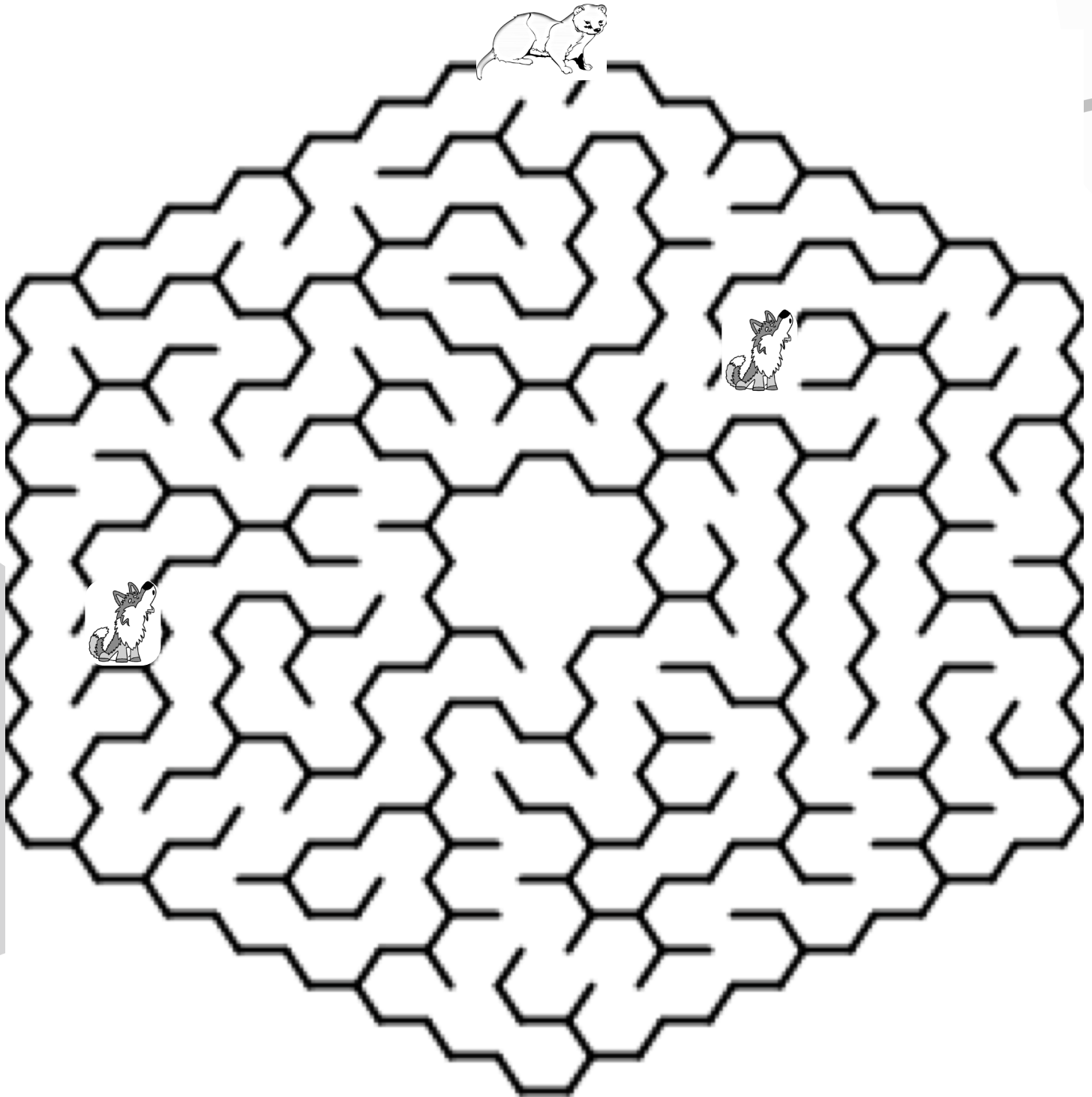
This activity continues on the next page!

Type of animal: _____ Energy comes from: _____ _____ _____	Type of animal: _____ Energy comes from: _____ _____ _____
Type of animal: _____ Energy comes from: _____ _____ _____	Type of animal: _____ Energy comes from: _____ _____ _____
Type of animal: _____ Energy comes from: _____ _____ _____	Type of animal: _____ Energy comes from: _____ _____ _____
Type of animal: _____ Energy comes from: _____ _____ _____	Type of animal: _____ Energy comes from: _____ _____ _____
Type of animal: _____ Energy comes from: _____ _____ _____	Type of animal: _____ Energy comes from: _____ _____ _____

Uh oh! Walley the weasel is running from two wolves. Using the plants that you collected in your maze on page 5, you can use them to block any paths the wolves might use to get get to Walley on Page 7!

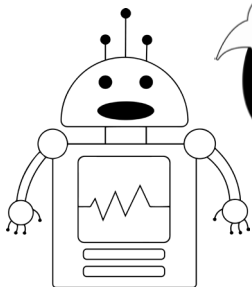
This activity continues on the next page!

Hint: Start by finding the most direct path that Walley can take to the centre of the maze. Then, trace the paths that the wolves need to get to the centre of the maze, or to the line you drew for Walley. Block off any of those paths using a plant. Wolves can't go through plants. If you don't have many plants to use, you can go back and do the first maze again.



Great work! You slowed the wolves down and helped Walley get to safety.

Lights in the Theater



By completing this activity, you can practice decomposition and binary!

You are at the famous Light Lights and More Lights store in Manitoba searching for the perfect lights to put in the brand-new theatre you built for the city. The store clerk mentions that the LED lights don't heat up very much.

Can you pick out the best lights to use in each scenario using binary? 1 is for a light you would use, and 0 is for a light you would not use!

1

You really want to grab people's attention for the light outside the theatre. It doesn't matter if the light gets really hot because nobody will get too close to touch it. Which light would you pick?

Neon lights

Flashlights

Ring lights

2

You want a light to light up the stage, but not one that gets too hot, or the actors will overheat. Which light would you pick?

Lanterns

LED overhead fixtures

Moonlight

3

The play you're putting on needs a lot of scene changes, so you want a reliable light that will let you switch between backdrops without overheating. Which light would you pick?

Lamps

Laser projector

Light blubs

4

The actors will need to wear costumes and makeup. They'll need a bright high-quality light that will let them see details but nothing that will get too hot because they're nearby it. Which light would you pick?

Ring lights

Light bulbs

Fairy lights

5

The actors always complain that it's too cold backstage and you want a way to keep them warm but without adding too much light to the room which can affect the makeup lighting needed. Which light would you pick?

Furnace

Fireplace

Electric heater

6

You want to light up the pathway so that the audience can find their seats, but you don't want anything that might get too hot or too bright because you want the theatre to remain somewhat dark. Which light would you pick?

Candles

LED light strips

LED overhead fixtures

Light Energy Log

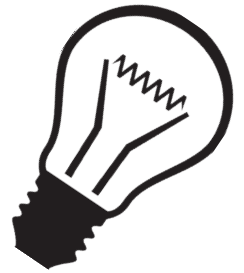
Have you ever wondered why humans are able to move? Why we can see light, feel heat, and hear music? A big reason why we are able to do so many things is **energy!**

Energy is the ability to do **work**. Whenever something moves, it **works** to make a specific type of energy. This means that heat from a fire, light from a light bulb, and music from an instrument are all forms of energy because their particles are moving to create what we see, hear and feel.

Types of Energy

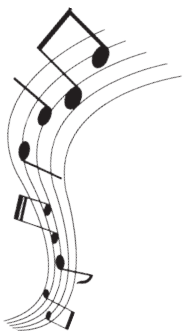
Here are a few different types of energy that people use often.

Light energy: Light energy is a type of **electromagnetic radiation**. Light travels in waves, and is the only type of energy people can see.



Heat energy: This is also called **thermal energy**. This is created when particles move very quickly, and give off lots of heat.

Food energy: This type of energy is found in food is called **chemical energy**.



Sound energy: Sound energy is also called **sonic energy**. Sound happens when an object vibrates quickly enough to make noise. The noise from an object travels through the air in waves, reaching our ears. This is how we are able to hear sound!

This activity continues on the next page!

SLO: 4-2-02, 4-2-03, 4-3-02

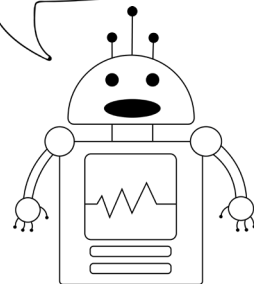
Can you track your daily energy usage?

Make a mark in the energy column each time you notice yourself using or experiencing that type of energy. Don't worry about keeping perfect track of your day. Write whenever you remember!

Type of energy	Times energy was used
Light energy	
Heat energy	
Food energy	
Sound energy	

Which type of energy did you use most often? Write down and draw the different activities that you did while using or experiencing energy on Page 12. Pick up to three examples for each type of energy.

Noticing things and recording them is sometimes called gathering data. Data is super important in computer science because lots of computer programs are made based on information people get from data.



Light	Heat	Food	Sound
Activity: _____	Activity: _____	Activity: _____	Activity: _____
Activity: _____	Activity: _____	Activity: _____	Activity: _____
Activity: _____	Activity: _____	Activity: _____	Activity: _____

Do you think there are even more types of energy? What activities did you do that use another type of energy that you don't think is listed on pages 10 and 11?

The History of Sound

We are used to having music all around us, but a long time ago that wasn't super common. Music players are something we have taken for granted. Read through the information below and order the pictures on Page 14 on our music timeline.

In 1877, the Cylinder Phonograph was created. The music was carved into a cylinder that was put into the machine. The cylinder would turn inside and the make the music through a flared horn.

In the 1880s some improvements were made, and it was reintroduced as the gramophone. It looked similar but now instead of cylinders, it used flat disks to play music.

In the 1940s, gramophones again were changed to become what we now know as record players, eventually using vinyl records.

8-tracks came along in the early 60's. They were very similar to cassette tapes, but with more stereo tracks inside (4 instead of 2). They were double the size.

Later, cassette tapes became more popular. They had two miniature spools inside, and were able to be played in car radios, boom boxes, and more!

Compact Disks, or CDs can hold up to an hour and twenty minutes of media, and soon dominated the music industry. Round and thin, they were more compact than a cassette.

MP3 players introduced a new, portable, digital way to listen to music. They were small and compact, able to connect to a computer, or take along with you.

Now, we use streaming services and are able to listen to music on our computers, phones, and tablets!

How do computers produce sound? Later in the timeline, music energy is magnetic, and then electric instead of mechanical. In a computer, sound waves are sent through a digital to analog converter, and then through an analog speaker.

Phonograph

Gramophone

Record

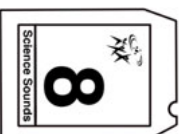
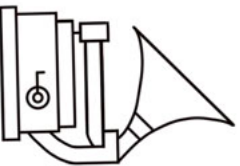
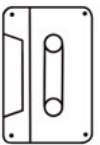
8-Track

Cassette Tape

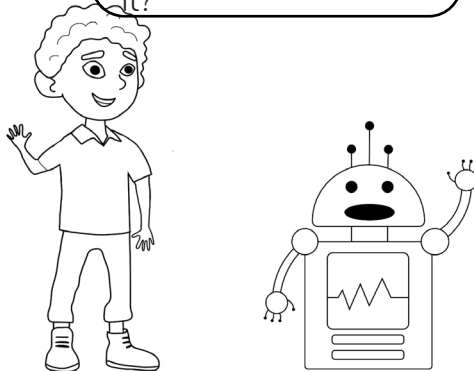
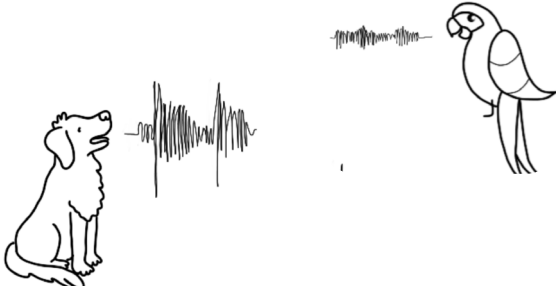
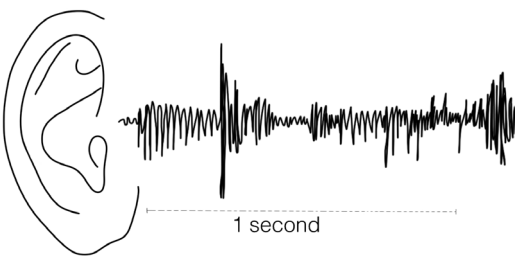
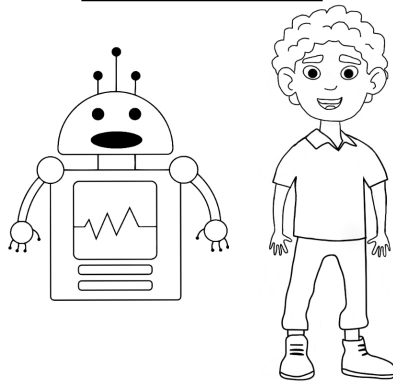
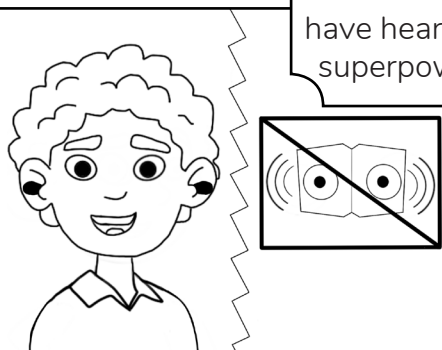
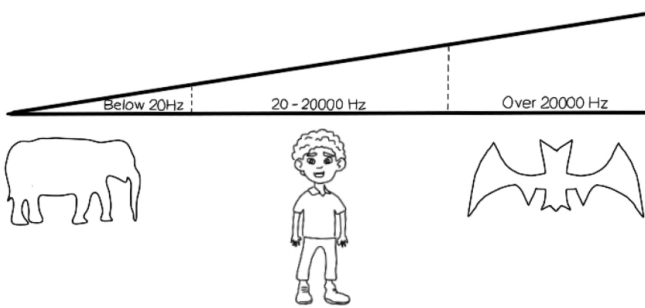
CD

MP3

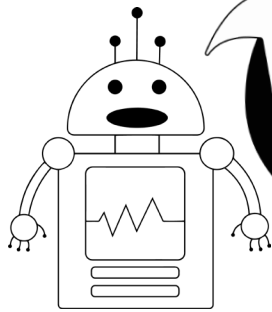
Streaming



Frequencies Comic

<p>Hey there Esiw! I learned this really cool thing at school today. Do you want to hear about it?</p>  <p>Yes please, I love learning! Remember to explain it to me in coding terms so I can understand it better.</p>	<p>Sound is invisible, so we can't see it. But we can hear it! Sounds make waves that have their own frequencies, which makes every sound unique! When we hear a sound, it's stored in our brains as data.</p> 
<p>A sound is made when an object vibrates. The frequency of a sound is the number of vibrations that object makes per second. Frequency is measured in Hertz. This means that 1 Hertz = 1 vibration per second.</p> 	<p>That's super cool! Can humans hear everything?!</p> <p>Humans can only hear 20-20 000 Hertz, and our hearing gets worse as we get older. That's why I have to speak really loudly to my grandparents.</p> 
<p>We need to protect our ears because we can damage them easily. When I go to concerts with my parents, I wear earplugs. I also don't listen to music at really loud volumes.</p> <p>Do humans have hearing superpowers?</p> 	<p>Not really, but some animals do! Infrasonds are frequencies that are too low for humans to hear. Ultrasounds are frequencies that are too high for humans to hear. Bats use ultrasounds to navigate!</p> 

Sounds in the Neighbourhood



By completing this activity, you would have practiced search algorithms. This is similar to what a computer would do when it's told to search for something in a pool of items!

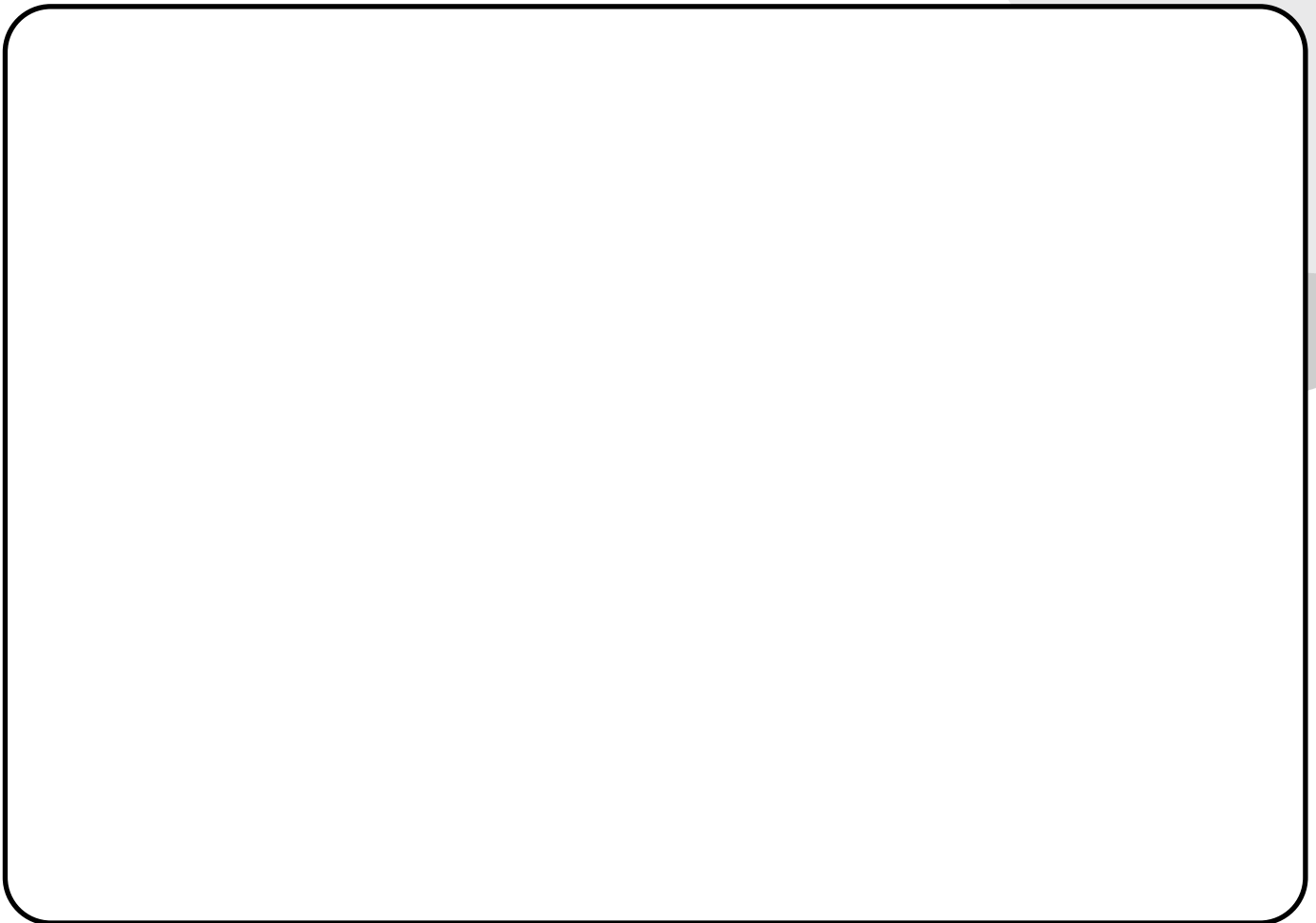
We always hear a lot of sounds in the neighbourhoods we live in, and some of them can contribute to sound pollution in our homes and communities. Can you help Esiw identify some of the bad sounds in the neighbourhood below?



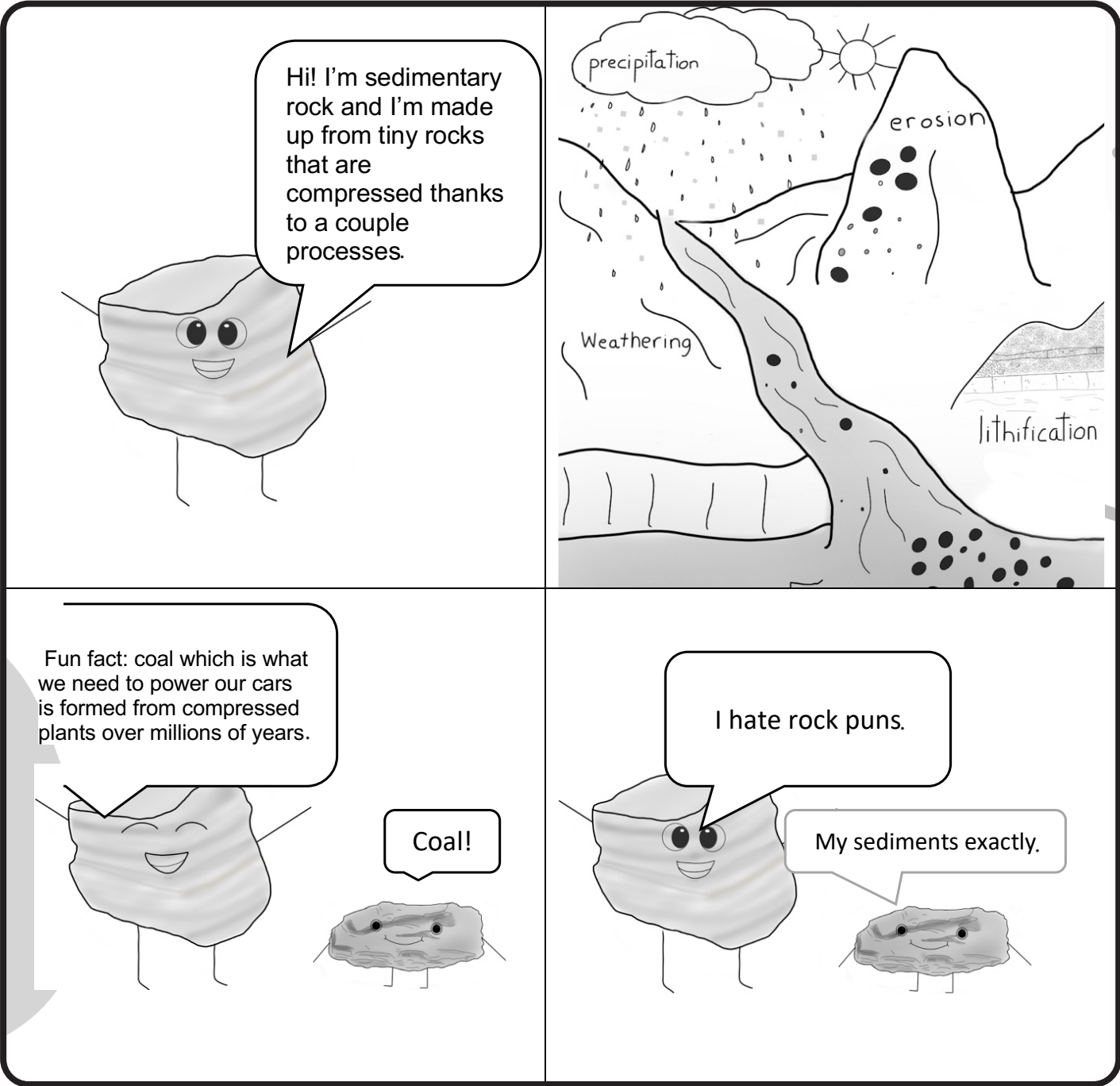
List the sound pollution you can identify in the picture on Page 16. Why would these sounds be considered “pollution”? Write your thoughts in the space below.



Now, think of some sounds you hear in your neighbourhood that you like to hear! These could be like your neighbours playing the guitar, or your dog at home barking. Draw them into the space below!



Meet the Sedimentary Rocks

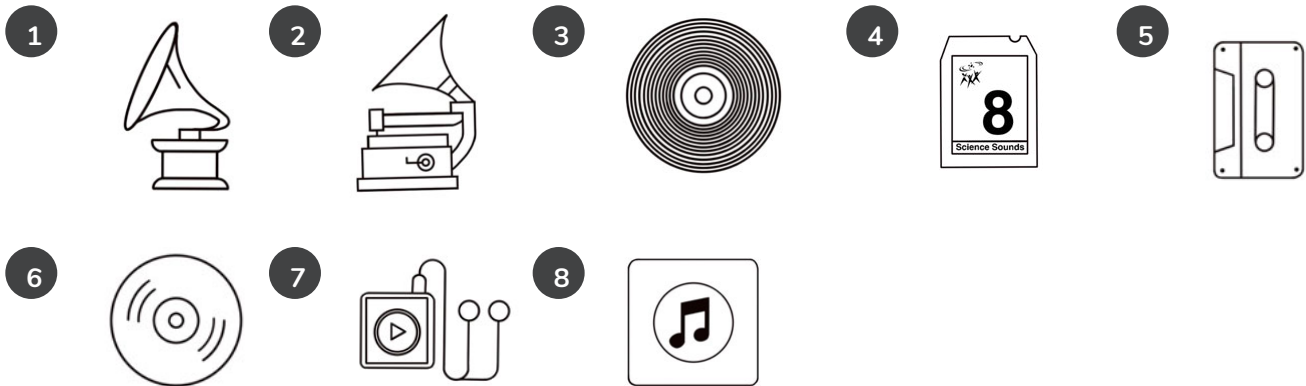


Answer Keys

8-9 - Lights in the Theatre

- 1-Neon Lights, 0-Flashlights, 0-Ring lights.
- 0-Lanterns, 1-LED overhead fixtures, 0-Moonlight.
- 0-Lamps, 0-Light bulbs, 1-Laser projector.
- 1-Ring lights, 1-Light bulbs, 0-Fairy lights.
- 0-Furnance, 0-Fireplace, 1-Electric heater.
- 0-Candles, 1-LED light strips, 1-LED overhead fixtures.

14 - The History of Sound

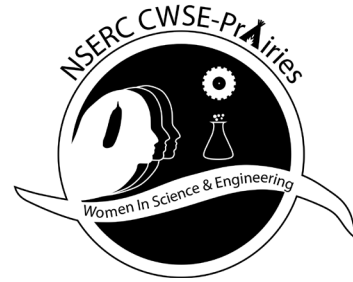


16 - Sound in the Neighbourhood

Suggested answers for sound pollution:

Airplane, construction, jack hammer, stereo, leaf blower, driving car.

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