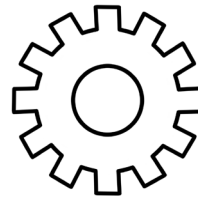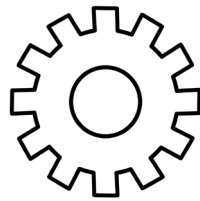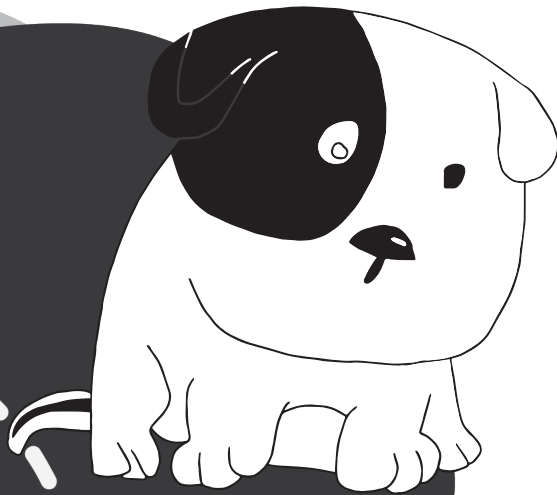# WISE Activity Booklets

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

Grade 5
AUGUST 2020

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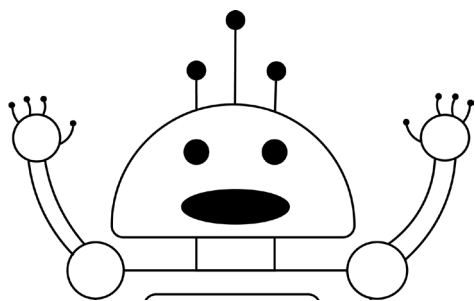
Hello there!

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!
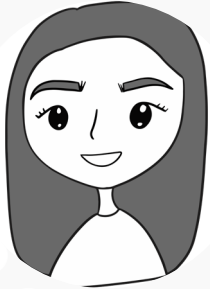
Brandi

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!

Robyn

Robyn is going into her forth 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.
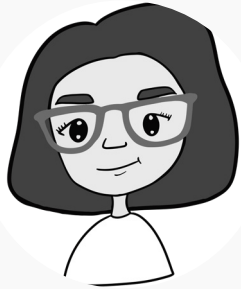
Victoria

Victoria just finished her first year as a Science student at the University of Manitoba and is planning on becoming a nurse. She loves to cook, read and take care of plants in her free time!

Zoe

Zoe just finished her first year of Engineering, and is entering the department of Civil Engineering in the fall. She loves math, and in her free time enjoys walking her dog, as well as playing volleyball and ultimate frisbee.
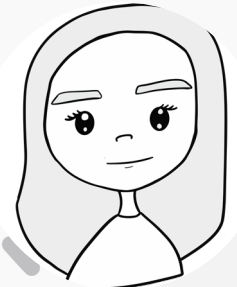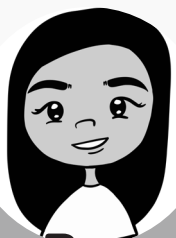
Esiw the Robot

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!
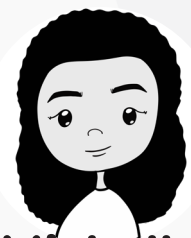
... and our Incredible Editors!

Alex   **Bea**   **Mahalia**   **Michelle**

Debugging the Digestive System (Part 1)

Using the word bank at the bottom of this page, fill in the blanks of the code on Page 5 to help Esiw with processing food in the digestive system. To help you out, look at the example below for how the code might look.
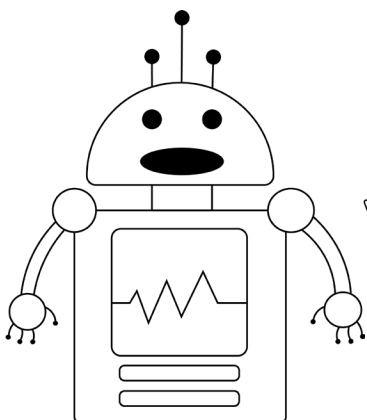
EXAMPLE

```
Line 1: Food1 = cooked chicken;

Line 2: Food2 = uncooked chicken;

Line 3: Mouth = eats food;

Line 4: if Mouth and Food1:

Line 5:          Stomach = not upset

Line 6:          else:

Line 7:               Stomach = upset;
```

This sample code represents what happens to your stomach if you eat raw versus cooked food. Lines 1, 2 and 3 are **variables** representing specific things. The **variable *Food1*** represents cooked food, the variable ***Food2*** represents uncooked food, and the variable ***Mouth*** represents eating the food. Lines 4 and 5 are saying that if your ***Mouth*** eats `cooked chicken`, your ***Stomach*** will not react. Lines 6 and 7 are saying that if you eat `uncooked chicken`, your ***Stomach*** will become upset.

WORD BANK

broken down into a liquid mixture	*Esophagus*	broken down	*Small_Intestine*
not broken down	waste disposed of	separated into nutrients and waste	*Stomach*

Hi! Esiw here! In this activity, keep an eye out for conditional statements (like the one in the example above!). It may sound scary, but conditional statements here are whenever you see the word `if` in the code. This tells us that `if` something happens (like the ***Mouth*** eats `cooked chicken`), then the instructions below will happen (the ***Stomach*** is not upset)!

SLO : 5-1-06

Debugging the Digestive System (Part 2)
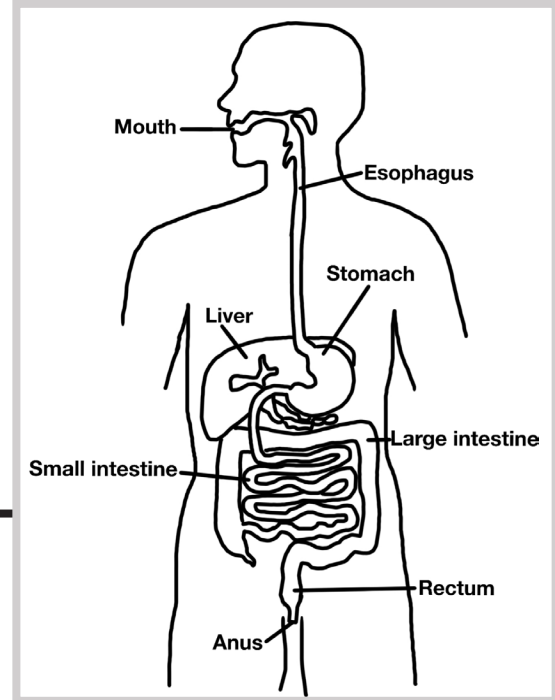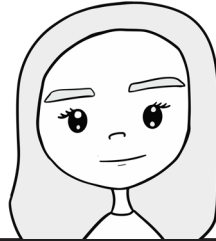
DIGESTIVE SYSTEM CODE

```
Line 1:  Food = apple;

Line 2:  Teeth = chew Food;

Line 3:  Esophagus = pathway for Food;

Line 4:  Stomach = Food travels here from Esophagus;

Line 5:  Small_Intestine = Food travels here from Stomach;

Line 6:  Liver = separates nutrients from waste;

Line 7:  Large_Intestine = waste travels through here;

Line 8:  if Teeth and Food:

Line 9:        Food = _____

Line 10:       else:

Line 11:          Food = _____;

Line 12: if Food and _____:

Line 13:       Food = moves down to stomach;

Line 14: if Food and Stomach:

Line 15:       Food = _____;

Line 16: if Food and _____:

Line 17:       Food = broken down further and nutrients absorbed;

Line 18: if Food and Liver:

Line 19:       Food = _____;

Line 20: if Food and Large_Intestine:

Line 21:       Food = _____;
```

Food Label Frenzy (Part 1)

Do you ever look at food labels? You should! They give us information about how nutritious the food is (or isn't)! Here's an example of one from a cereal box:

This measures how much energy is in the food! Energy helps us to function everyday. If you consume more energy than you need, it is stored as body fat.

This provides energy that helps us grow and it keeps us warm. Unsaturated fats are good for your heart, while saturated and trans fats are not.

This helps us take in nutrients and remove waste.

These are found in almost everything we eat! They provide our brain and muscles with energy so they can do their jobs! If the energy is not needed right away, it is stored as body fat.

This is a type of fat made in the liver that helps our organs work properly. Since our bodies make it, we do not need to eat much of it.

This helps to control water levels in our body, but most of us consume too much of it.

This is what our muscles and organs are mostly made up of. Protein is found in meat, eggs, fish, milk, nuts and beans. It helps us stay healthy and strong.

Vitamins and minerals are vital for healthy growth and development. Vitamins come from plants, such as Vitamin A which helps improve eyesight! Minerals come from water and animals, such as Calcium in milk which helps keep bones strong!

Nutrition Facts / Valeur nutritive
Serving 1 cup (28 g) / Portion de 1 tasse (28 g)

Amount per serving Teneur par portion	Cereal Céréales	With 1/2 Cup 1% Milk Avec 1/2 tasse de lait 1 %
Calories / Calories	110	160
% Daily Value / % valeur quotidienne		
Fat / Lipides 0 g†	0 %	2 %
Saturated / saturés 0 g + Trans / trans 0 g	0 %	2 %
Cholesterol / Cholestérol 0 mg	0 %	2 %
Sodium / Sodium 140 mg	6 %	8 %
Potassium / Potassium 25 mg	1 %	6 %
Carbohydrate / Glucides 25 g	8 %	10 %
Fibre / Fibres 0 g	0 %	0 %
Sugars / Sucres 3 g		
Protein / Protéines 2 g		
Vitamin A / Vitamine A	0 %	8 %
Vitamin C / Vitamine C	0 %	0 %
Calcium / Calcium	0 %	15 %
Iron / Fer	25 %	25 %
Vitamin D / Vitamine D	20 %	45 %
Thiamine / Thiamine	45 %	45 %
Niacin / Niacine	8 %	10 %
Vitamin B_6 / Vitamine B_6	10 %	10 %
Folate / Folate	8 %	10 %
Pantothenate / Pantothénate	6 %	15 %
Manganese / Manganèse	15 %	15 %

Now answer the questions below about the nutritional label you see here!

What elements of this cereal seem healthy? Why?

_____

_____

_____

What elements of this cereal seem unhealthy? Why?

_____

_____

_____

SLO : 5-1-02, 5-1-03

Food Label Frenzy (Part 2)
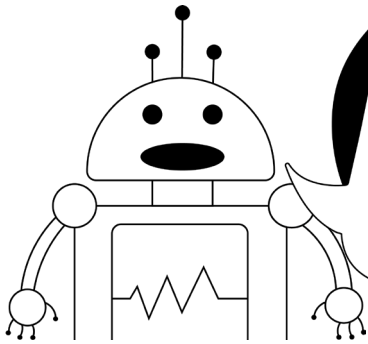
All the terms in bold on a food label could be considered **variables**, unknown values, that need to be found/filled. For example, if I wanted to know the *calories* in the cereal, you would say 110. So, *calories* was the **variable** and the value was 110. Can you help me fill the values out for the different variables below using different food items?

Grab 3 items from your fridge or pantry and fill in the table below! Each variable will have a different value for each food item.
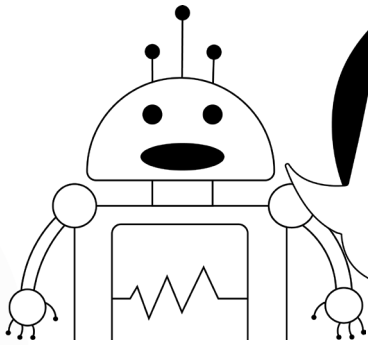
Food Name			
Serving Size			
Calories			
Fat			
Cholesterol			
Sodium			
Potassium			
Carbohydrates			
Fibre			
Sugar			
Protein			
Vitamin and Mineral List			

What do they have in common? What are some differences?

_____

_____

_____

Food Label Frenzy (Part 3)

Hi again! By filling in that table, you provided me with a **data set** which is an organized set of information. We can do a lot with this data, like ordering the items according to the nutritional content! Ordering is important in computer science as well because it can help us make decisions, like which food we should eat!

Answer the questions below about the 3 foods you chose! From the answers and data you found, can you decide which one is the healthiest?

Order the food items from highest to lowest calorie content (ex. *Food 1, Food 2, Food 3*):

_____

Order the food items from lowest to highest sugar content:

_____

Order the food items from highest to lowest cholesterol content:

_____

Which food item has the highest protein content?

_____

Which food item has the most vitamins and minerals?

_____

Which of the 3 food items do you think is the healthiest option? Why?

_____

_____

_____

_____

What MATTERs? Bingo!

Go on a walk around your home and community and see if you can get a BINGO. A BINGO is a line in the vertical, horizontal or diagonal direction. Everything in this BINGO frame is matter or made of up of matter. Do you notice anything else that ties these things together? What IS matter? Why does it seem to be everything in sight?

Earthworm	Picnic	Coffee Cup	Bald Eagle	Truck
Dirt	Gravel Path	A Friend	Dog	Recycling Bin
Cell Phone	Pot Hole	FREE SPACE	Pencil	Cone
Stairs	Apple	Headphones	Yellow House	Streetlight
Paintbrush	Tree	Hill	Restaurant	Soccer Ball

Here's a basic "print" code that explains what matter is:

```
matter = [ANYTHING THAT HAS MASS/WEIGHT]
          and [TAKES UP SPACE]
   if x == matter, print x;
```

Because everything above is matter, this code will print all the items above!
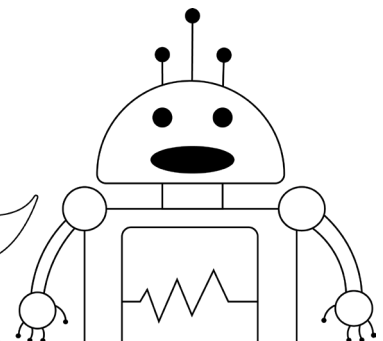
How to Make Toothpaste (Part 1)

Making your own toothpaste is easier than you think. There are 2 ways to make it and it only requires 3 ingredients! Follow the instructions below and on page 11 to make two different kinds!
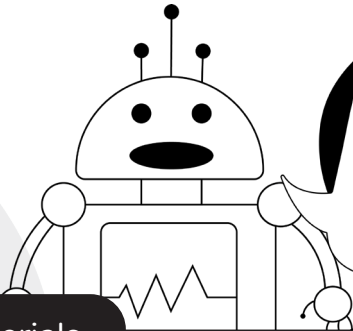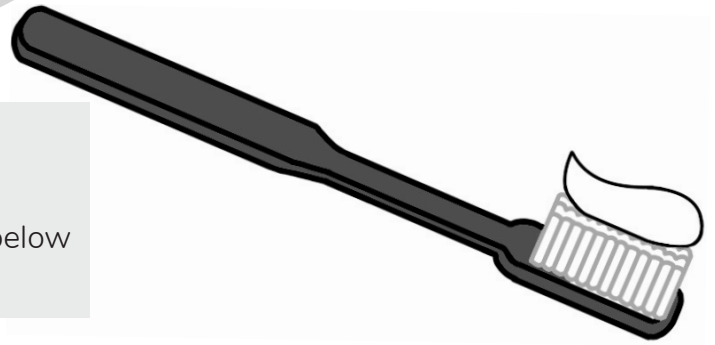
To me, the following instructions look like **algorithms** that I read all the time! An **algorithm** is a set of guidelines or steps that computers follow to complete tasks. Can you follow these **algorithms** properly?

Materials

2 tbsp. Baking Soda: gentle abrasive which can help remove plaque and surface stains.

2 tbsp. Coconut Oil: for centuries, many have claimed that coconut oil can help remove plaque from your teeth and bacteria from your mouth.

Drops of Peppermint Extract/Essential Oil: peppermint or spearmint extracts/oils, can help freshen your breath! NOTE: peppermint essential oil provides stronger flavour than the extract, giving it a more classic toothpaste taste.

Drops of Water

Empty glass jar or plastic container

Baking Soda + Water Toothpaste

1. Add 2 tbsp. baking soda into an empty glass jar or plastic container.

2. Add a few drops of peppermint extract or essential oil (add more for a stronger mint flavour).

3. Add water a few drops at a time.

4. Mix all the ingredients until smooth and the consistency of a paste. *If the mixture appears clumpy, add more water. If the mixture is liquidy, add more baking soda.*

5. Place a lid on your jar/container!

SLO : 5-2-03

How to Make Toothpaste (Part 2)

Baking Soda + Coconut Oil Toothpaste

1   Add 2 tbsp. baking soda into an empty glass jar or plastic container.

2   Add 2 tbsp. of coconut oil.

3   Add a few drops of peppermint extract or essential oil.

4   Mix all the ingredients until smooth.

5   Place the lid on your jar/container!

Here's what your toothpaste could look like when you're done!

Now you've made toothpaste!

But is it a solid or a liquid?

It's actually neither! It's a **colloid** which is a mixture of two substances in different states, in this case a liquid and a solid, where the solid particles are evenly spread out through the liquid.

Side note: this is a DIY recipe and does not contain fluoride which is a recommended ingredient for toothpaste by dentists.

Reverse Engineering (Part 1)

Everything around us is engineered from raw materials. We can think about the raw materials that make up everything surrounding us in two ways.

1 As separate material parts to be formed into tradable goods (wood, aluminum, rocks). The pre-engineered materials.

2 As engineered technologies that can be broken down into their raw materials, like pencils or computers.
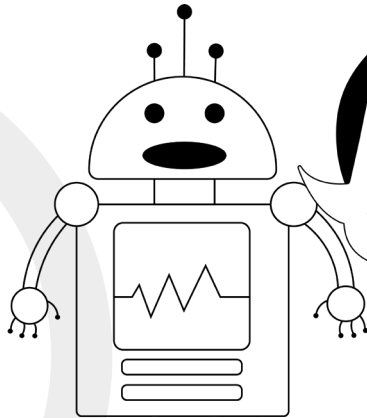
Engineering and reverse engineering also follow steps and processes like **algorithms**, too! I reverse engineered the pencil below back into its raw materials! Do you think you could do the same thing with another object in your home on page 13?

The piece that fixes the shaft of the pencil to the eraser is made of aluminum. Aluminum is a metal that is mined from the crust the earth.
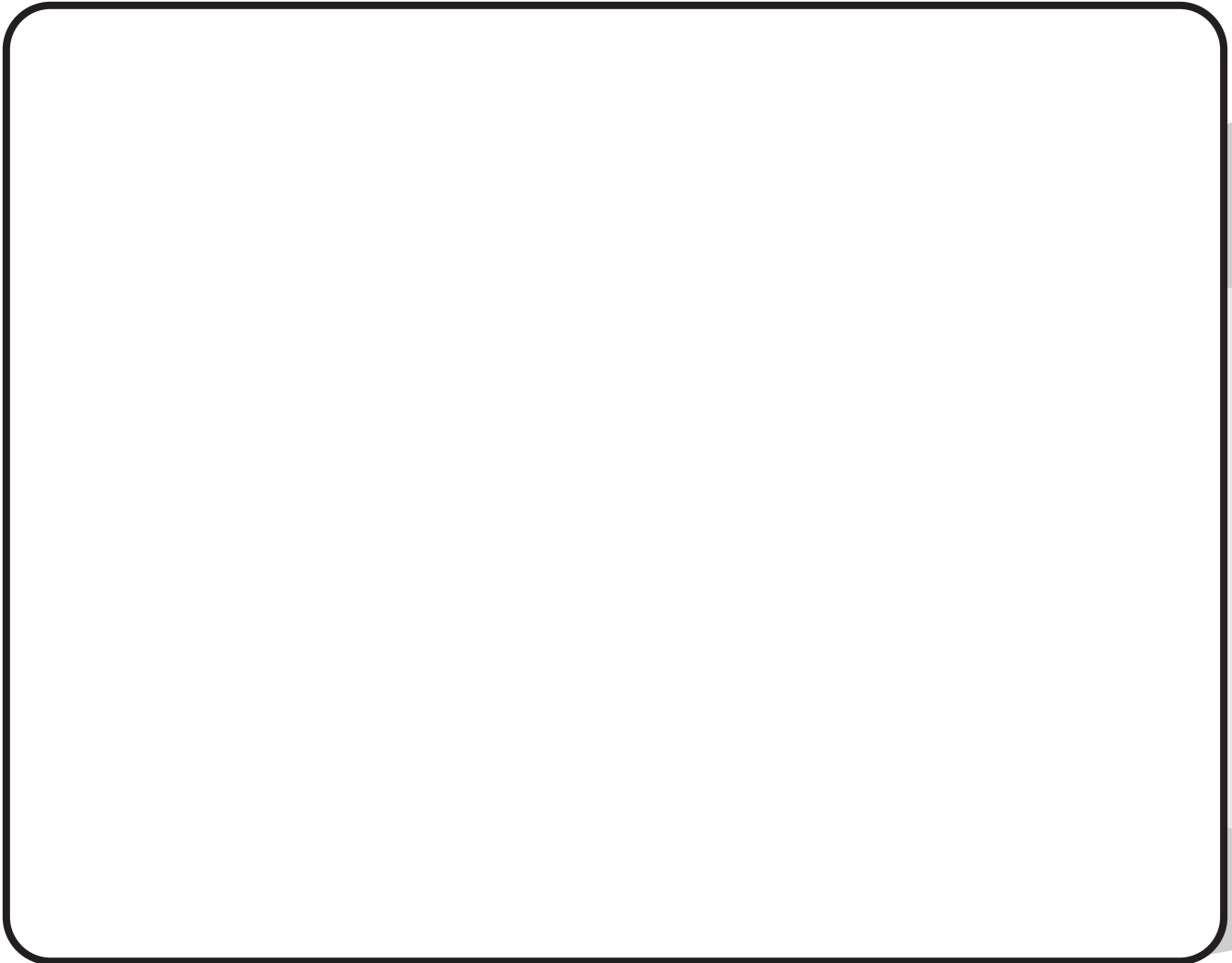
The eraser that fixes all our mistakes is made from a mixture of pumice, a volcanic rock, and rubber, a naturally forming substance.

The writing tip of the pencil is made of graphite, that is mined from our precious planet.

The shaft of the pencil is made from milled trees, or more commonly known as wood. Trees grow naturally in our vast forests.

SLO : 5-2-14

Reverse Engineering (Part 2)

Choose an object in your home to reverse engineer and draw it in the box below! You can either draw the full object or broken down like the pencil on page 12.

Now, just like Esiw did with the pencil break your object down into its raw materials and list them here:

_____

_____

_____

_____

_____

_____
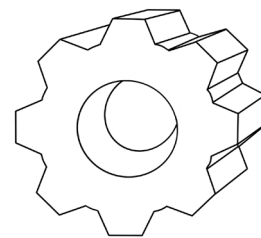
It is really important to remember that these raw materials aren't infinite. We need to use these materials sparingly and with caution.

Try going for a walk and looking at what is around you. What can be engineered into technologies?

Simple Machine Matching

Simple machines are tools that are used to make any physical work easier. There are seven simple machines: lever, wheel and axle, pulley, inclined plane, wedge, gear and screw.

Draw lines to match the pictures to their corresponding simple machine!
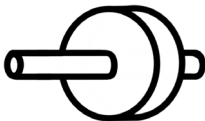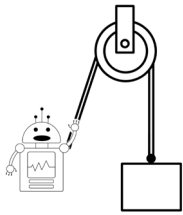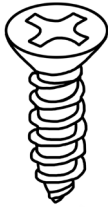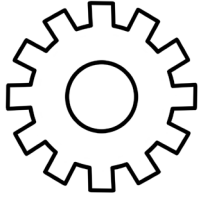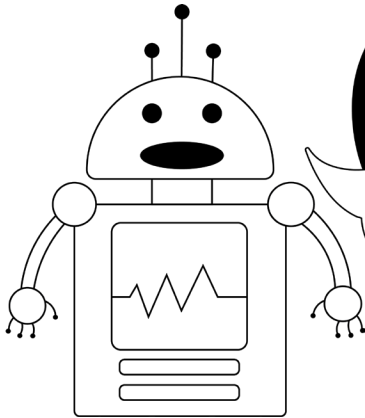
INCLINED PLANE

LEVER

GEAR

WHEEL AND AXLE

SCREW

PULLEY

WEDGE

SLO : 5-3-01

Simple Machine Outputs (Part 1)

This activity is very similar to **inputs** and **outputs**! The **input** is data or information that a computer receives, while the **ouput** is data that a computer sends back! In this case, the **input** is each situation and the **output** is the solution or answer to the situation that you choose! Every **input** has a unique **output** which is very similar to how a code works.

Now that you know more about simple machines and using the word bank provided, identify which simple machine (output) would be best to use for each situation (input) by writing the correct simple machines in the blanks.

WORD BANK: OUTPUTS

SCREW	PULLEY	WEDGE
WHEEL AND AXLE	CLASS 1 LEVER	CLASS 2 LEVER
GEARS	INCLINED PLANE	

SITUATIONS: INPUT

1 You and Robyn went rock climbing and now Robyn is stuck on the side of a mountain. What kind of simple machine should you use to help pull Robyn back up?

OUTPUT: _____

2 You and Victoria want to build a seesaw in your backyard to play and experiment with balance. What simple machine would come into play?

OUTPUT: _____

Simple Machine Outputs (Part 2)

3 Your friend Serenity is in a wheelchair and your front door has stairs. You really want Serenity to come over. What type of simple machine would you build so that Serenity can come inside?

OUTPUT: _____

4 You and Brandi are going on a fishing trip, and you catch a really big fish. What type of simple machine(s) are in your fishing rod that will help you reel the fish in?

OUTPUT: _____

5 You and your friend Zoe are going to the carnival. To get a ticket, you must identify what type of simple machine is used in the construction of a Ferris Wheel. What do you tell the ticket booth worker?

OUTPUT: _____

6 You are in charge of designing a new play structure for your local park. Your friends tell you that they like riding a windy slide the best. You want your friends to like your design, so what type of simple machine should you use for the windy slide?

OUTPUT: _____

7 Toni is going for a nice bike ride on a path when he encounters a large hill. What simple machine on Toni's bike helps him increase the force when he pedals so he can make it up the hill?

OUTPUT: _____

How Clouds are Formed (Part 1): An Introduction

There are two main processes in which clouds are formed. They are called **condensation**, and **deposition**. Some definitions:

- **Condensation:** when a gas changes to a liquid

- **Deposition:** when a gas changes to a solid

Clouds are formed when water vapour, an invisible gas, turns into liquid water droplets (condensation), or ice crystals (deposition). These droplets or crystals attach themselves to tiny particles floating around in the air. These particles are very important because they provide a surface for the droplets to form on and are usually dust, bacteria, ash, or even salt crystals from sea spray. When a large amount of these droplets or ice crystals form together, it makes a cloud. Here is a diagram showing this:
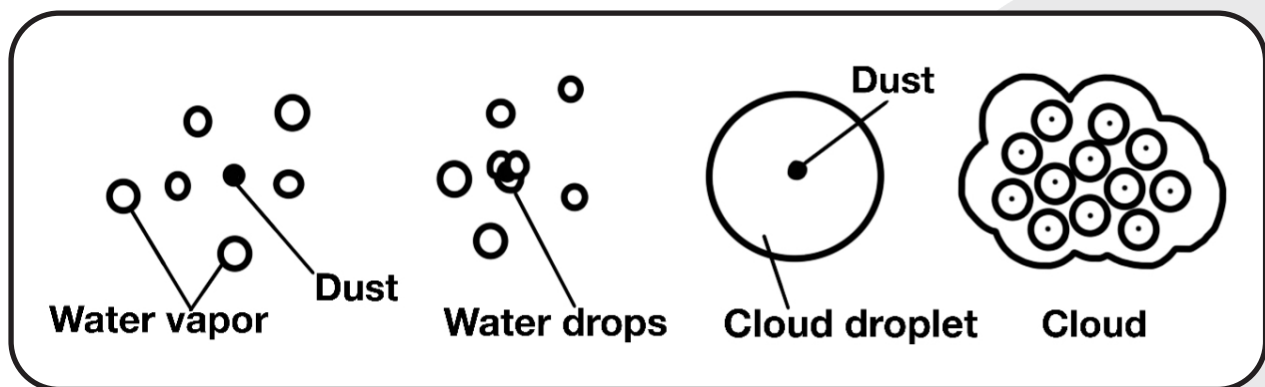

In this activity, your challenge is to write a creative/funny/twisted story about how clouds are formed, while still including the actual process written out above. Follow the instructions below on how to fold a mini eight-page storybook. You'll only need a piece of paper and a pair of scissors. After you are done folding, write and draw in your creative story!

Instructions

1 Fold your sheet of paper in half lengthwise (hotdog style). Then fold that in half widthwise (hamburger style). Then fold that in half again, so that your paper is folded into eighths.
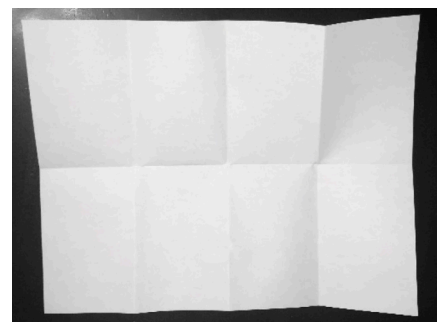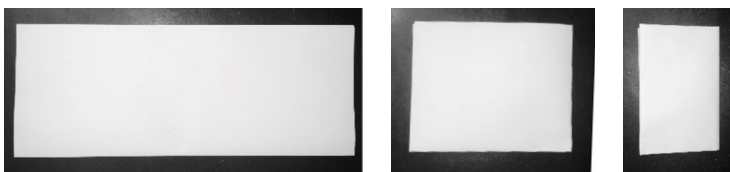
# How Clouds are Formed (Part 2): Creating the Storybook

2 Fold your paper in half widthwise (hamburger style). Cut halfway across the middle from the folded side. When you open the paper, it should have a slit in the middle.
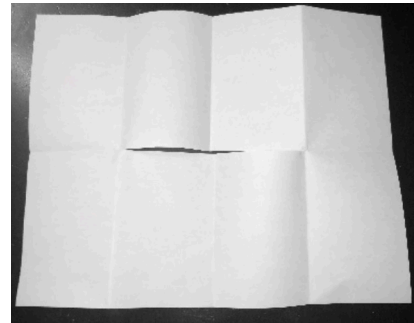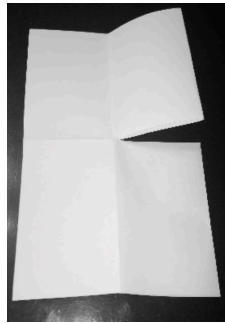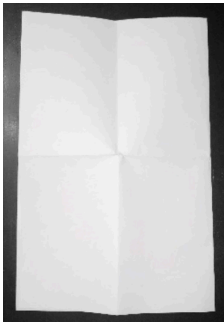
3 Fold your paper lengthwise along the crease that has the slit. Hold the paper at either end, then push the ends in toward each other. The sections should fold into each other to form an eight-page booklet.
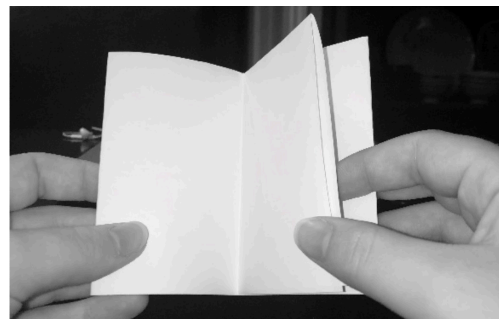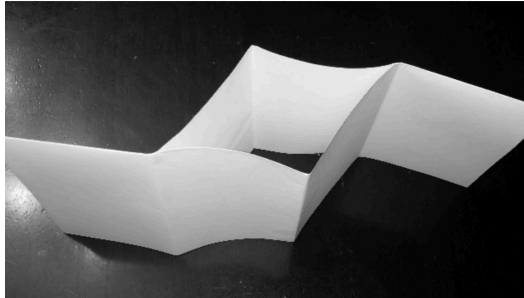
**4** Now you're ready to write in your mini storybook!

Answer Keys

Debugging the Digestive System (Page 4-5)

Line 9: `broken down`
Line 11: `not broken down`
Line 12: ***Esophagus***
Line 15: `broken down into a`
`liquid mixture`
Line 16: ***Small_Intestine***
Line 19: `separated into`
`nutrients and waste`
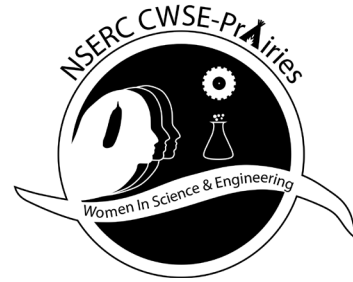Line 21: `waste disposed of`

Simple Machine Outputs (Page 15-16)

1. A pulley
2. A class one lever
3. An inclined plane
4. Any of the following: A pulley, lever, wedgewheel and axle
5. Wheel and axle
6. A screw
7. Gears

Simple Machine Matching (Page 14)
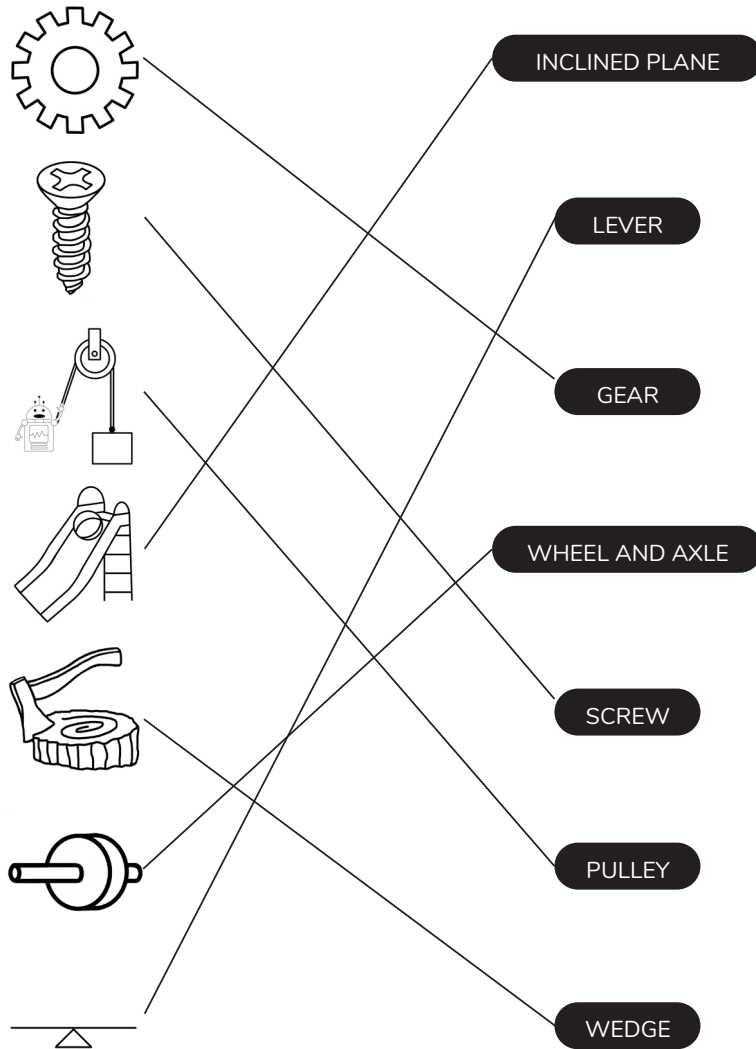
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