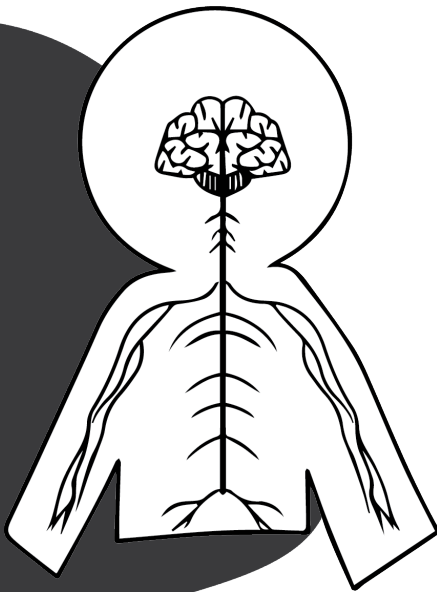


# WISE Activity Booklets

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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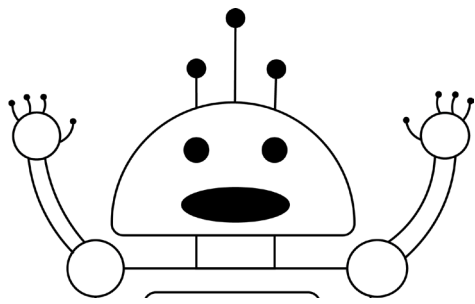
Youth · STEM · Innovation

With funding from

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## Grade 5 VOLUME 5 2020

Forces & Simple Machines - Maintaining a Healthy  
Body - Changing Substances - Weather



# 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.

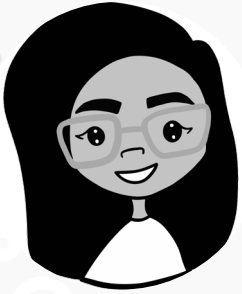
We hope that you enjoy doing the experiments and activities as much as we loved creating them for you.

In this Grade 5 booklet the science topics you will be exploring are: forces and simple machines, maintaining a healthy body, properties of and changes in substances and weather!

**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!

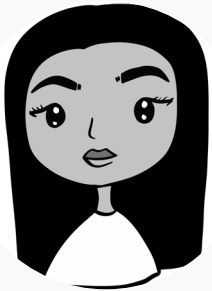
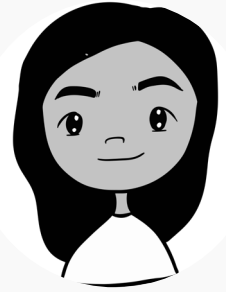


### Alora

**Alora** is in her sixth year of studying Neuroscience and French at the University of Winnipeg. Next year she's hoping to continue her education in order to become a high school science teacher and eventually, a guidance counsellor! In her spare time she enjoys spending time with friends, being outside, and reading.

### Gagan

**Gagan** is a fourth-year BSc Honours Student in the Department of Psychology. She enjoys being creative and loves to learn! In her free time, she likes to try new things, read, and grow plants.

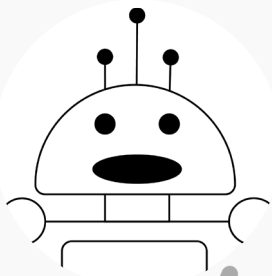
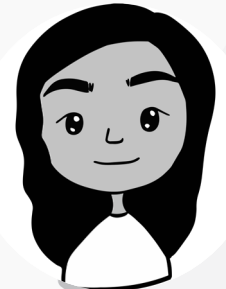


### Habiba

**Habiba** is a second year computer engineering student. In her free time, Habiba loves to learn about everything computer and internet related, but in her free time she likes to draw, go outside as well as cook.

### Kajal

**Kajal** is in her second year of computer science. She likes to read and make new things! Her favourite fruit is mango.



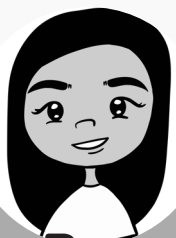
### Esiw the Robot

**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!



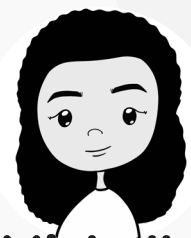
Alex



Bea



Mahalia

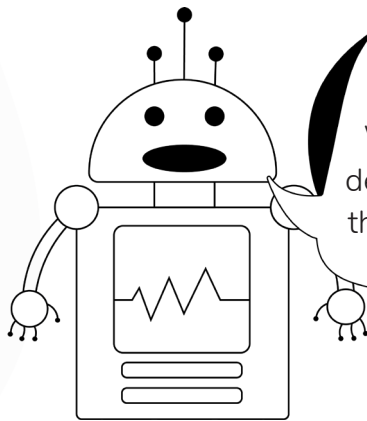


Michelle

## Human Body Systems Match-up

Did you know that our body is always working really hard to take care of us? There are **many** systems working together within our bodies that make sure things are running smoothly! From digesting our food, to transporting nutrients to every part of our body, or making sure we can simply stand up properly. All these systems work together at every moment of every day to make sure we stay healthy and happy!

What are all the different systems? How do they work? This activity will provide you with the information about the system, then a picture of the system. However, you are going to need to match the description of the body system with the picture! **Let's get started.**



**Did you know?** Sorting and sequencing are important skills to have to study computer science! We're going to be doing that today by matching descriptions to their proper system and then putting them in the correct order: **most internal to most external.**

### Time for the task!

- 1 Colour the body systems on Page 7 as desired! Feel free to get creative because when else could you have a purple liver?
- 2 Cut out the body systems and place them in order (I'll leave a hint somewhere in the drawing if you're having trouble with this step!). The most **internal** system is going to be on the **bottom** of the pile and the most **external** is going to be on the **top**.
- 3 Fill out any blanks in the description boxes!
- 4 Cut out the description boxes and match them with the body systems picture. Once you're certain of your matches, glue or tape them to the back of the body system pictures!
- 5 Now that everything has been matched and all the body systems are in order, attach the whole "body" to the space on Page 9.

This system helps the body break down food to use for energy in order for the body to grow and repair itself!

**Match the structure to the function below!**

Teeth 1.5 m long, any undigested materials pass through this tube and gets excreted from the body.

Saliva Relays food from the mouth to the stomach.

Tongue Tear and grind food into pieces small enough to swallow.

Esophagus At 6.5 m long (on average), most of the digestion takes place in this long tube.

Stomach Moves food to the back of the mouth.

Small Intestine Mixes and churns food while adding a strong acid to break the food down further.

Large Intestine Liquid that contains enzymes to break down food in the mouth.

This system works closely with the skeletal system in order for us to move, sit, or stand. It also helps us control internal organs. This system also includes ligaments which attach muscles to bones and tendons which connect bones together or hold organs in place!

**Can you name a muscle in your arm?** \_\_\_\_\_

**In your leg?** \_\_\_\_\_

One of these systems makes sure the body receives **oxygen** and makes sure we breathe out **carbon dioxide**. Includes the nose, trachea (windpipe), bronchi, lungs which contain small alveoli. *Bonus question:* We need oxygen and get rid of carbon dioxide; what living thing wants carbon dioxide and gets rid of oxygen?

The other system is like a huge transportation system that helps every system in the body by pumping blood through its vessels. Blood carries nutrients, oxygen, carbon dioxide, and white blood cells (which prevent infections!). What's the pump in this system?

This system includes the brain! And is responsible for controlling all the other systems of the body. It communicates what's going on in and around the body so the brain can react and make changes if needed. An **example** of this would be the brain telling the body to sweat when we get too hot!

This system is made of bones to provide our body with structure and protection for our internal organs.

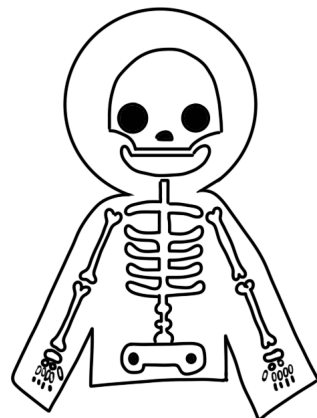
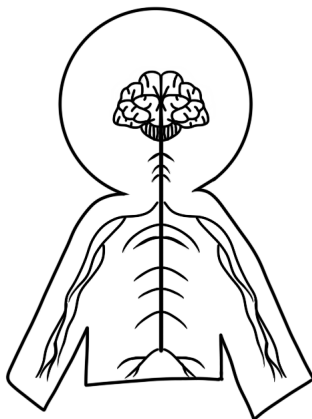
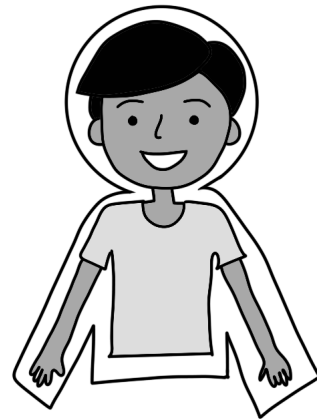
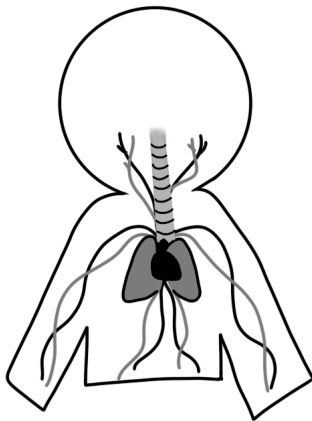
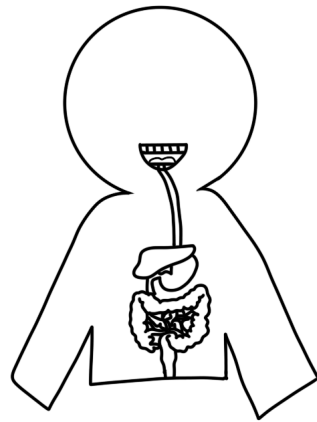
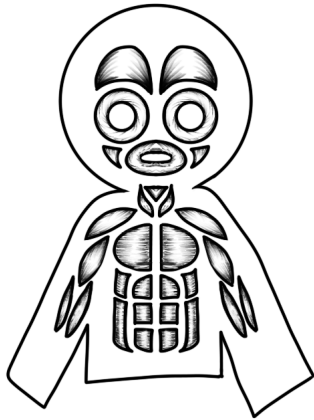
**Can you name any bones?**

**Fun fact!** The smallest bone in the human body is found in the ear.

This one is mainly responsible for preventing our internal body parts from drying up! It also protects us from bacteria, dirt, and the Sun's rays. It helps us control the internal temperature of our body and tells the body what's going on outside of the body!

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because the previous page is meant  
to be cut up.

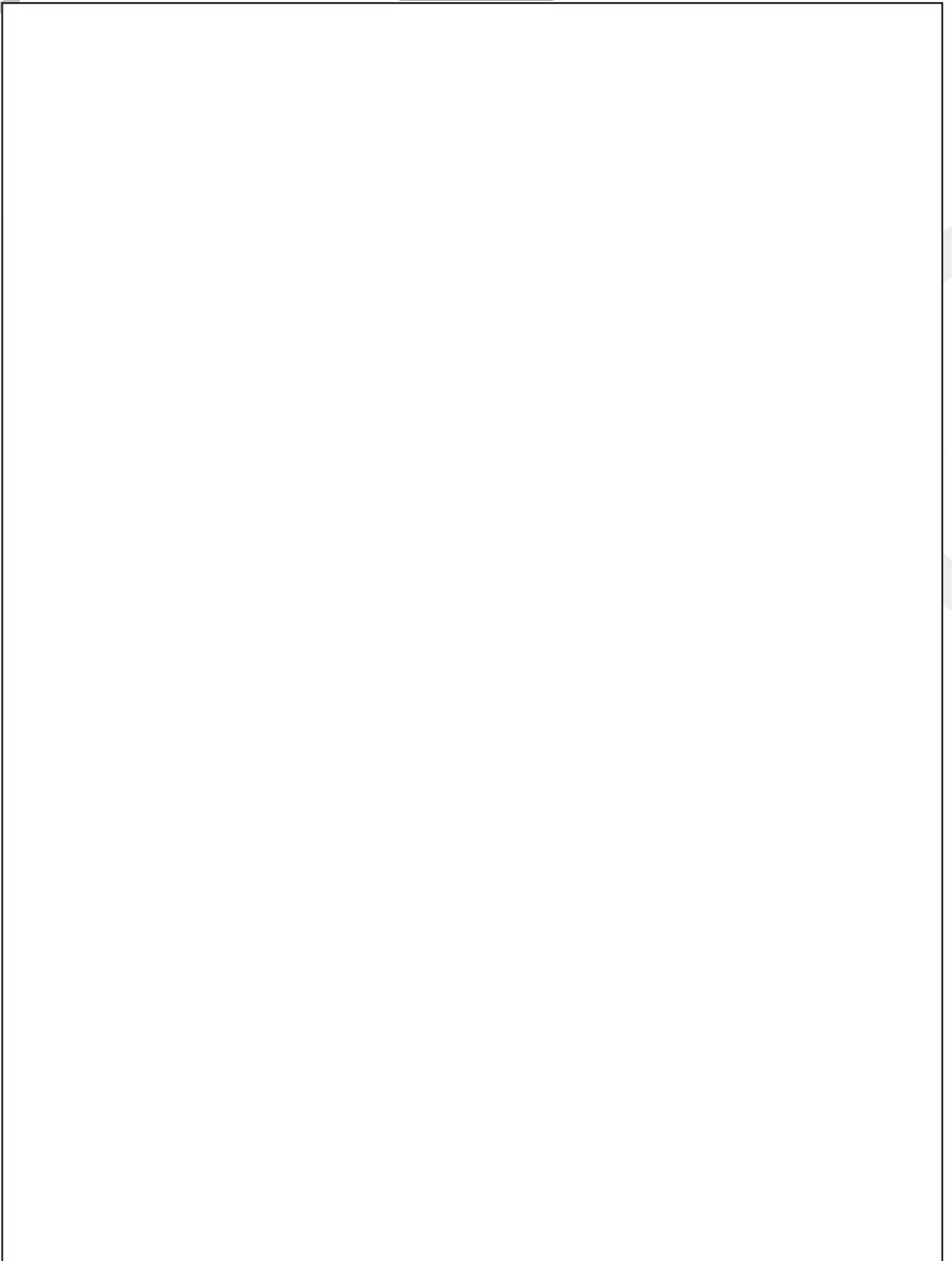
Colour these in and cut them out!



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



Final Product!



# Sum of the Parts Equal the Whole

Understanding that the weight of a whole object is equal to the sum of the weight of its parts, fill the following shopping bag with a select number of groceries. Make sure that the total weight of the bag (with groceries) matches the goal weight. In coding, we call this **Decomposition** - breaking down a system into its parts in order to better understand a computational problem.

Total Weight = 35 kg



Bag weight = 0.5 kg

Grocery List Items

Weight (kg)

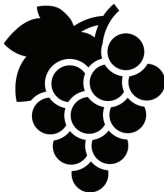
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____

\_\_\_\_\_ kg Total

## Groceries



5 kg



0.5 kg



0.5 kg



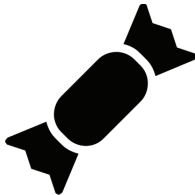
7 kg



3 kg



2 kg



0.2 kg



3 kg



12 kg



2 kg



0.7 kg



3 kg

## Let's Talk About Chemistry!

Have you ever wondered why cakes and other baked goods rise in the oven? Or why we can eat eggs that are cooked but not eggs that are raw? Also, how does our body absorb the nutrients from food that we eat? All of these questions can be explained by **chemistry**! Chemistry is the study of what things are made of and how they behave with the space around them.

An important part of chemistry is being able to tell the difference between a **chemical change** and a **physical change**.

A **chemical change** is when a substance (this can be just about anything!) goes through a change that makes a new substance that acts differently.

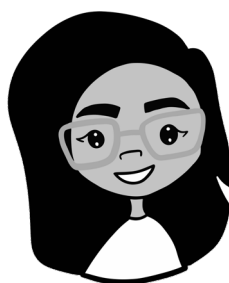
- A good example of this is burning a piece of paper. Once it is burnt (this is the change), you can't write on it or fold it like you could before because it has turned into ash.

A **physical change** is a change that doesn't change how the substance acts.

- Using paper as an example again, folding and cutting the paper may change the way it looks, but not the way it behaves! So even if we cut or fold the paper, we can still write on it.

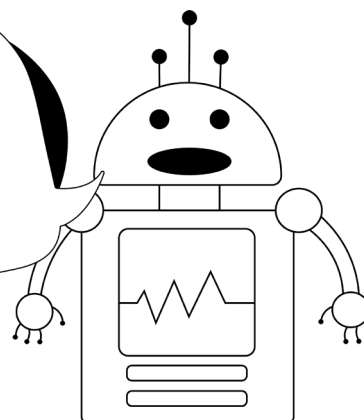
For this activity, we're actually going to combine chemistry with computer science for a **binary** activity.

**Binary** is the most basic computer language that allows humans to communicate with computers! It uses only two digits: **0** and **1**. This is used to represent power moving through a switch (**on**) or not moving through the switch (**off**).

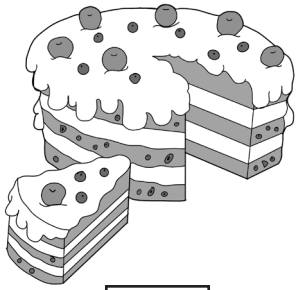


**Fun fact!** If you look at some sort of machine with an on and off switch, usually the 1 and 0 can be found on the switch to this day. It might just look more like and I and an O instead.

Can you help me out? I can only understand binary code so can you help sort the the changes on the next page into **physical change = 0** and **chemical change = 1** on the next page? Place the "1" or "0" in the box below each change.



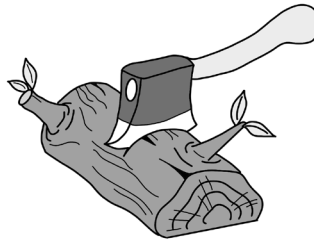
Cutting a cake



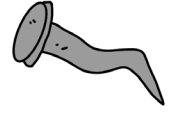
Picking an apple



Chopping wood



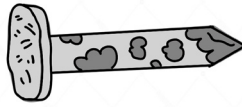
Bending a nail



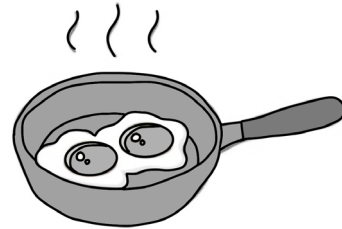
Cooking chicken



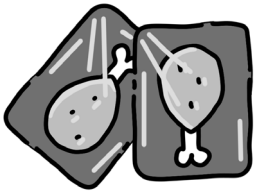
A nail rusting



Cooking eggs



Thawing chicken



Burning wood



Beating an egg



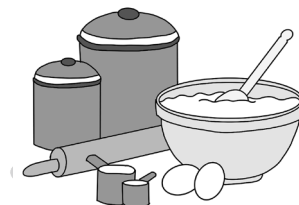
A rotting apple



Re-potting a plant



Baking a cake

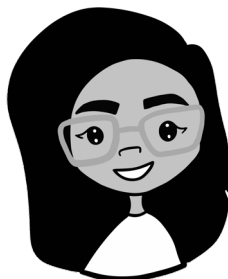
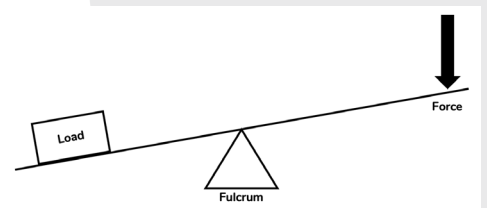


## I Spy a Simple Machine ...

How often do we use simple machines? The answer is: Everyday! A **simple machine** is a device used to change the direction or magnitude of a force, or where that force is applied. This happens so that the force can be used to do the work to complete a task.

There are actually **6 types** of simple machines:

- Incline plane -> this is a tool that helps to move objects from high ground to low ground or low ground to high ground with less effort than simply lifting the object.
- Wedge -> similar to an inclined plane, it's a block of material flat on the bottom, thin at one end and thick at the other.
- Lever -> consists of a rod (or other straight and ridged object like a board) balancing on a fixed point. Part of the rod is responsible for lifting a heavy object called the **load** and the point where the rod is fixed is called the **fulcrum**.
- Wheel and axle -> the axle is the rod going through the middle of the wheel in order for it to turn.
- Screw -> pretty much a nail with grooves in it! The thread of the groove is actually a continuous inclined plane wrapped around the shaft of the screw.
- Pulley -> Made of a wheel with a groove going all the way around the edge where a rope can be passed through. A pulley is responsible for changing the direction of the force we need to move the object. So instead of pulling up to pull something upwards, the pulley will change the direction of the force so we can pull down to hoist something up.

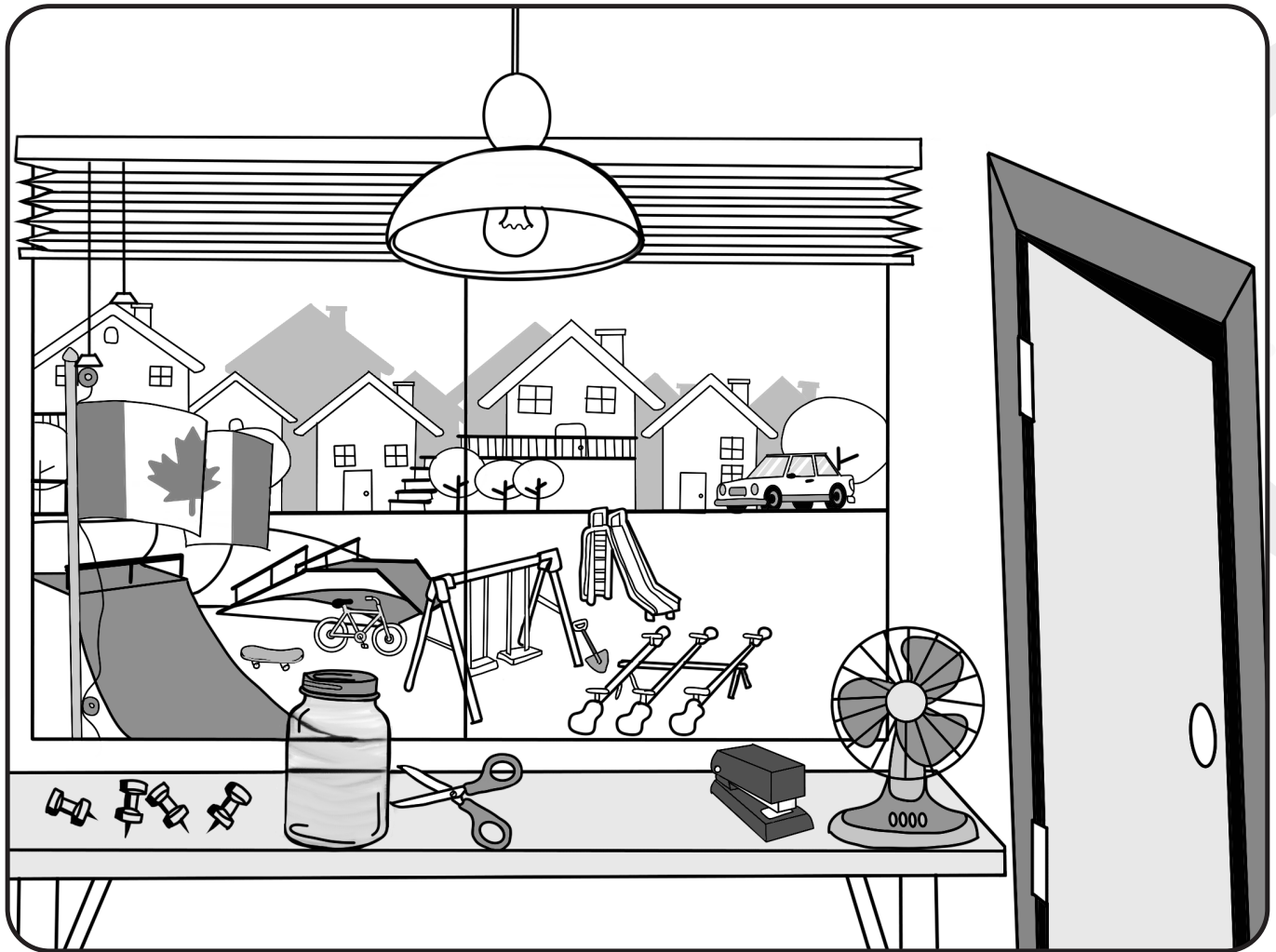


**Did you know?** Tools created using simple machines are a very important part of how humans got where we are today! Simple machines are the base of all complex machines.

We're surrounded by simple machines that we don't even think of all the time! Let's look for some in the picture on the next page (14).

In the picture below, I've hidden some simple machines and to be extra tricky, I've included some complex machines.

**Your challenge:** Find the simple machine and write its name under the correct simple machine category! If you find a complex machine, write its name under all the simple machine categories it includes. Example: A wheelbarrow would be written under the lever category and it moves using a wheel and axle.

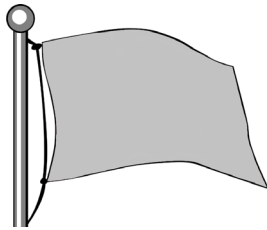


Inclined plane	Wedge	Lever	Wheel & Axle	Screw	Pulley
	Shovel	Shovel			

## System Preferences

Circle the simple machine (e.g., screw, wheel & axle, lever, pulley, inclined plane, and wedge) that best represents each of the following systems. Bonus: Find similar examples around your house and see if you can determine what kind of simple machine it is.

Flagpole



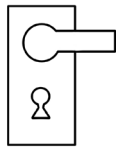
Screw	Wheel & Axle	Lever
Pulley	Inclined Plane	Wedge

Catapult



Screw	Wheel & Axle	Lever
Pulley	Inclined Plane	Wedge

Doorknob



Screw	Wheel & Axle	Lever
Pulley	Inclined Plane	Wedge

Ladder



Screw	Wheel & Axle	Lever
Pulley	Inclined Plane	Wedge

Axe



Screw	Wheel & Axle	Lever
Pulley	Inclined Plane	Wedge

Lightbulb



Screw	Wheel & Axle	Lever
Pulley	Inclined Plane	Wedge

## The Global Warming Algorithm

Complete the following code with "TRUE" or "FALSE" to complete the algorithm that determines the causes of global warming.

**Global Warming** = The increase of the Earth's average temperatures over time. This could cause a lot of harm to the planet and our environment.

**Fossil Fuels** = Natural fuels that burn to give off Carbon Dioxide, like the gas we use in our cars, or from burning coal.

**The Greenhouse Effect** = What happens when greenhouse gases such as Carbon Dioxide do not escape the Earth's atmosphere and end up trapping the heat, causing the Earth to heat up.



If humans use their cars less:  
Global warming will increase = \_\_\_\_\_

If humans reduce their meat intake:  
Global warming will decrease = \_\_\_\_\_

If humans increase their renewable energy usage:  
Global warming will decrease = \_\_\_\_\_

If humans recycled more:  
Global warming will increase = \_\_\_\_\_

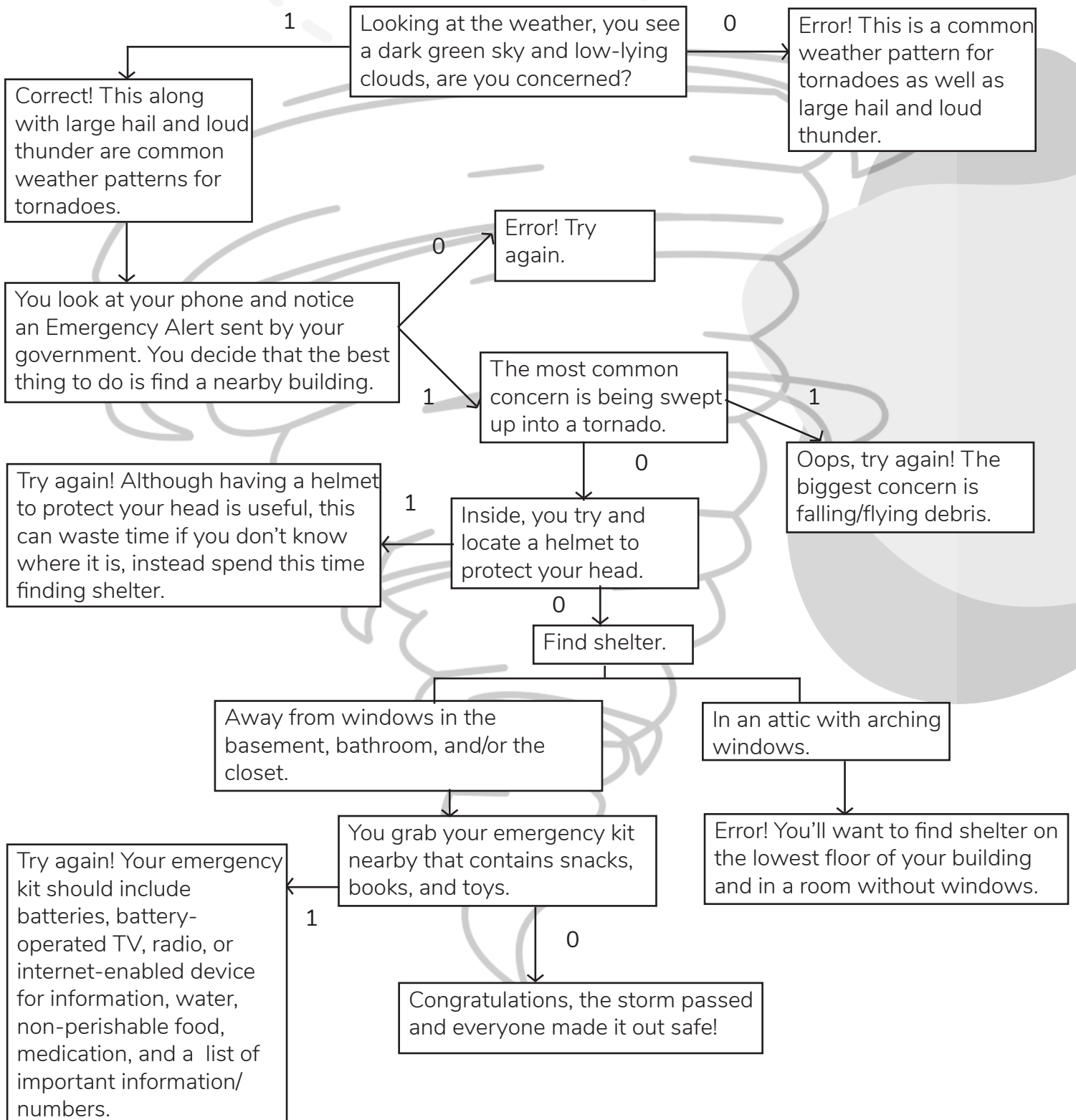
If humans used less plastic:  
Global warming will decrease = \_\_\_\_\_

If humans asked corporations to use less fuel:  
Global warming will increase = \_\_\_\_\_



## Mission to Safety

You're outside, and the weather changes dramatically. Not sure if you should be concerned, you try and recall the appropriate steps in case of a tornado. Using Boolean Algebra ~1~ is true or yes, and ~0~ is false or no. Follow the prompt below to try and determine the right steps.



# Measuring Weather

Can you make an instrument that can help you record the weather?

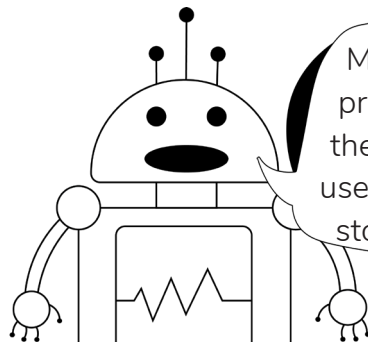
Name of instrument: \_\_\_\_\_

What it measures: \_\_\_\_\_

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Hours of sunlight	6	5	2	6	7	6	5

## Weather you can measure

- Amount of precipitation
- Wind speed
- Wind direction
- Cloud type
- Amount of sunlight
- Amount of snow
- Temperature
- Humidity

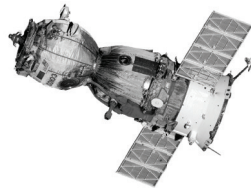


Meteorologists use modelling programs with satellites to predict the weather. The modelling programs use algorithms to predict where a storm will start and its path!



A rain gauge measures the amount of precipitation over a period of time.

## Examples of weather instruments:



Satellites take pictures of earth from space. Then meteorologists compile and analyze the data with the help of computers.



A wind sock tells us about wind directions and relative speed.

# Answer Keys

## Let's Talk About Chemistry (Pages 11-12)

0 = Cutting a cake, Picking an apple,  
Chopping wood, Bending  
a nail, Thawing chicken,  
Beating an egg, Re-potting a  
plant.  
1 = Cooking a chicken, A nail rusting,  
Cooking eggs, Burning wood,  
A rotting apple, Baking a  
cake.

## I Spy a Simple Machine ... (Pages 13-14)

Inclined plane - Stairs, slide, skate-  
board, ramps.  
Wedge - Scissors, pushpin, shovel.  
Lever - Shovel, bike, peddles, scissors,  
seesaw, stapler.  
Wheel & Axle - Fan, door hinge, bike  
wheels, skateboard, car  
wheels.  
Screw - Jar lid, lightbulb.  
Pulley - Flagpole, window shade, car  
engine, bike gear.

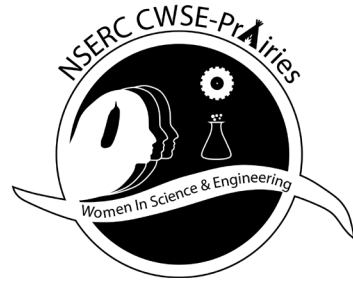
## System Preferences (Page 15)

Flagpole = Pulley  
Catapult = Lever  
Doorknob = Wheel & Axle  
Ladder = Lever  
Axe = Wedge  
Lightbulb = Screw

## The Global Warming Algorithm (Page 16)

False  
True  
True  
False  
True  
False

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