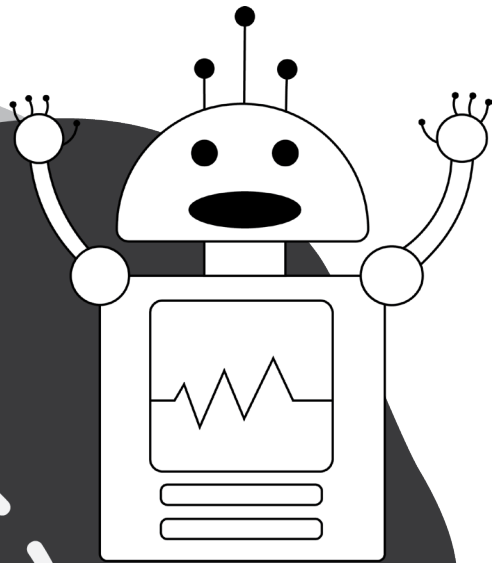


WISE Activity Booklets

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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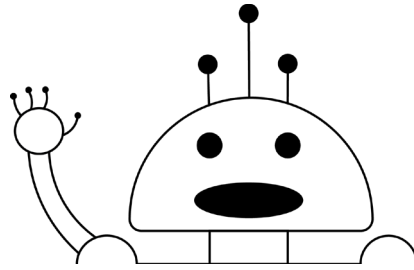
Youth · STEM · Innovation

With funding from

Canada

Grade 5
JULY 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 last page of this booklet to see who created the activities, experiments and recipes within.

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

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

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

In this Grade 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!

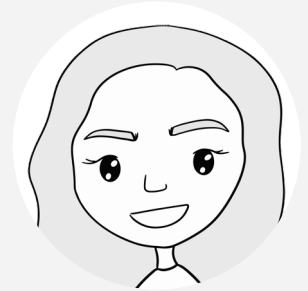
Best of luck, and until we see you again,
the WISE Kid-Netic Energy Crew

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!

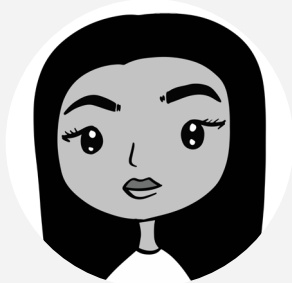
Amelia

Amelia just completed her first year of the two-year after-degree program in early years education. When she isn't reading, she loves writing lists, running, having quality conversations with friends, knitting and singing show-tunes. Amelia is very excited to be working with WISE Kid-Netic Energy this spring!



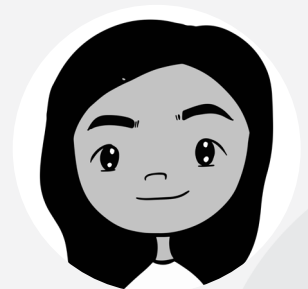
Habiba

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.



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.



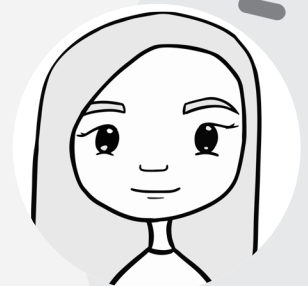
Olivia

Olivia is going into her third year of biosystems engineering. She hopes to work in renewable energy or water treatment in the future. In her free time, she plays and refs touch football and enjoys playing the piano.



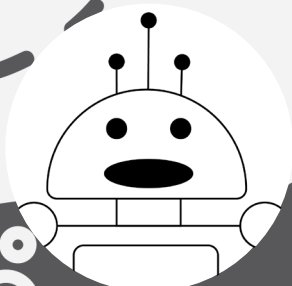
Sophia

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



Esiw the Robot

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



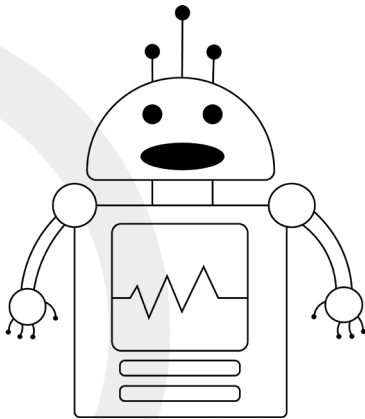
Code for a Healthy Body!

In the box below, there is a code for a healthy body, but it is incomplete! Use the list of conditions here that, if done, make for a healthier body and fill in the blanks in the box to complete the code!

eat well
move your body
get out in nature

practice gratitude
take deep breaths
sleep

take breaks



Hi! Esiw the Robot here! The lines below are formatted like **conditional statements**: these are lines of code that need the “if” (condition) to happen for the “then” action to happen! For example, for Line 1: what condition needs to happen first for your body to feel good?

Line 1: *if you* (_____), *then body* feelsGood;

Line 2: *if you* (_____ \geq 8 hours), *then body* notTired;

Line 3: *if you* (_____), *then brain and body* functionBetter;

Line 4: *if you* (_____), *then mind and body* feelRefreshed;

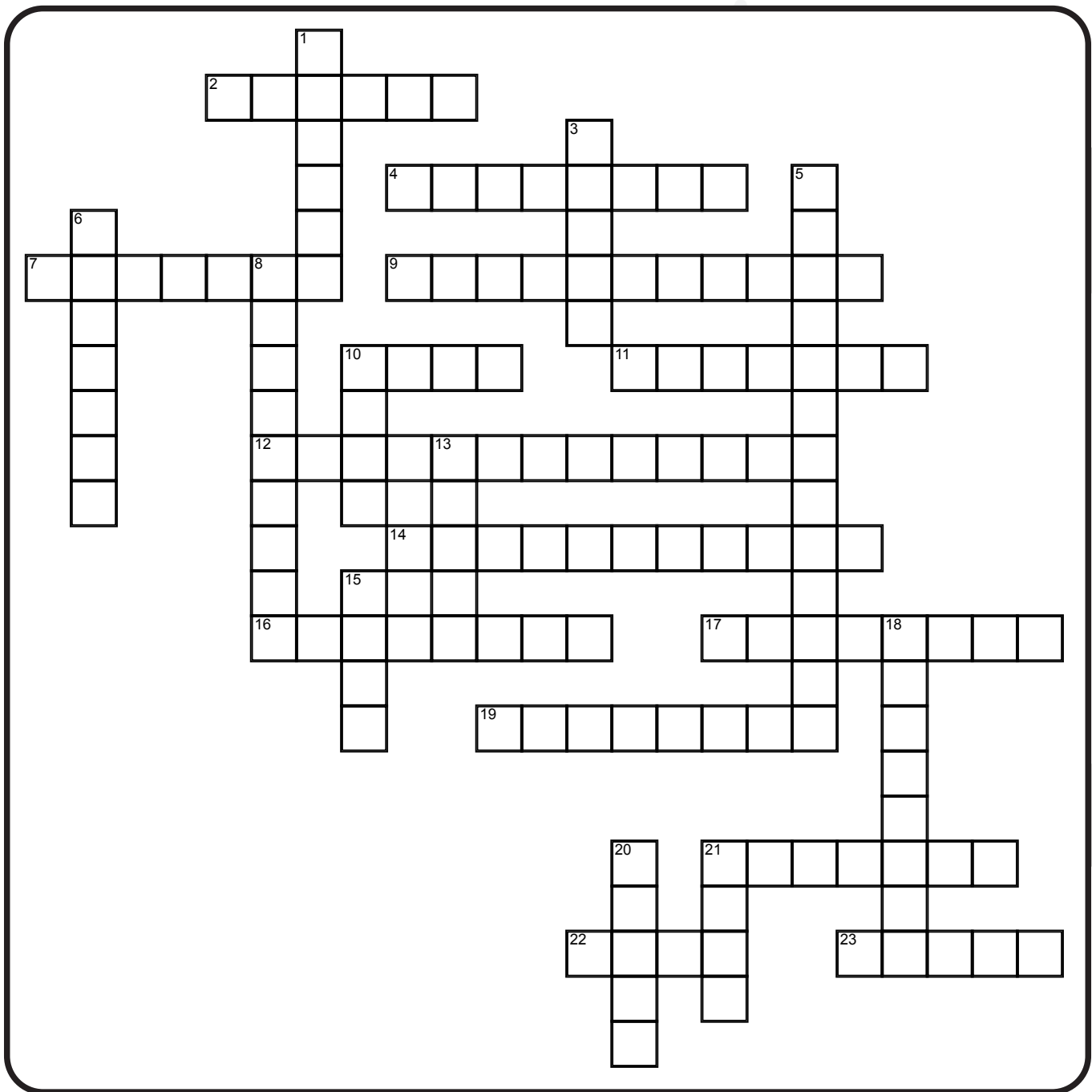
Line 5: *if you* (_____), *then body* isEnergized;

Line 6: *if you* (_____), *then body* relaxes;

Line 7: *if you* (_____), *then life* isGood;

Maintaining a Healthy Body Crossword

Use the clues on Page 6 to fill out the crossword about maintaining a healthy body below!
You can also use the word list below to help you out.



- | | | | |
|---------------|---------------|-----------|-------------|
| CAKE | FOOD | MEAT | RESPIRATORY |
| CARBOHYDRATES | FRUIT | MILK | SERVING |
| CIRCULATORY | GRAINS | MINERALS | SKELETAL |
| COMPLEX | GROUP | MUSCULAR | VITAMINS |
| DAIRY | GUIDE | NERVOUS | |
| EATING | HEALTHY | NUTRIENTS | |
| FATS | INTEGUMENTARY | PROTEINS | |

ACROSS

- 2 Carbohydrates are the main type of nutrient received from this food group
- 4 Essential nutrients important for growth and nourishment. Foods sometimes have _____ added to them to increase their nutritional value.
- 7 The amount of food represented on a nutrition label is called a _____ size
- 9 This system involves the parts of the body that help a person breathe
- 10 The name of the substance from which humans receive nutrients.
- 11 The system in the body that includes the nerves is called the _____ system
- 12 The _____ system includes the skin, hair and nails
- 14 Blood is an important part of the _____ system
- 16 The system in the body comprised of bones is called the _____ system
- 17 Provided through a variety of foods, these essential nutrients are most often recognized by letter names
- 19 The building blocks needed for growth and maintenance of a healthy body are called _____
- 21 Foods such as bread and rice that have starch and cellulose are called _____ carbohydrates
- 22 A dairy product that provides the body with calcium and fat
- 23 More than one object in the same place or area is called a _____

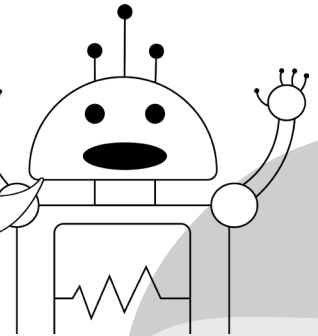
DOWN

- 1 The action of consuming food is called _____
- 3 This food provides essential vitamins and minerals and can sometimes act as a dessert
- 5 The body receives most of its energy from this source
- 6 Not diseased
- 8 The substances that provides nourishment. Can be separated into five categories
- 10 _____ are a high-calorie source of energy necessary for the maintenance of healthy skin
- 13 Canada's Food _____ to Healthy Eating provides a recommended outline of what most people should eat each day
- 15 This is an essential source of protein that vegetarians choose not to eat
- 18 The bodily system comprised of muscles is called the _____ system
- 20 A food group that relies heavily on products from cows
- 21 An example of a source of simple carbohydrates that should be eaten in moderation

How to Meal Prep! (Part 1)

Meal planning is super important for a lot of different reasons. It can be better for the environment, and it saves time and money! It also makes it easier to keep track of what you're eating so you can have a well-balanced diet full of the proper nutrients.

Meal planning works a little bit like a code. Computer programs follow a set plan in the same way that a cook would follow a recipe. While a recipe needs the right ingredients to get the resulting meal, a computer program needs the right inputs to get the proper output.



It's better for the environment because you will only buy what you need and will use, so less food goes to waste. Since you're using all the food you buy, it will also save money because you're not throwing away the things you buy, and you will need to eat out less. When you plan meals, it saves time when you're at the store because you know exactly what to buy.

How do you meal plan?

That's easy! Here is what you need to do to start meal prepping.

1. Set aside some time to plan your meals.
2. Find your recipes! They can either be from a book, from online or from an app.
3. Make sure to save your favourite recipes and plans so you can reuse them if you want.
4. Put an empty grocery list where everyone can see so everyone can add what they need.

Here are a few things to consider when you're choosing your meals:

- Make sure to think of what snacks you want too! Snacks are important to a healthy diet. They help keep you from overeating during the big meals of the day.
- What's your schedule like? If you have a busy week, you may want to choose recipes that take less time to make. You can also choose one day to make your meals for the entire week, so you don't have to make more meals later in the week. If your schedule is less busy, you may want to choose a few days during the week to prepare your meals.
- How many people are going to be eating the food? Whether it's just you, 4 people or even 8, you must make sure you're buying enough food so everyone can eat.
- Try recipes with overlapping ingredients. For example, if one recipe uses half an onion, try to plan it so another recipe uses the other half of the onion. This is important because if you use all your fresh food before they go bad, you reduce the amount of waste you're producing. No matter what, try to use all your fresh foods first! Canned and frozen food lasts way longer.

How to Meal Prep! (Part 2)

Here's an example meal plan for 3 days for 2 people:

	Breakfast	Lunch	Dinner	Snack
Monday	<p>Maple Brown Sugar Oatmeal with an apple</p> <p>Ingredients: Instant oatmeal, maple syrup, brown sugar, apple</p>	<p>Turkey sandwich with carrot slices and ranch dressing</p> <p>Ingredients: Whole wheat bread, turkey slices, marble cheese slices, lettuce, tomato slices, mayonnaise and mustard, carrots, ranch dressing</p>	<p>Rice and vegetable stir fry with black beans</p> <p>Ingredients: Brown rice, frozen vegetable medley, black beans, stir fry sauce</p>	<p>Morning snack: Yogurt cup and grapes</p> <p>Afternoon snack: Peanut butter and oat bar and banana</p>
Tuesday	<p>Peanut butter and banana sandwich</p> <p>Ingredients: Whole wheat bread, peanut butter, banana</p>	<p>Taco salad</p> <p>Ingredients: Lettuce, tomatoes, black beans, tortilla chips, marble cheese</p>	<p>Pizza melts</p> <p>Ingredients: Whole wheat bread, tomato slices, marble cheese, turkey slices</p>	<p>Morning snack: Apple slices and yogurt</p> <p>Afternoon snack: Fruit rollup</p>
Wednesday	<p>Maple Brown Sugar Oatmeal</p> <p>Ingredients: Instant oatmeal, maple syrup, brown sugar</p>	<p>Turkey sandwich with carrot slices and ranch dressing</p> <p>Ingredients: Whole wheat bread, turkey slices, marble cheese slices, lettuce, tomato slices, mayonnaise and mustard, carrots, ranch dressing</p>	<p>Rice and vegetable stir fry with black beans</p> <p>Ingredients: Brown rice, frozen vegetable medley, black beans, stir fry sauce</p>	<p>Morning snack: Banana and peanut butter and oat bar</p> <p>Afternoon snack: Tortilla chips and guacamole</p>

Leftovers can be refrigerated for 3-4 days. That way, you can make a bunch of food at once to take away some of the stress that comes with preparing food in the middle of the week.

A few good food prep apps to check out: Mealime, Paprika, Plate Joy, MealPrepPro. Mealime is my personal favourite. Everyone is different though, so try out a few to see which one you like best!

Coding in the Kitchen! - A recipe for Rice and Vegetable Stir Fry!

Ingredients

- 1 cup of rice
- 2 cups of water
- 2 cups of frozen vegetables
- 1 can of black beans
- 1 bottle of stir fry sauce
- Salt

Instructions

Add rice and water to a saucepan and bring it to boil. Make sure to add some salt to the water in order to give the rice some flavour. Once the water is boiling, cover the saucepan with a lid and turn the heat to low. Let it simmer until all the water has been absorbed (around 16-18 minutes), then fluff the rice with a fork.

Put the frozen vegetables in a pot with a little bit of water. Put a lid on the pot and let it boil until the vegetables are thawed but still firm. You can test the vegetables with a fork.

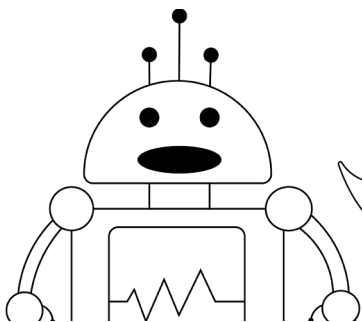
```
if vegetables (are frozen), then let vegetables keepBoiling  
  
if else, then drainWaterFromPot using colander  
and put vegetables backIntoPot;
```

While the vegetables are cooking, drain and rinse the beans.

Once you drain the vegetables, put them back in the pot and add the beans. Stir in the stir fry sauce and allow the whole mixture to heat up until the rice is done.

```
if rice (is done cooking), then rice isPlated and vegetables  
areAddedOnTop;  
  
if else, then keepCooking rice  
and vegetables keepHeating;
```

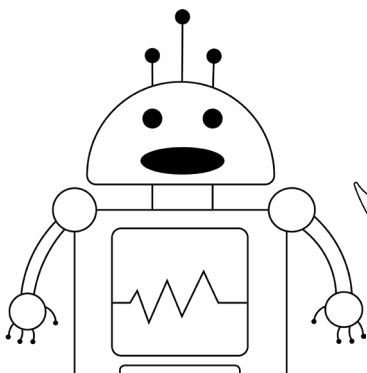
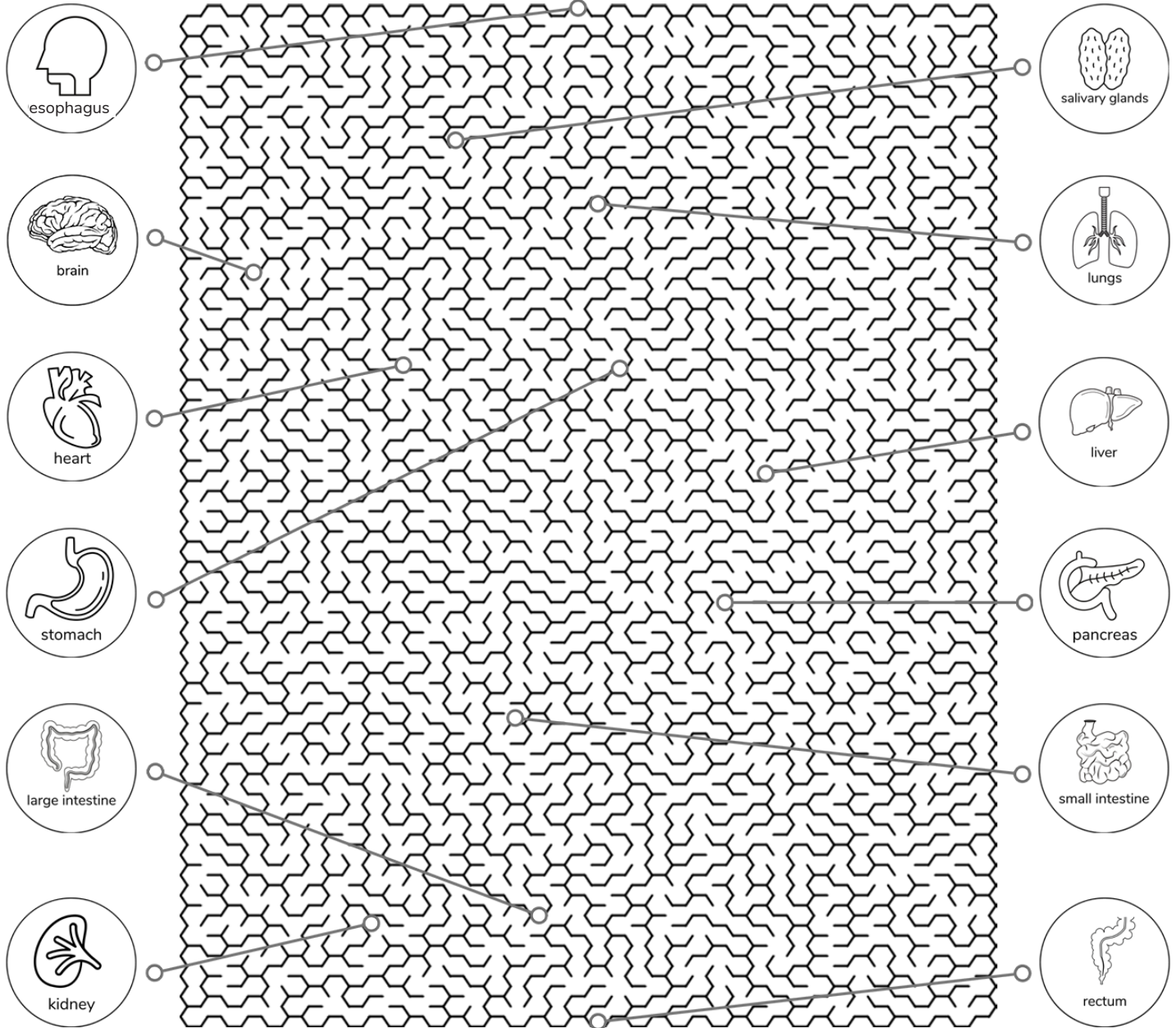
Put the rice in a bowl and top it with the vegetables. Enjoy your dinner!



More **conditional statements**! But this time, we have “if else” conditions: these are special cases where if the first condition does not happen, then the action after “if else” will happen. For example, in the first box above, the “if” line needs the vegetables to be frozen, but if the vegetables are anything but frozen, then the “if else” action happens instead.

Digestion Maze

Complete the following maze. Use the organs in the digestive system as guides. Hint: there are only 8 digestive system organs in this activity, so be sure to avoid the organs that are not a part of it!



In coding, you will often find something called **functions**. **Functions** are lines of code that can be repeated whenever a computer or machine “calls” it. **Functions** are called to take an **input** and make an **output**. The digestive system can be thought of as a **function** that humans call whenever they take food as **input**! Some **outputs** could be waste and the nutrients the body gets.

Physical and Chemical Changes in Substances!

Just like in **binary coding** where we use 1s and 0s to code true (1) or false (0) statements, classify the following substance changes as either a physical or chemical change, by writing either 1 or 0 in the circle beside the change..

Definitions

Physical Change:

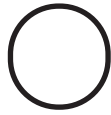
a change in objects that do not form a new chemical identity

Chemical Change:

formation of a new product via chemical reaction

RECODE: 1 = physical change and 0 = chemical change

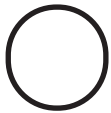
Rusting of a nail =



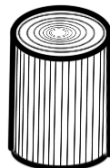
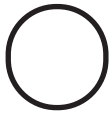
Chopping wood =



Chewing food =



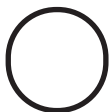
Burning wood =



Bending a nail =



Brewing tea =



Steep/
Heat

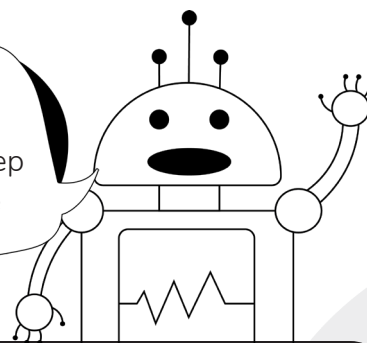


Esiw's Egg-cellent Experiment!

Materials

- A tall glass
- Vinegar
- One raw egg

You following the instructions below is the same as me following an **algorithm!** Algorithms are step-by-step instructions that I'm given to complete a task. In this case, what is the task?



Instructions

- 1 Place the egg in the glass gently.
- 2 Fill the glass with vinegar so the egg is fully submerged. Do you see any bubbles forming? What could this be?
- 3 Leave the glass in a safe place for 24 hours.
- 4 After 24 hours, carefully pour out the vinegar and replace with fresh vinegar. Place the glass back in a safe place and leave for one week (do not disturb the egg!)
- 5 After the week is over, carefully pour out the vinegar, take the egg out and rinse it gently with water.

You have successfully just chemically removed the shell of the egg! All that is left now is a thin membrane, or **Semipermeable Membrane** that surrounds the yolk and egg white.

This is a **Chemical Change**. A **chemical change** produces a new substance with distinct properties. You may be thinking that you still have an egg, so it was just a physical change. But you actually performed a chemical reaction and created new products. This is also **Not Reversible**. Unfortunately, you will not be able to recreate the shell that egg had.

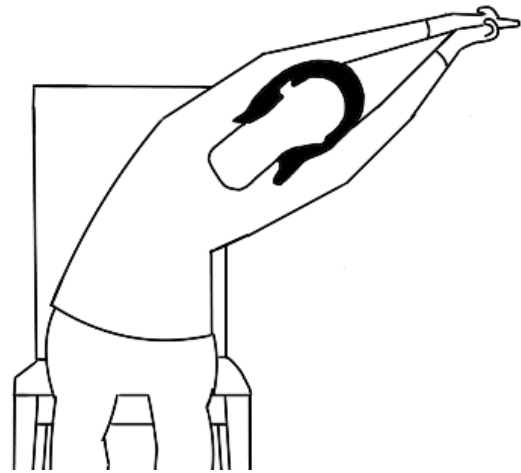
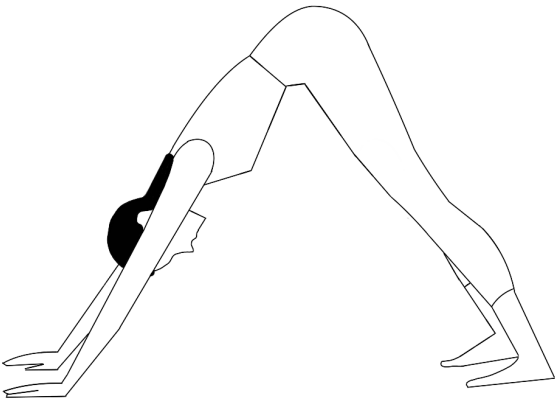
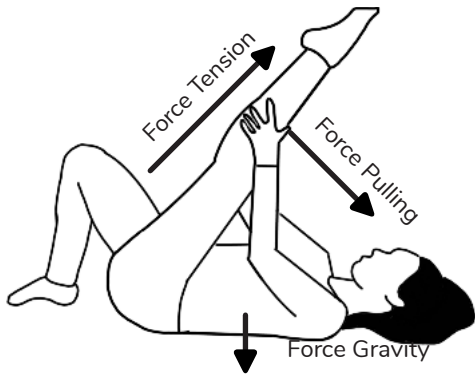
What Happened?

The shell of an egg is made of **Calcium Carbonate**, and the vinegar you used is a diluted form of **Acetic Acid**. When the two substances come together, they react to form **Carbon Dioxide** (the bubbles you saw forming on the egg!), **Calcium Acetate** and **Water**.

Forces Related to Stretching

Time to stretch! Find a nice open space and complete each stretch to the best of your ability. Once you've done each stretch draw a free body diagram illustrating where and in which direction the forces are acting on your body after you've completed each stretch.

Example of a free body diagram:



Invent Like an Engineer (Part 1) - Anemometer

Imagine this:

You would like to start practicing for a kite flying competition later this year. But you know that you can only fly a kite if the wind is going at least 10km/h and no faster than 40km/h. Unfortunately, all the weather stations and apps are down for a mass update this summer, and there's no information about the wind available. You need to determine the wind speed on your own each day to see if you're able to practice kite flying this summer! How can you solve this problem?

In this activity, you will use your engineering and design skills to make an anemometer! An anemometer is a wind speed calculator. Based on the amount of time it spins, you can determine the wind speed. But first, you will need to build and calibrate it.

Materials

- 3 thin wooden dowels (skewers will work)
- 5 paper cups
- An empty water bottle
- Hole puncher
- Tape

Instructions

- 1 Ask an adult for help to punch holes in one side of four of the paper cups. Add a piece of tape or colour one of these cups so it's easily identifiable.
- 2 Ask an adult to make four evenly spaced holes around the fifth cup.
- 3 Slide two of the wooden dowels through the cup so it makes an "X" inside.
- 4 Add one cup to each end of the dowels and secure them with tape. Make sure the cups are all facing the same direction in the circle!
- 5 Take the third wooden dowel and poke a hole in the centre of the fifth cup. Slide it up until it touches the "X" you made before. This is the axis!
- 6 Place the middle dowel into the empty water bottle.

To Calibrate:

Ask an adult to drive down the street on a windless day at 20km/h and hold your anemometer out the window (if it's okay with the adult!). Count how many rotations the marked cup makes as it spins for 30 seconds. Now you know how many rotations it makes when going 20km/h.

Evaluate how consistent the machine is. Try calibrating five different times. Will it always make the same amount of revolutions each time? Find an average based on the five trials.

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Rotations at 20km/h					

An average can be found by adding all 5 numbers together and dividing by 5.

Based on your calibration, you can now use the anemometer to determine if the wind is fast enough to fly your kite! For example, let's say the average rotations of your anemometer during calibration was 10 rotations. On a day when you do not know the wind speed, use your anemometer and find out how many rotations it makes, then use the following equation to determine the windspeed:

$$\text{Windspeed} = \frac{\text{Rotations on unknown wind speed day}}{\text{Average rotations from calibration}} \times 20$$

Criteria for Evaluation:

Some things to consider when evaluating the prototype:

- How well did it function? i.e. did it stand on its own?
- Did it spin consistently?

Write down some strengths and weaknesses you observed:

Based on these observations, what can be done to solve the problem efficiently? Think about the problem at hand. Is there an easier way to solve the problem? When considering your next prototype, do you want to modify the current model or create a new machine that has a similar function?

Evaluating the design:

Is there a way you can recreate this prototype using cheaper materials or other materials you might find at home? Could you list them below?

Are there other materials you can use to attach things that may be more effective? (ex. instead of tape)

What would you improve on this prototype so that the anemometer can be more efficient?

Invent Like an Engineer (Part 2) - Pulley

Imagine this:

You and your friend are socially distancing. They want to come over to play a fun game. Your friend will have to go in your basement, while you have to stay on the main floor. You want to be able to hand each other toys while you're on the main floor and they're downstairs, but you don't want to throw them, so they don't break. How can you solve this problem?

In this activity, you will use your engineering and design skills to make an elevator using a pulley! A pulley is a wheel with a grooved rim around which a cord passes. It acts to change the direction of a force applied to the cord and is chiefly used (typically in combination) to raise heavy weights.

Materials

- A plastic water bottle with its cap
- 2 pieces of cardboard cut in circular shapes of the same size
- Yarn
- Hot glue
- Wooden skewer
- Scissors

Instructions

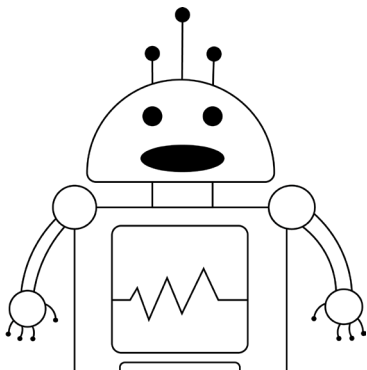
- 1 With the help of an adult, take the plastic cap off the bottle and punch a hole its center.
- 2 Cut a hole in the center of the two cardboard pieces.
- 3 Using the hot glue, glue the two pieces of the cardboard to each end of the cap.
- 4 Insert the skewer in the middle of the hole.
- 5 Using the scissors, cut off the bottom third of the water bottle to make a basket.
- 6 Cut two holes in the basket.
- 7 Cut a long piece of lanyard (however long you would like your pulley to extend).
- 8 Pass your string through the holes you created in the basket while passing the extended part through the bottle cap/cardboard piece through placing it on top of the cap.
- 9 Place the ends of the skewer on two high surfaces while having the middle part suspended.
- 10 Place an item in the basket and use the yarn to pull it with the help of your pulley.

Evaluating the design:

Is there a way you can recreate this prototype using cheaper materials or other materials you might find at home? Could you list them below?

Try placing a range of items with different weights in the basket. List the items you use below. Did it feel easier using a pulley to lift the heavier items, compared to directly lifting them?

What would you improve on this prototype so that the pulley can be more efficient?



Evaluation

is an important part of computer programming! **Evaluation** is when a program's success is measured. For example, if you were testing a program that delivered results for math questions, some things you might evaluate for success would be how accurate the answer is or how fast does it take the program to get the answer. In this case, how would you measure your pulley's success?

I Spy Clouds!

Unscramble the following cloud types and place them in the proper blank spaces below!

TSATSUR

=

RIRUSC

=

MULCUSU

=

I spy a cloud that is....

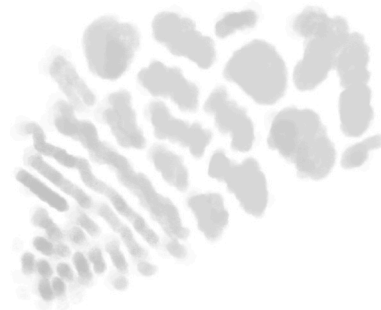
- wispy
- thin
- “curly”
- found high in the sky



It's a ----- cloud!

I spy a cloud that....

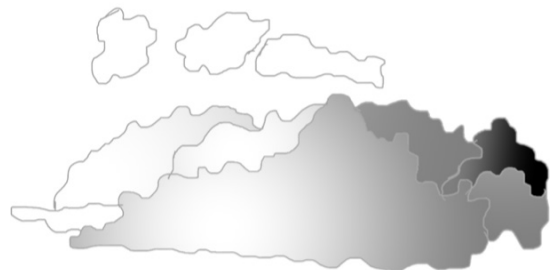
- produces light showers
- is often seen in large flat sheets
- is lower to the ground
- sometimes turns to mist or fog
- stays in the sky for many days at a time



It's a ----- cloud!

I spy a cloud that is....

- white
- fluffy
- “heap” like
- like a ball of cotton in the sky
- close to the ground



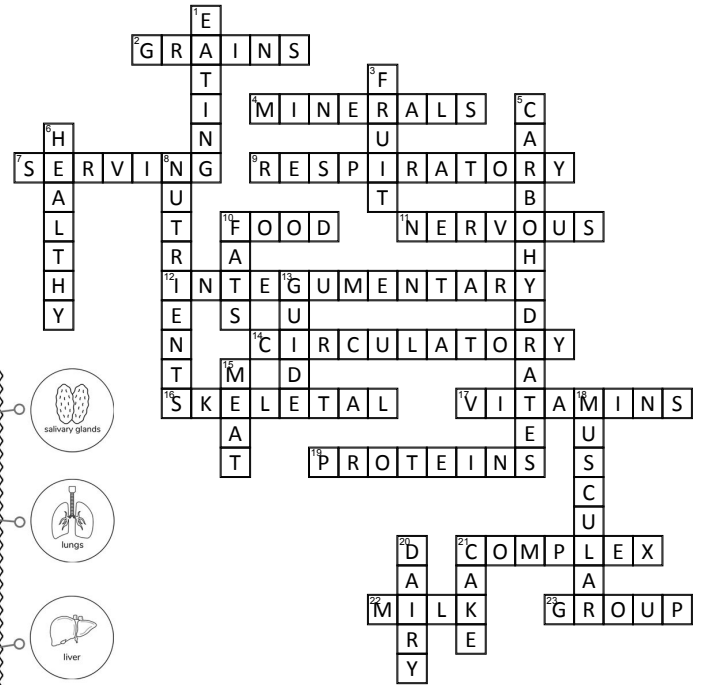
It's a ----- cloud!

Answer Keys

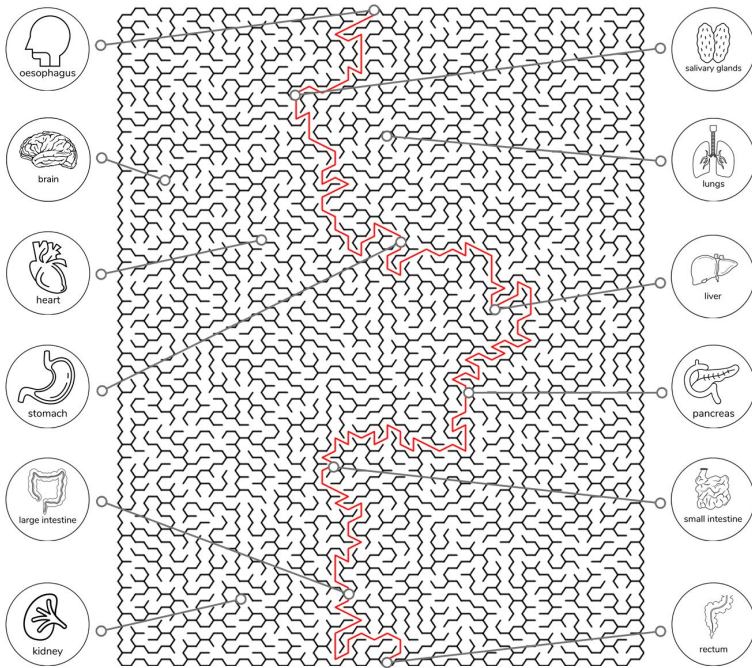
Code for a Healthy Body (Page 4)

- Line 1: move your body
- Line 2: sleep
- Line 3: eat well
- Line 4: get out in nature
- Line 5: take breaks
- Line 6: take deep breaths
- Line 7: practice gratitude

Maintaining Healthy Body Crossword (Page 5-6)

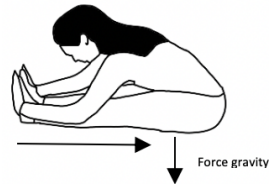
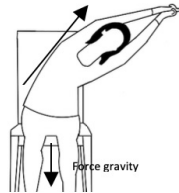
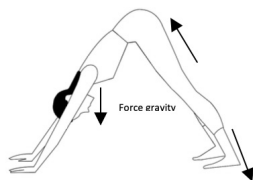
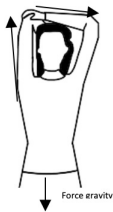


Digestion Maze (Page 10)



Physical and Chemical Changes in Substances (Page 11)

- Rusting of a nail = 0
- Chopping wood = 1
- Chewing food = 1
- Burning wood = 0
- Bending a nail = 1
- Brewing Tea = 0



I Spy Clouds! (Page 18)

TSATSUR = STRATUS

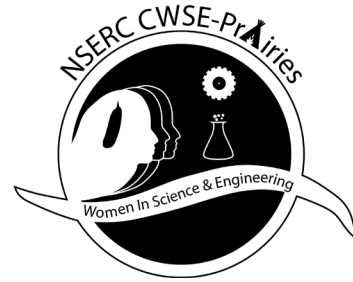
RIRUSC = CIRRUS

MULCUSU = CUMULUS

From top-down:

- Cirrus
- Cumulus
- Stratus

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