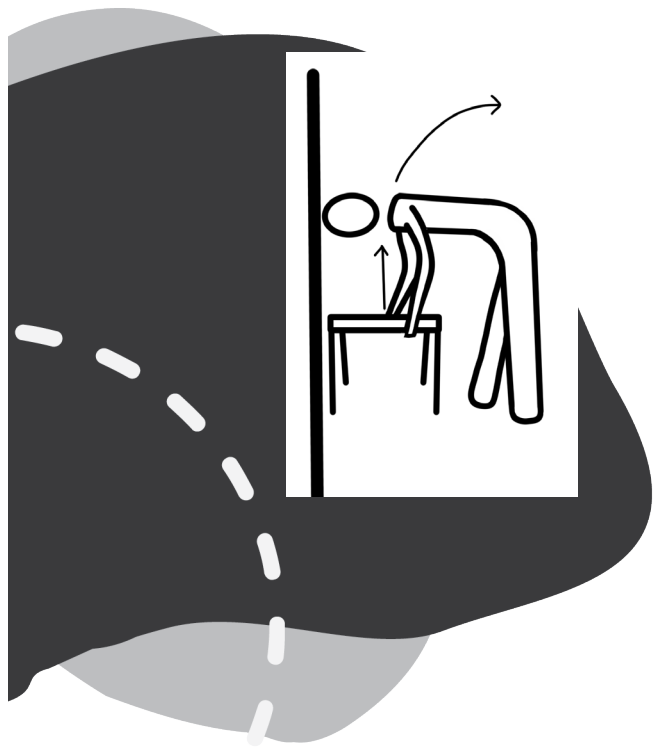


WISE Activity Booklets

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



DIY Activities
Puzzles
Challenges
... and more!

Mined Metals:
Thompson: Cu, Ni
Wabowden: Ni
Snow Lake: Au, Cu, Zn
Flin Flon: Cu, Zn
Bisset: Au
Bernic Lake: Cs



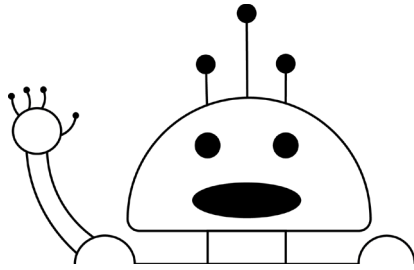
WISE Kid-Netic Energy is a proud member of Actua



With funding from
Canada

Grade 7 VOLUME 6

Interactions within the ecosystems - Forces and structures - Particle theory of matter - Earth's crust



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.

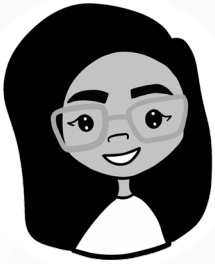
We hope that you enjoy doing the experiments and activities as much as we loved creating them for you.

In this Grade 7 booklet, the science topics you will be exploring are: interactions within the ecosystems, forces and structures, particle theory of matter, Earth's crust 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!

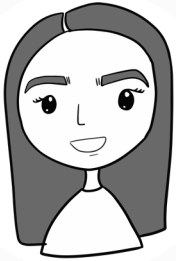
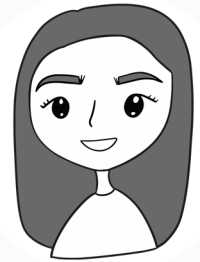


Alora

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.

Brandi

Brandi is in her second year of the Bachelor of Science program 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!

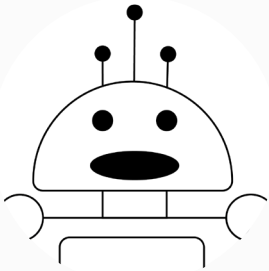
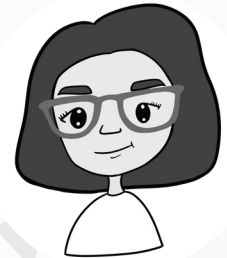


Shannon

Shannon is in her second year of Engineering at the University of Manitoba, with a plan to go into biomedical engineering. Her favourite animals are giraffes and dogs. In her spare time she enjoys drawing, exercising, being outdoors, and trying new things.

Victoria

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



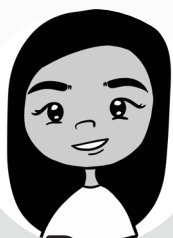
Esiw the Robot

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!



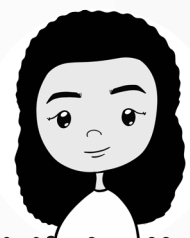
Alex



Bea



Mahalia

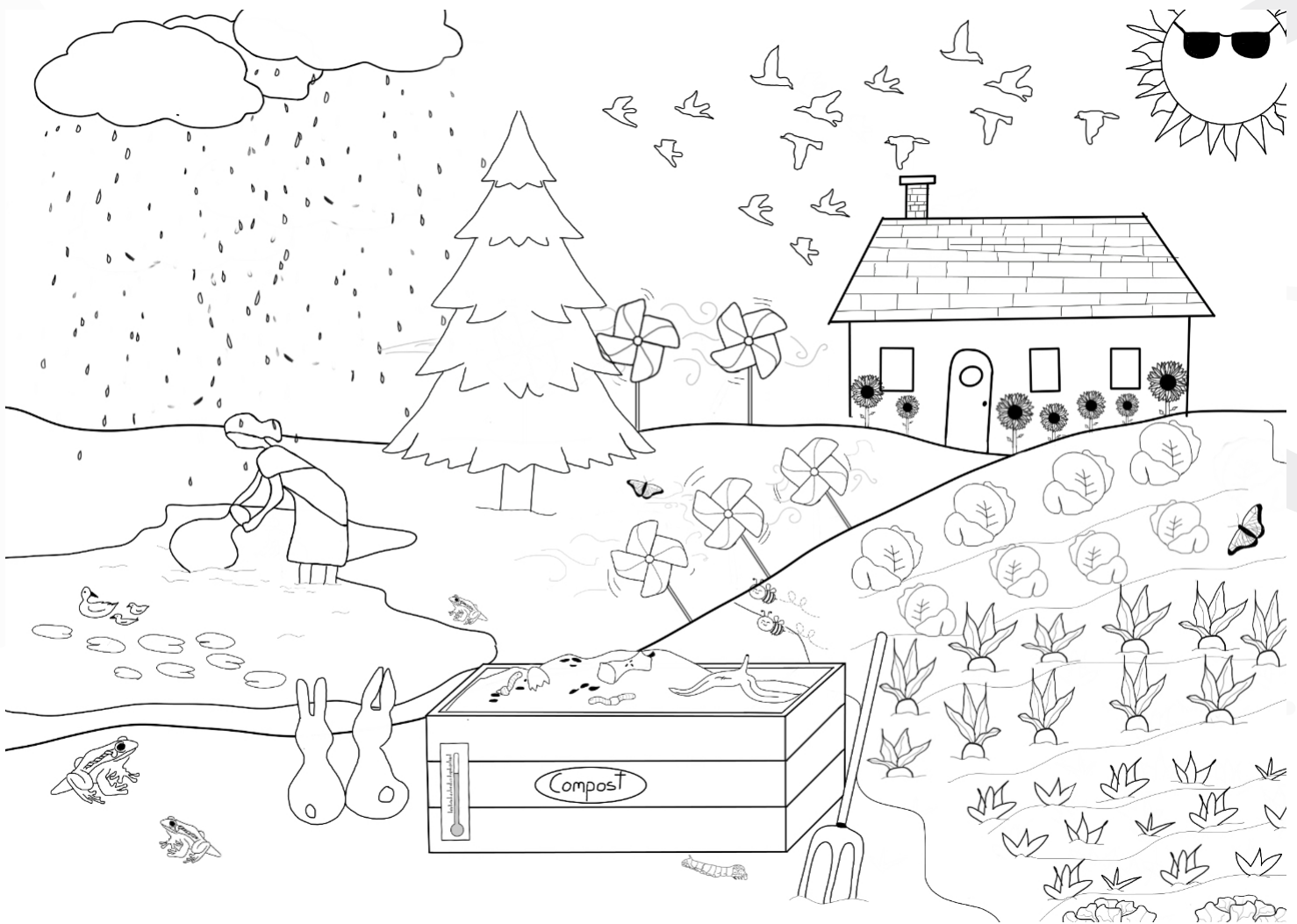


Michelle

Abiotic or Biotic?

Biotic and abiotic are very similar words, but they are opposites. That's what the prefix "a" does as it means "not". Biotic factors are the living organisms in an ecosystem. Abiotic factors are non-living components that are needed for growth, maintenance, and reproduction.

Colour this garden and circle and list 5 abiotic and 5 biotic factors!



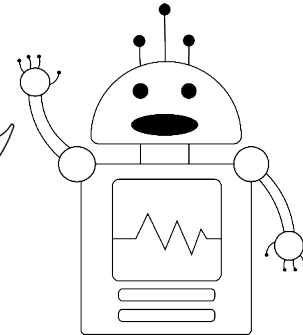
Abiotic Factors

Biotic Factors

Experimenting with Experiments

The main method of investigation in science is experimenting. An experiment is an investigation in which a hypothesis is scientifically tested. A scientific theory helps to explain an observation. This experiment has to be repeatedly tested and shown to be consistent before it becomes accepted in the scientific world. In order for your information to be credible, you must obtain the most accurate results possible. This can be done by measuring things, such as distance and time, and through repeating the experiment multiple times.

Before computers can solve a problem, the problem and the ways in which it can be fixed must be understood. Decomposition helps by breaking down complex problems into smaller, more manageable parts that are easier to understand. The smaller parts can then be examined and solved in order to resolve the problem.



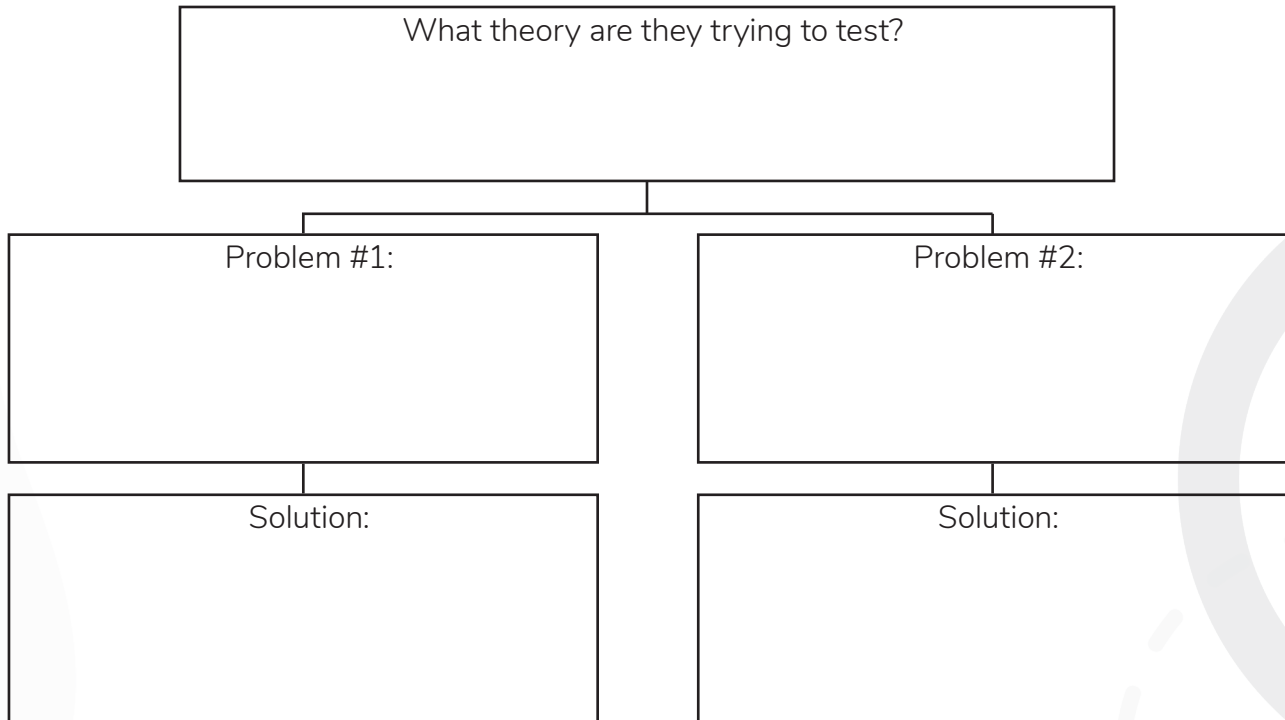
Scenario 1

A team of students are interested in testing Aristotle's hypothesis that the mass of an object determines how fast it falls. Students obtained two objects with different masses and different shapes; a ball and a textbook. They dropped them from exactly 2 meters above the ground. They only use their eyes to measure when the objects hit the ground. They perform their test one time.

What theory are they trying to test?		
Problem #1:	Problem #2:	Something they did right:
Solution:	Solution:	

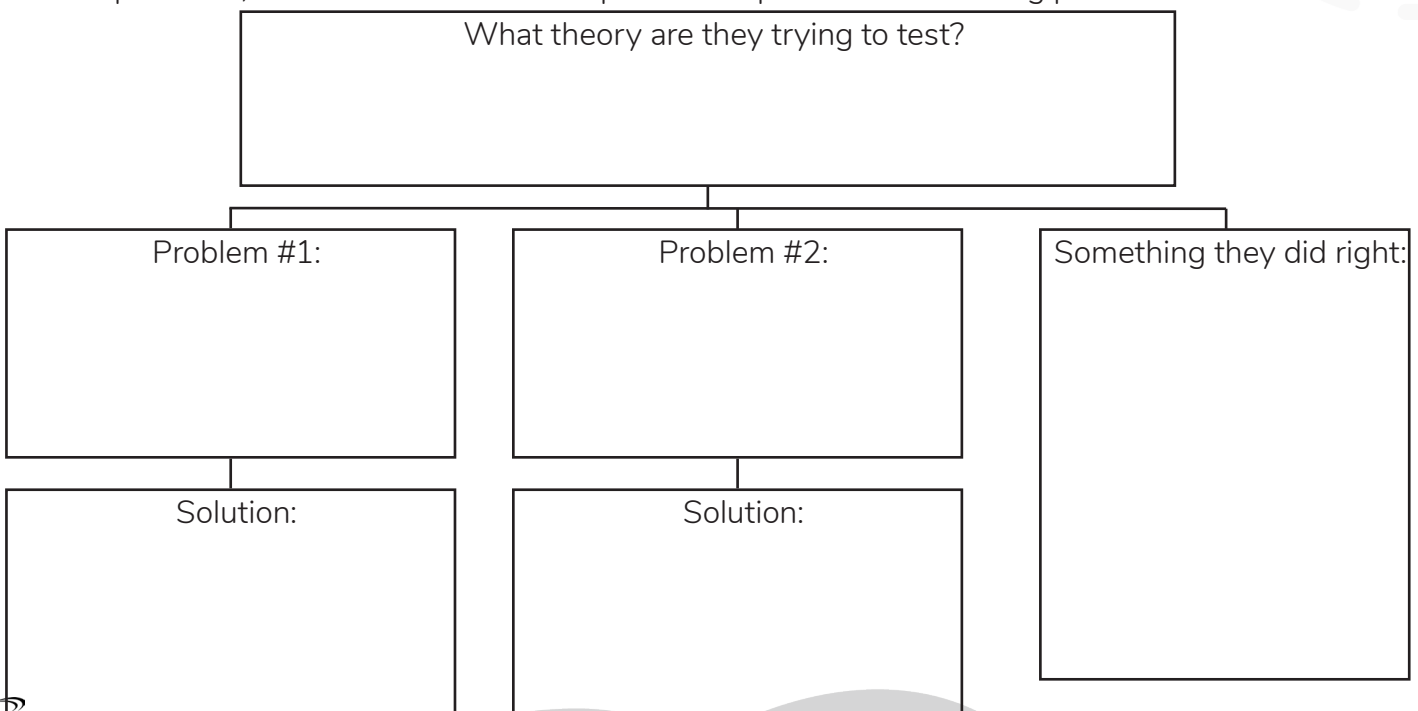
Scenario 2

A team of dermatologists are developing a face wash to treat acne. They quickly create the product and put it out on the market without testing it out first.



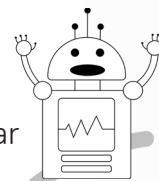
Scenario 3

Esiw is exploring cell theory and is trying to verify that all living things are made up of one or more cells. Esiw decides to look at samples under a microscope, however Esiw chooses only two living things - a plant and a dog - to use as test subjects. The experiment is repeated multiple times, however Esiw doesn't repeat the experiment over a long period of time.



Mixtures and Data Sets

In coding a **variable** is like a labeled box where you can have many different things inside of the same category. For example, a variable can be balls, and within the variable of balls we find blue, red, or green balls. A variable for a substance can be categorized if they are pure or impure. **Sorting** is putting things in different groups based off a certain characteristic. Now that you know so much about coding, let's teach Esiw about these mixtures.



Computers need to be given information in order to function. Often this data is stored in something called **data sets**, where the data is stored and organized as a collection of similar information.

Today Esiw will be learning about mixtures, solutions, substances, and mechanical mixtures as we sort them into data sets.

Substance is a material that has a particular composition, for example water. Water is made using H_2O .

Mechanical mixture: contains two or more substances, which are not chemically combined. They only have physical interactions. Think of oil and water, or trail mix! The components of a mixture can be separated using physical properties because they don't change, as an example, their boiling or melting point.

- The components of each mixture can be easily separated
- The components each keep their original properties
- The proportion of the components is variable
- Each component is visible

Solution: A solution is a uniform mixture of two or more substances. The solution is said to be saturated if the maximum amount of the solute is added to the solvent.

- Components don't settle at the bottom
- Uniform and evenly mixed
- Solid, liquid or gas

Purity Variable:

Pure substances have their own chemical property, and have a defined and constant composition. Like water or gold.

Impure substances have different components. An example can be a burger or a rock.

The "geneous" variable:

Homogeneous substances are uniform and individual components can't be identified. An example, sugar dissolved in water.

Heterogeneous substances are varied and you can clearly see its individual components. Impure substances are considered heterogeneous. An example, oil and water.

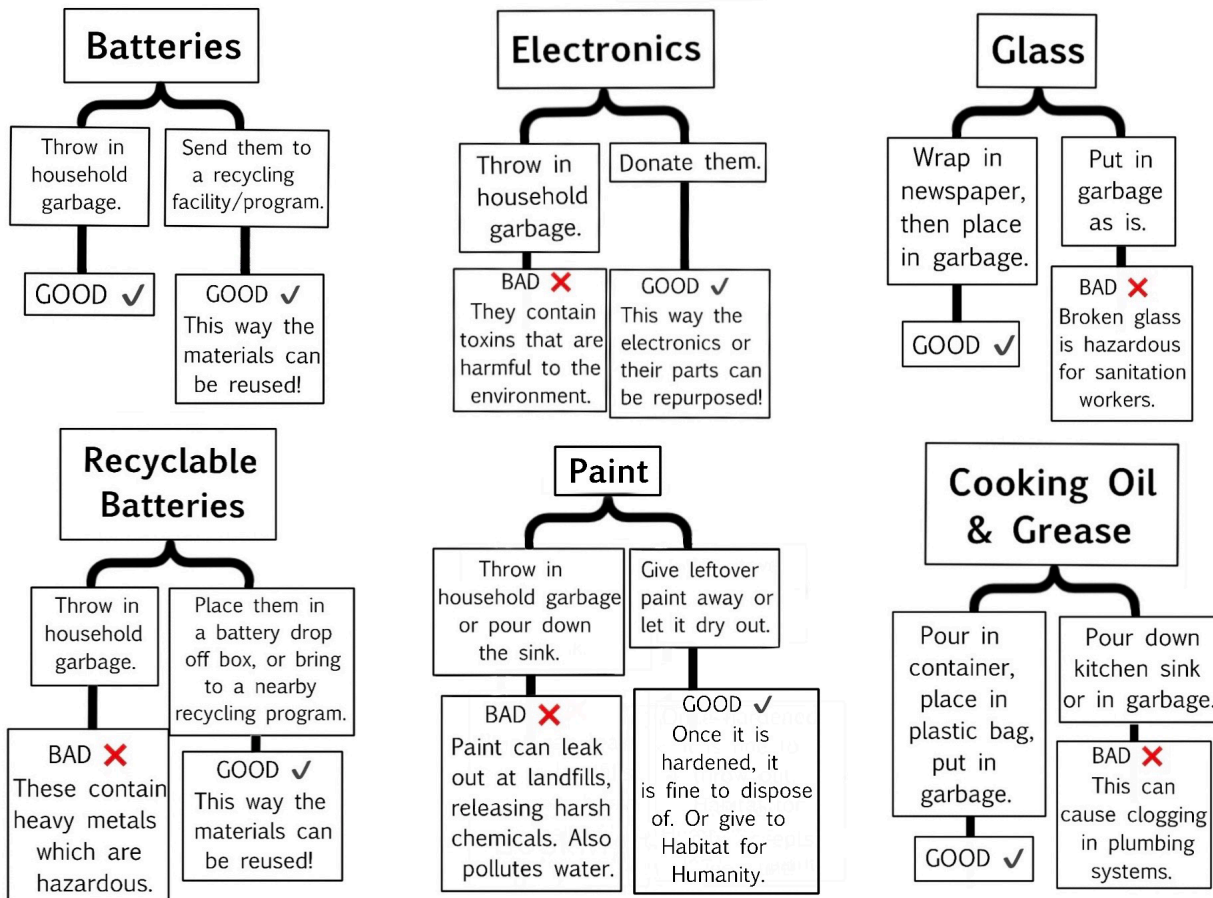
Use your logical reasoning and critical thinking skills to sort the examples below in the right variables. Determine if the following examples are chemical mixtures or solutions, and if they are heterogeneous or homogeneous. Explain why. Esiw will store this information into data sets!

	Mechanical Mixture	Solution	Heterogeneous	Homogeneous	Critical Thinking
Salt and water	X	✓	X	✓	It is a homogeneous solution because it has a uniform consistency and it does not settle, unless the solution is saturated (too much salt).
Trail mix					
Salt and pepper					
Sugar and water					
Orange juice and water					
Oil and water					
Soil and water					

	Mechanical Mixture	Solution	Heterogeneous	Homogeneous	Critical Thinking
Salt and water					
Trail mix					
Salt and pepper					
Sugar and water					
Salt and water					

The Path of Proper Disposal

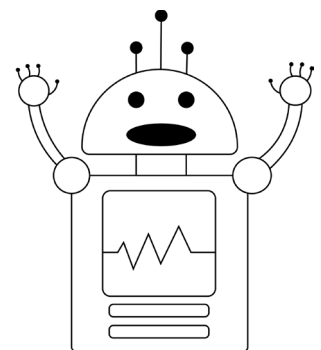
Do you know what types of waste can and cannot be tossed in the trash? You may not have realized that some of the items in your home require specialized disposal for safety reasons. Below is a chart highlighting a few of these items.



Regular batteries versus recyclable batteries: Regular batteries can only be used once then can be thrown away. Rechargeable batteries are made with materials that are able to be recharged and used multiple times (up to 2,000 times or more)!

On the next page, first identify the method of disposal you would select, then justify it in one sentence or more! Refer back to the chart above if needed.

Hi! Make sure to use your optimization skills to solve these problems. Optimization in computer science is picking the most concise and efficient way to solve a problem or complete a task. In these scenarios, try to come up with disposal methods that are not harmful to the environment, but also not too complicated.



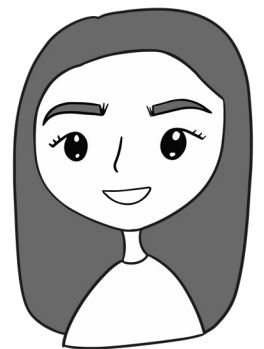
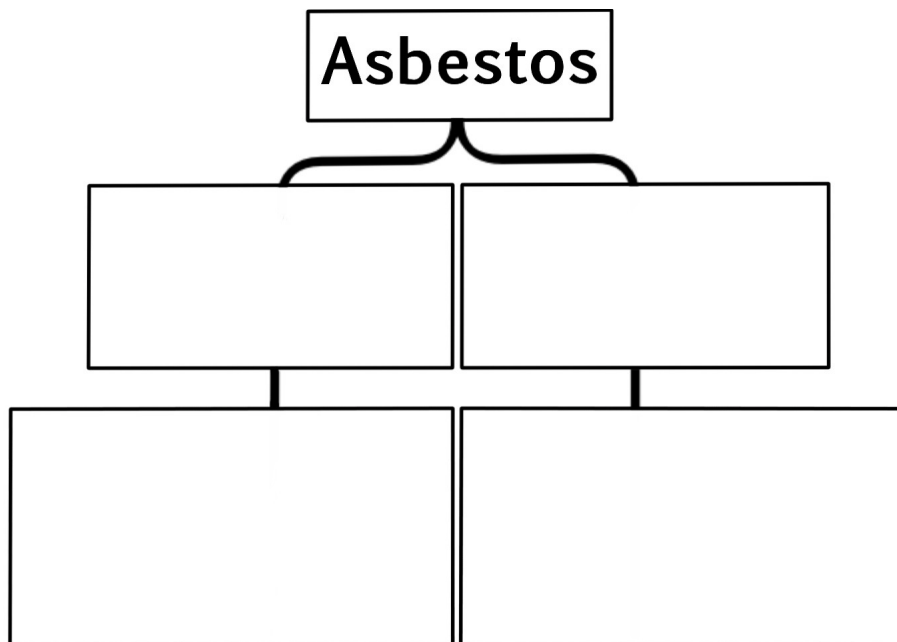
1 You decide that you want to make a hearty Canadian poutine for yourself one day. To make the fries, you must deep-fry them! Afterwards you have all this hot, leftover grease/oil ... how will you dispose of it?

2 Oh no, you dropped your families glass vase on the ground and it shattered. No amount of super glue will fix that, but you need to clean it up quickly before they come home ... how will you dispose of the shards of glass?

3 While doing some spring cleaning, you find your old MP3 player. You decide there's no point in keeping it when you have new music on your cell phone. There are two AA batteries still in it and they read "rechargeable" ... how will you dispose of this electronic?

BONUS!

Asbestos is a deadly carcinogen, a cancer-causing substance that is found in many older homes within plaster, insulation, tiling, and more. This is dangerous if inhaled, and therefore requires very careful disposal. I challenge YOU to do some research of your own regarding improper and proper ways to dispose of asbestos. Then create your own path of proper disposal chart below!



Test Your Centre of Gravity!

Gravity is a force that exists between any two masses, bodies, or particles. This force doesn't only exist between us and the Earth to keep us grounded, but it's also responsible for keeping the Earth in orbit around the Sun!

The centre of gravity is an imaginary point in the body where the total weight of the body is measured and the point where half of the weight is thought to be concentrated in. For example, humans is around the waist or belly button, a ruler is in the middle. It's commonly used when designing large static structures or when we predict how an object is going to move when it's acted upon by gravity.

This activity is going to include some challenges that will manipulate your centre of gravity that you may even be able to trick your family and friends with! You can even record your findings in the spaces we've included below. Follow the steps to watch what happens, and read the answer key to find out what's happening once you have your results. Let's get started!

Defeated by a Finger

1. Have someone sit all the way back in a chair.
2. Make sure they're sitting straight up and with their feet on the ground.
3. Place your finger on their forehead.
4. Ask them to stand up without forcing your finger back!



Could the person stand? Why do you think this happened?

Heaviest Chair in the World

1. Place a chair or stool against a wall.
2. Bend over so that your abdomen is parallel with the floor.
3. Grab one side of the chair/stool with each hand.
4. Bend your elbows to lift the chair/stool from the ground.
5. Try and stand up straight without moving your feet!



Fill in the table on the next page!

This activity continues on the next page!

SLO : 7-3-01, 7-3-03

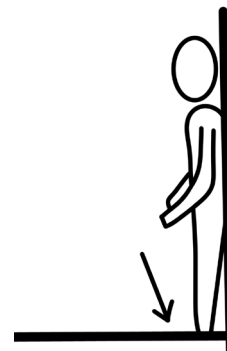
Try this one with a few people and fill out the table.

Name of participant	Could they complete the task? (yes or no)

What do the participants who could complete the task have in common?

Can you pick up the quarter?

1. Stand with your back against the wall.
2. Put your feet together and make sure the backs of your legs are also up against the wall.
3. Have someone place a coin on the ground at the tip of your toes.
4. Try to bend over and pick it up!



What happens when they try and pick up the coin?

Find out why these experiments happened the way they did in the answer key!

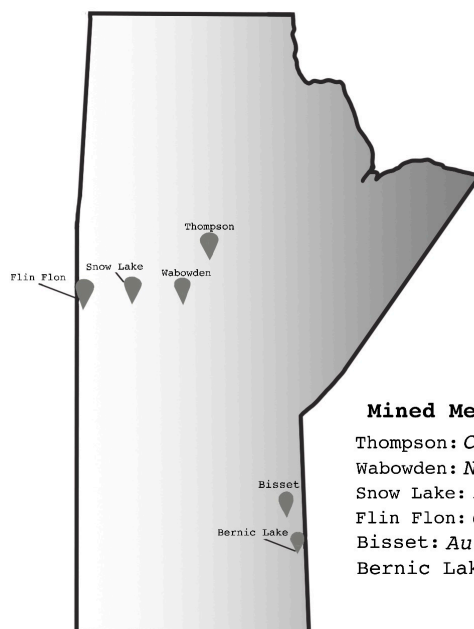
Manitoba Mining

Did you know that copper, zinc, nickel, gold and cesium are all metals that are mined in Manitoba? These are all substances or elements found on the periodic table. Metals are mined from the ground and found in the Earth's crust.

Can you spot them on the Periodic Table? **Hint:** to find gold, solve this riddle:
 Along the path to find the treasure,
 Under the ground, gold was found.

Group →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
↓ Period																		
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo

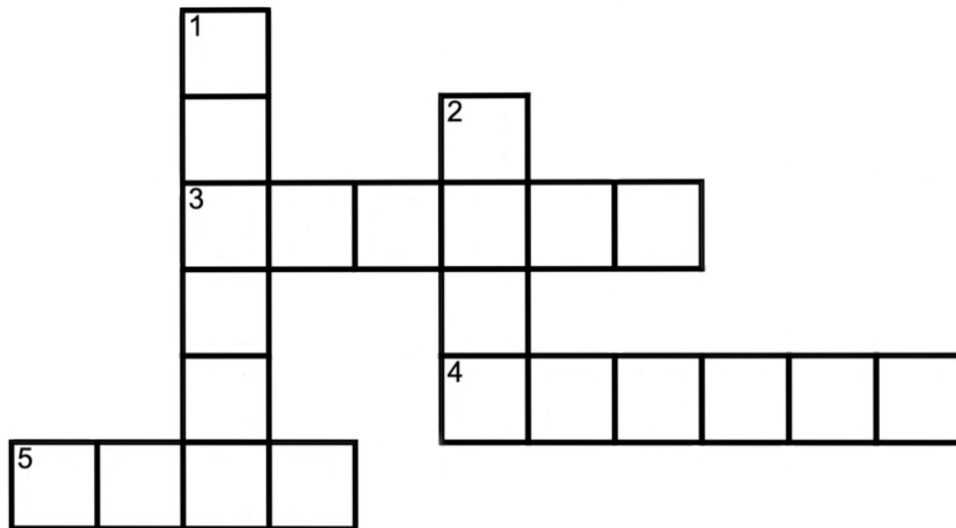
Lanthanides	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
Actinides	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr



Mined Metals:

Thompson: *Cu, Ni*
 Wabowden: *Ni*
 Snow Lake: *Au, Cu, Zn*
 Flin Flon: *Cu, Zn*
 Bisset: *Au*
 Bernic Lake: *Cs*

Did you know these metals are a part of your everyday life? Solve this crossword puzzle to find out how!



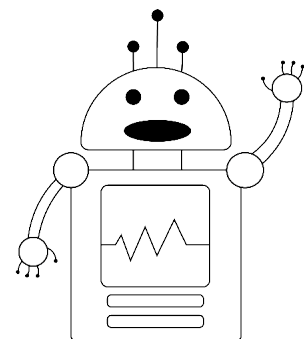
Down

- 1 This metal is used to make stainless steel products! It also lives within our phones, batteries, and is a part of our Canadian currency.
- 2 This metal is used to galvanize other metals, which protects them from rusting! It is also used in the manufacturing of cars. If you look on a sunscreen bottle, it is one of the main ingredients!

Across

- 3 This metal is often used for drilling fluid (keeps the machine cool), or to make the lenses in glasses which help those with poor vision see.
- 4 This metal composes electrical wiring and many of the pipes that run through our homes.
- 5 This metal is very expensive and is often used to make jewelry.

There is an extensive process that goes into mining - it doesn't just stop when the ore is extracted! It is comparable to a function in coding. There are many steps to refine the ore after the mining process before it can be used to make buildings, cell phones, etc. In computer science, functions are used to complete a task (or many tasks!).



This activity continues on the next page!

Now attempt to construct “the mining process” function. Cut out the blocks of code/steps on Page 17 and assemble them inside the bigger function below! (This codes specifically for gold mining.)

The Mining Process

TAILINGS DISPOSAL - waste rock used to build embankments that prevent flooding.

BULLION - gold sludge dried & put in furnace. Once molten, put into bar moulds.

GRINDING & SIZING - in mill

WATER TREATMENT

excess water treated,
some recycled

SAMPLE - is it ore or waste rock?

ROCK HAULING - using dump trucks

**LEACHING &
ADSORPTION**

mix ore, water, and other chemicals
in leach tanks. fluids go on surface
of gold (adsorption).

Mining

CRUSHING - breaking down rocks for transport

EXCAVATION - by hydraulic diggers

BLAST - explosives used to loosen rock

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because the previous page is meant
to be cut up.

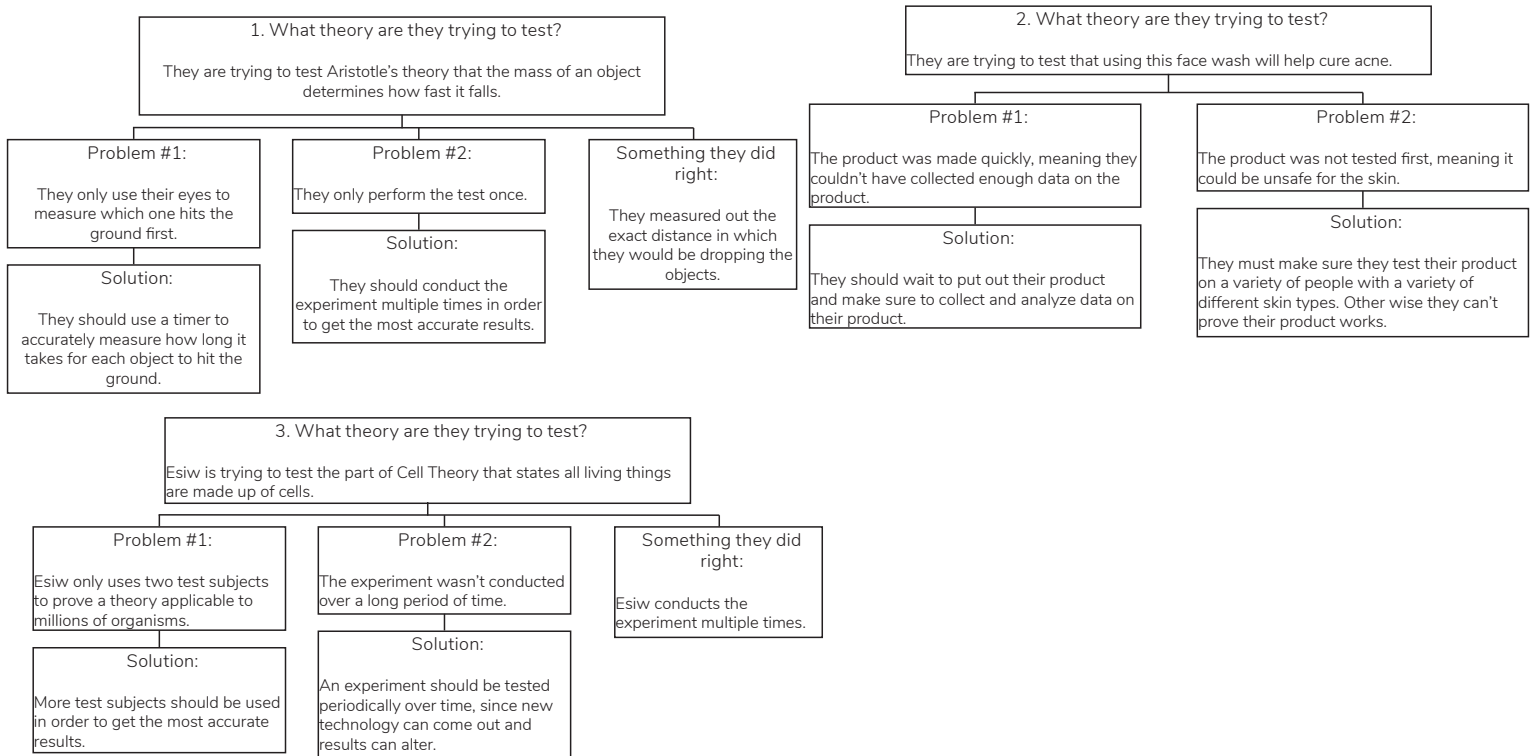
Answer Key

Page 4:

Abiotic factors: temperature, air, wind, water and sunlight.

Biotic factors: everything else that is alive! Bunnies, frogs, plants, humans, tree, butterflies, birds, worms, bees, ducks.

Pages 5-6:



Pages 8-9:

Trail mix: Mechanical mixture, heterogeneous, it is a heterogeneous chemical mixture because it does not mix evenly, and you can see its individual components. There are only physical interactions taking place.

Salt and pepper: Mechanical mixture, heterogeneous, it is a heterogeneous chemical mixture because it does not mix evenly, and you can see its individual components. There are only physical interactions taking place.

Sugar and water: Solution, homogeneous, it is a homogeneous solution because it has a uniform consistency and it does not settle, unless the solution is saturated (too much sugar is added).

Orange juice and water: Solution, homogeneous, it is a homogeneous solution because it has a uniform consistency. Individual components cannot be identified. Chemical and physical interactions are taking place.

Oil and water: Mechanical mixture, heterogeneous, it is a heterogeneous chemical mixture because it does not mix evenly, and you can see its individual components. There are only physical interactions taking place.

Pages 8-9 (continued):

Soil and water: Mechanical mixture, heterogeneous, it is a heterogeneous chemical mixture because it does not mix evenly, and you can see its individual components. There are only physical interactions taking place. Its components will eventually settle.

Vinegar and water: Solution, homogeneous, it is a homogeneous solution because it has a uniform consistency. Individual components cannot be identified. Chemical and physical interactions are taking place.

Sand and water: Mechanical mixture, heterogeneous, it is a heterogeneous chemical mixture because it does not mix evenly, and you can see its individual components. There are only physical interactions taking place. Its components will eventually settle.

Cereal and milk: Mechanical mixture, heterogeneous, it is a heterogeneous chemical mixture because it does not mix evenly, and you can see its individual components. There are only physical interactions taking place.

Snack mix: Mechanical mixture, heterogeneous, it is a heterogeneous chemical mixture because it does not mix evenly, and you can see its individual components. There are only physical interactions taking

Pages 10-11:

- 1: Allow the grease to cool, pour into a container, place in a used plastic bag, then place into the household garbage.
- 2: Sweep up the glass shards carefully onto a sheet or two of newspaper, wrap them up and place them into the garbage. Vacuum over the area where the shards were to pick up any that were missed in the sweeping.
- 3: Remove the rechargeable batteries from the MP3 player and check if they can be recharged for reuse! If not, bring to a nearby battery drop box (ex. Staples, electronic stores). Bring the MP3 player to an electronic donation facility (usually the original place of purchase will accept old devices).

Pages 12-13:

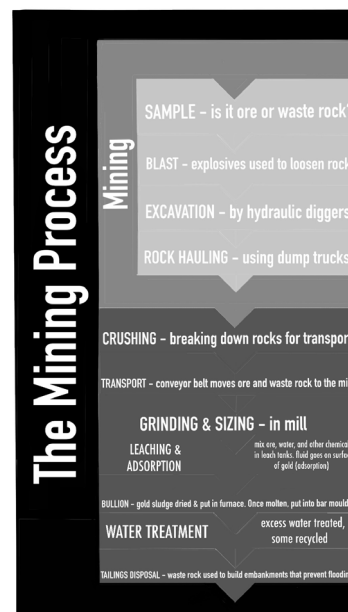
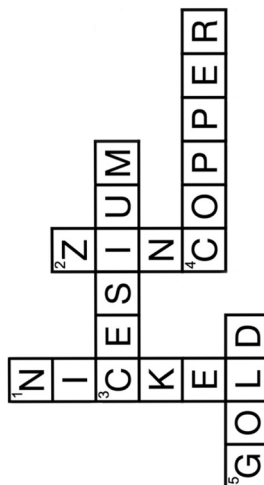
Defeated by a finger: It's so challenging to stand up from the chair here because your centre of gravity is placed in the chair and not in your feet. This is why we typically lean forward in order to stand up from sitting down!

Heaviest chair in the world: The results of this challenge vary depending on the person! People with a lower centre of gravity, located more around the hips, will be able to complete this task! People with a higher centre of gravity will struggle more because it will once again, not be located over their feet!

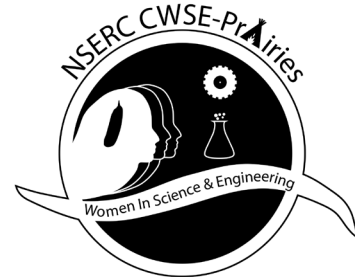
Can you pick up the quarter?: Most people who attempt this challenge will fall forward! This is because of the wall restricting our bottoms from moving backward in order to better distribute our weight while we bend over to pick up the coin. This causes the centre of gravity to shift forward and throw us off balance.

Pages 15-18:

Gold is #79 on the Periodic Table.



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