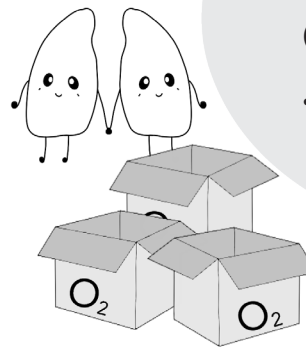


# WISE Activity Booklets

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

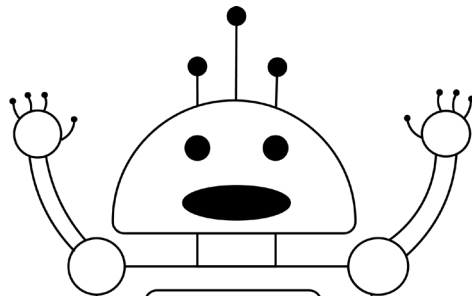
A network  
member of  
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Youth · STEM · Innovation

With funding from  
**Canada**

## Grade 5 VOLUME 6

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.

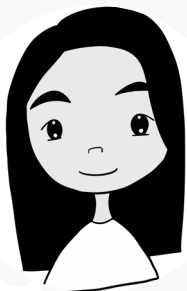
We hope that you enjoy doing the experiments and activities as much as we loved creating them for you.

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!



### Amaris

**Amaris** is in her second year in sciences at the University of Winnipeg and plans on majoring in biology. In her free time, Amaris likes reading, playing piano and baking.

### Brenna

**Brenna** is in her third year of mechanical engineering and loves learning about the science behind how things in our world work! In her free time she likes baking, seeing friends, and playing with her dog



### Huda

**Huda** is in her second year taking general science courses and she's trying to decide between a degree in Microbiology or Genetics. She enjoys baking and cooking and her favorite activity is watching videos on YouTube!



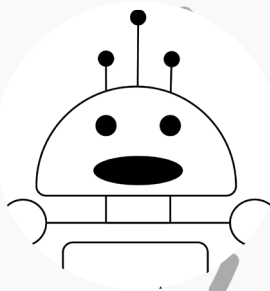
### Toni

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



### Esiw the Robot

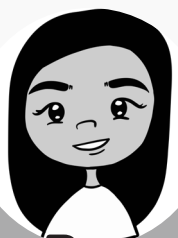
**Esiw** is a friendly robot that loves to help kids learn about computers & coding! Esiw loves to do math, solve problems and make people laugh!



## ... and our Incredible Editors!



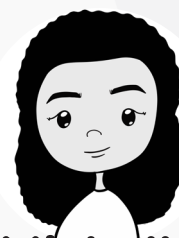
Alex



Bea

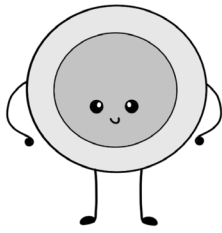


Mahalia



Michelle

# Cherry the Blood Cell



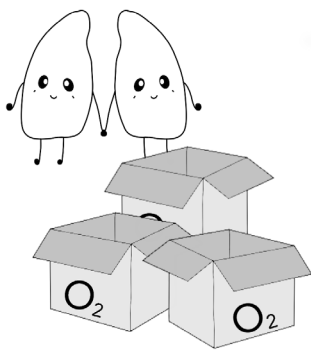
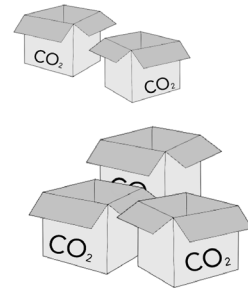
This is Cherry, she's one of the 20-30 trillion blood cells in your body. She has a simple yet VERY important to do list. We need her to survive.

## TO DO LIST

### IMPORTANT TASKS

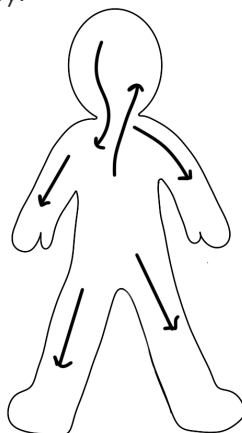
- REMOVE CARBON DIOXIDE FROM THE BODY.
- CARRY OXYGEN FROM THE LUNGS TO THE BODY.
- CARRY NUTRIENTS TO THE BODY.

Cherry begins her day by collecting boxes and boxes of carbon dioxide from places within the body. She takes these boxes to the lungs where they can be turned into oxygen.

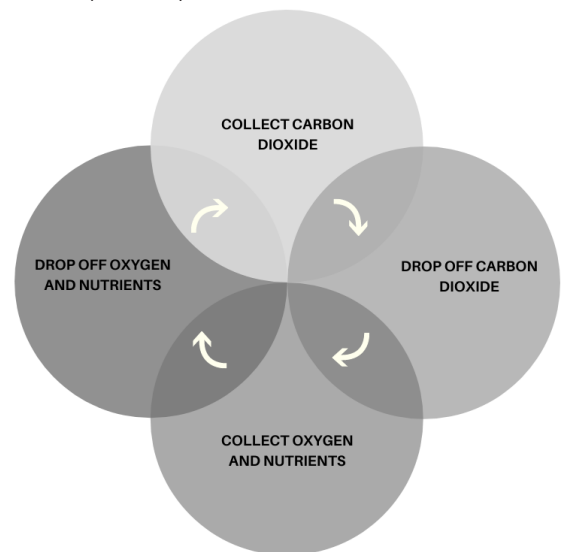


After dropping off the carbon dioxide, she fills up her boxes with oxygen from the lungs.

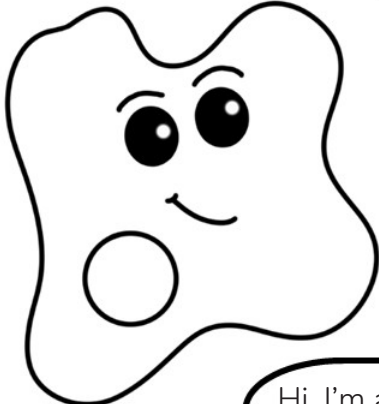
She then leaves to transport oxygen and nutrients she collected to different parts of the body.




When her boxes become empty, she begins to collect carbon dioxide again, and the cycle repeats.




## Immune System Comic



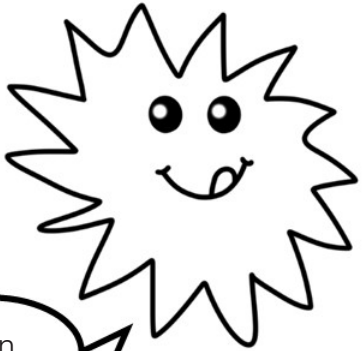
Hi, I'm a **macrophage**! I identify unknown substances in the body then destroy them by engulfing them with my cell body.



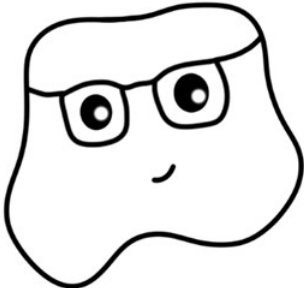
Hi, I'm a **helper T cell**! After the macrophage identifies an unknown substance, I recognize the identification and send a chemical signal to the B cells and start the immune system.



Hi, I'm a **B cell**! I make antibodies which are chemical markers that tag substances as foreign. These tags make these unknown substances easy targets for the killer T cells.



Hi, I'm a **killer T cell**! I kill foreign cells and substances. Sometimes I have to kill my body's cells if they become infected to prevent the infected cells from reproducing unhealthy cells.

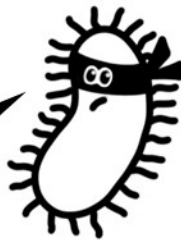


Hi, I'm a **memory B cell**! I'm part of a secondary immune response and my job is to remember information about foreign substances. In the case of a second attack of the same substance, I make the job of identifying that substance easier and quicker.

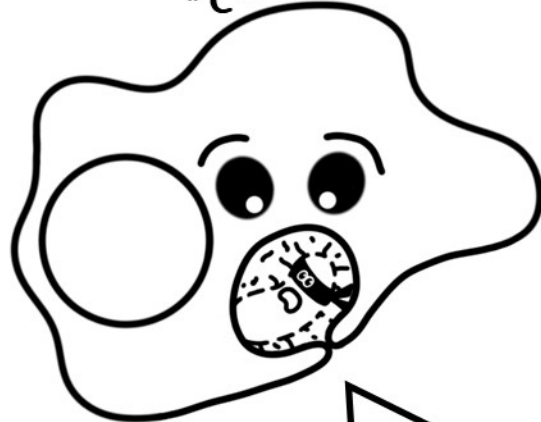
Hey! Who are you? You don't belong here...



Umm...yes I do...I'm one of you!

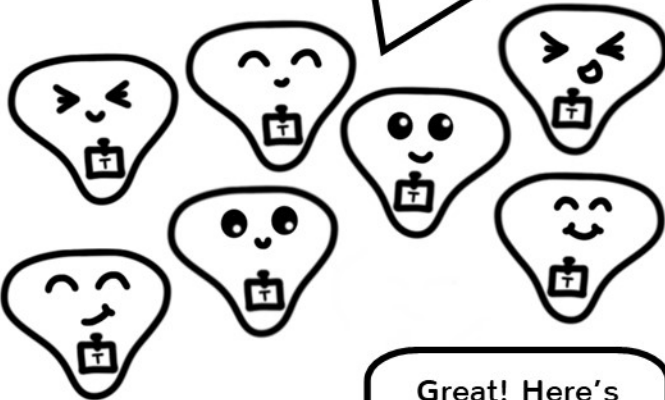


\*CHOMP

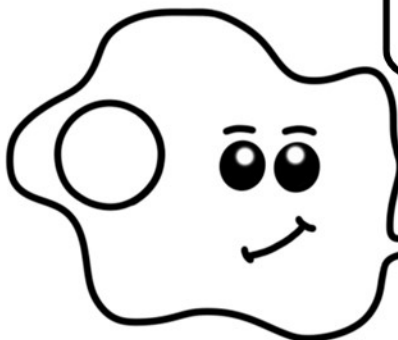


Aha! I knew it...a Cold Virus! I need help, we're under attack!!!

Helper T cells at your service!



Great! Here's what we're up against.



### WANTED

Name: Cold Virus

Specialty: Infectious Disease

Symptoms: Cough, Sore Throat,  
Runny Nose, Sneezing

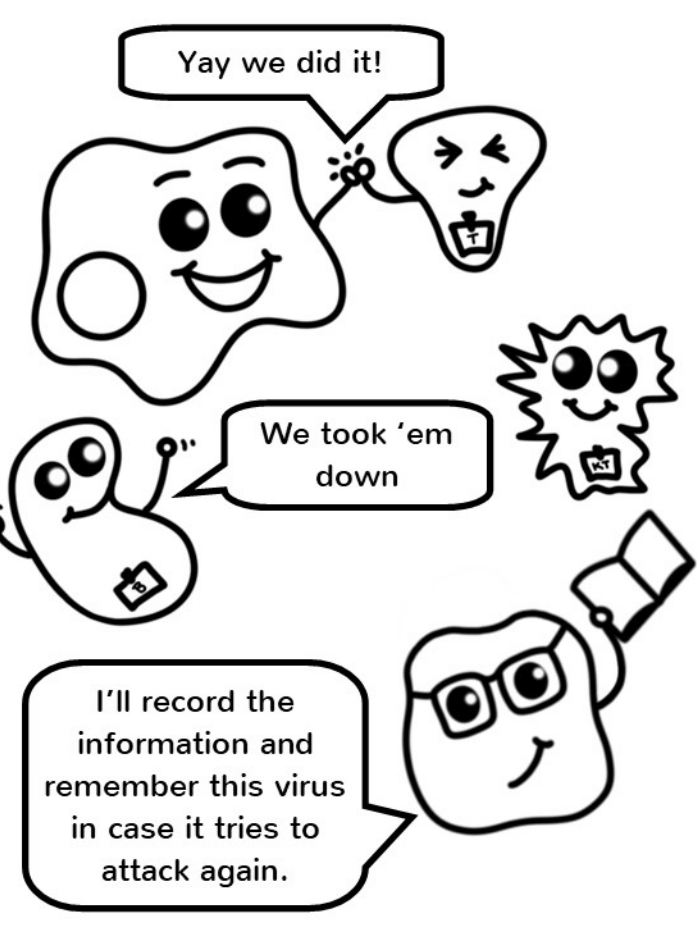
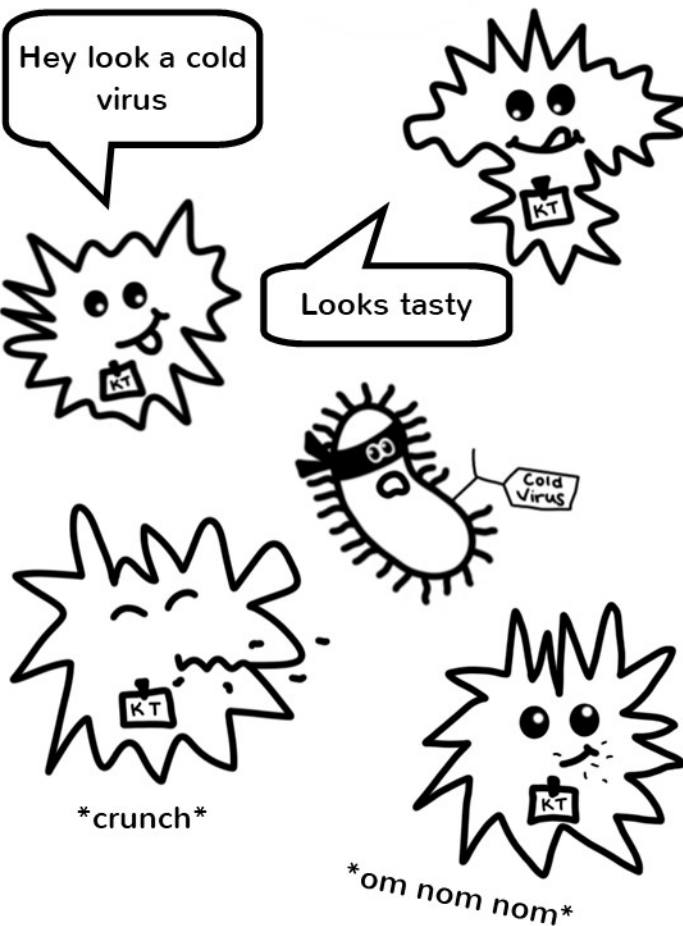
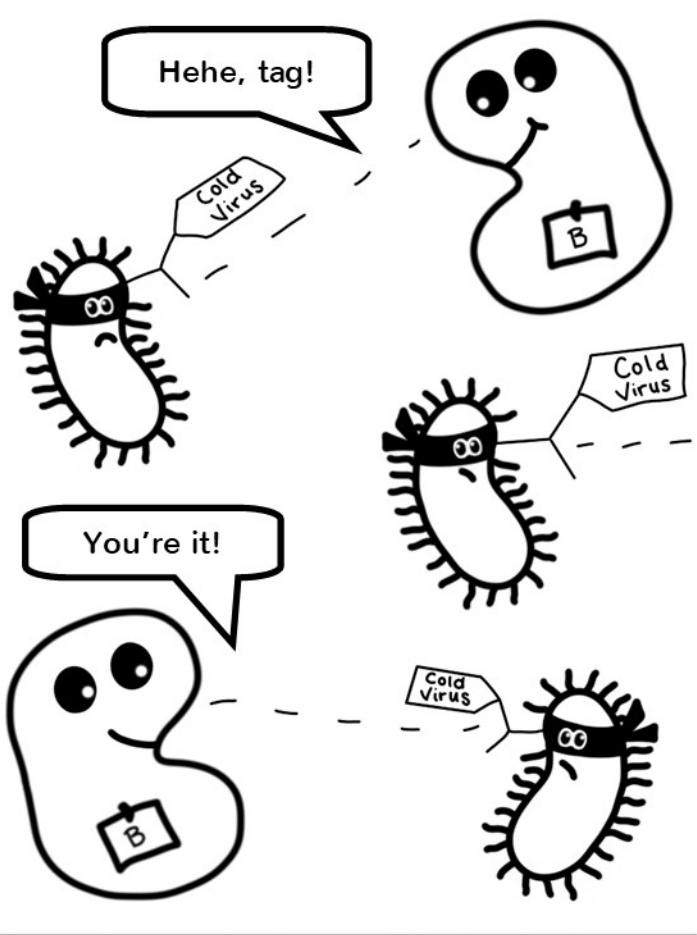
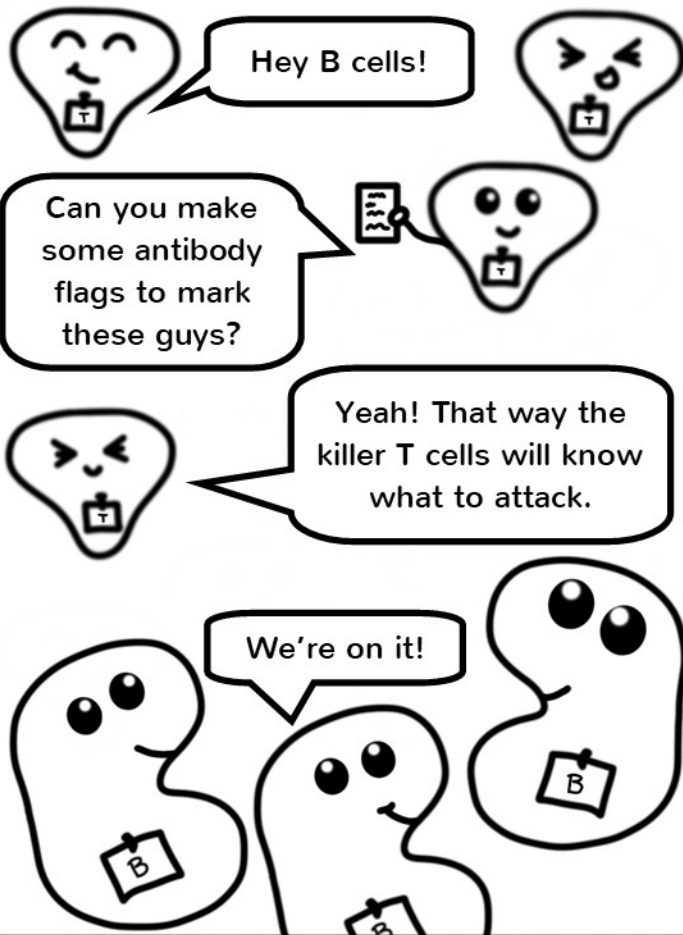
Notes: Needs host cells to survive.

Uses our cells to reproduce then kills the cells after.

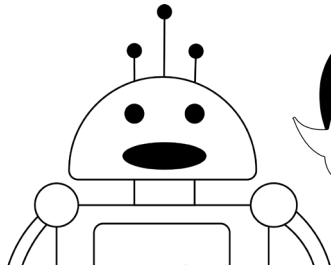
Must kill it before it kills us!!

Got it!

We'll let the B cells know.



## Drag and Drop Systems in the Human Body



Drag and drop coding is one way that you can program something!

Here's a little bit of information about the systems in our body:

1. The skeletal system is made up of all 206 bones in our body, including cartilage, tendons and ligaments. This system is what provides strength, shape, and balance to our bodies. We would not be able to stand up without it!
2. The muscular system is composed of all the muscles in your body! There are three kinds of muscles; they are skeletal (attached to bones), smooth (in blood vessels), and cardiac (your heart). The main purpose of this system is to move our body.
3. The nervous system works like a computer! It is made up of our brain, spinal cord, and nerves. Our brain sends and receives messages to and from our body, similar to a network.

**Write the code in the correct order for the following scenario:**

ESIW's friend Reem is sitting down on a chair in her living room and she needs to get up and head outside to catch her bus.

Help each system fulfill its duties to help Reem catch her bus using drag and drop coding on Page 9.

**Example: Reem wants to take water out of the fridge to drink.**

When Reem receives a signal from her brain that she is thirsty and wants a drink of water from the fridge.

I think I am thirsty (**Nervous system**)  
Go to the fridge (**Muscular and skeletal system**)  
Open the fridge with left hand (**Muscular and skeletal system**)  
Search for water (**Nervous system**)  
Remove water with right hand (**Muscular and skeletal system**)  
Close the fridge (**Muscular and skeletal system**)



**Drag and Drop Code Bank:**

Move 20 steps

Place right and left foot on the ground

Move 2 steps

Think I have to get up

Stand up, and balance using bones in toes

Close door with right hand

Go to bus stop

Fill in the blank code below using the code from the drag and drop code bank above.

When Reem receives a signal from her brain to get to the bus,

Open door with right hand

Stand

## Healthy Bodies, Coding Edition

Being healthy includes many things. Having a healthy body can mean eating healthy foods, exercising, drinking water and many other things.

This is the same for robots! Just like people, robots need to stay healthy so they can keep working.

Below you will find examples of things that people do to stay healthy, and things robots need to stay healthy. Can you sort them under human and robot? Can you line them up with the correct category?

### Actions

- Using the device or machine
- Eating lots of fruits and vegetables
- Getting 8 hours of rest every night
- Going on a walk every day
- No water - Water and electricity don't mix
- Turning a device or machine off after using it
- Drinking lots of water
- Doing lots of things to make us happy
- Staying indoors when it's too hot or cold
- Installing anti-virus software to keep a device safe or doing maintenance on machines
- Charging a device or giving them gas to run
- Giving a device a break when it starts overheating


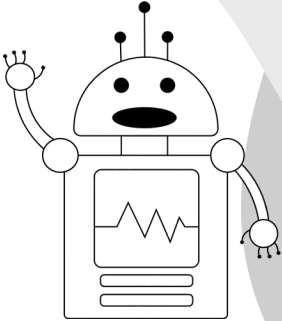
	Human	Robot
<b>Food</b>		
<b>Hydration</b>		
<b>Exercise</b>		
<b>Taking care of our mind</b>		
<b>Heat and cooling</b>		
<b>Sleep</b>		

Let's build a healthy day! Robots use codes to tell them what to do and to help them stay healthy. Using the same idea, let's arrange a healthy day for a person!

Below, you will see a chart for a robot and a person. In the Robot's box there are a list of things that robots do to stay healthy underneath the title called "Healthy day". This is what a basic code looks like.

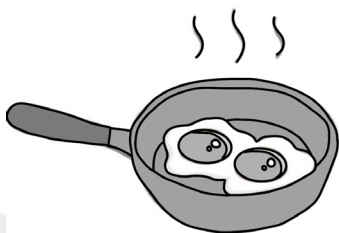
The title "AHealthyDay" is a function. Functions are big tasks that are made up of lots of smaller steps called components. Code is usually written without spaces, and by capitalizing the first letter in every word. You'll also see lots of shortened words or phrases so that the code is shorter and easier to read.

Can you code a healthy day for yourself? Think about what you do to stay healthy. Use three examples from the table on Page 10 and make up three of your own. Remember, everyone is different so every healthy day will look different!

	
<p>Function: _____</p> <ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> </ol>	<p>Function: <u>AHealthyDay</u></p> <ol style="list-style-type: none"> <li>1. UseTheDevice</li> <li>2. TurnOffDeviceWhenDoneUsing</li> <li>3. ChargeDevice</li> <li>4. GiveDeviceABreakWhenOverheating</li> <li>5. InstallAntiVirusSoftware</li> <li>6. NoWater</li> </ol>

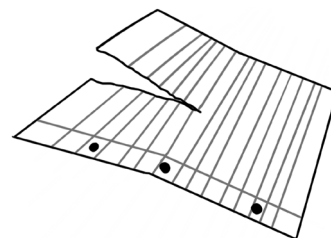
## Physical and Chemical Changes Journal

As we go about our everyday life, we make lots of changes to the objects around us! We might mix things together, fold or crumble them, cook something, or cause a state change like melting or freezing. These can all be sorted into two different categories: they are either a **physical change** or **chemical change**.



So how can we tell the difference between physical and chemical changes? Well, a chemical change means that there is a chemical reaction happening, and the substance has been changed on a molecular level. There is a totally new substance created with its own unique properties! Think of cooking an egg, burning a piece of paper, or a banana rotting.

With physical changes the actual substance is still the same, but the appearance has been changed. Any state changes like melting ice cream or boiling water are physical changes, because it is still the same substance, just in a different form. Bending, cutting, or breaking are also physical changes - a broken glass bottle is still glass, and a ripped piece of paper is still paper.



Physical and chemical changes are all around us! What are some of these changes in your daily activities? Think like a scientist and keep track of these changes in the chart below. Explain how the substance is changing and write down your thoughts and observations! To help you out, a few of the journal entries have already been filled in for you.

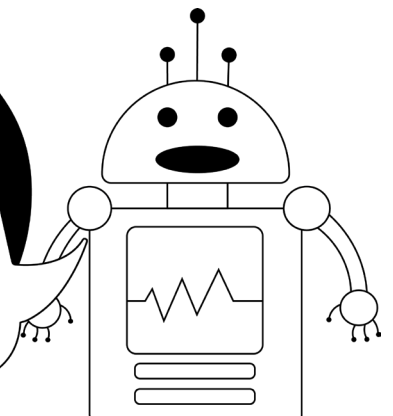
Activity	Before	After	What type of change is this? Why?
Cooking pancakes for breakfast with my family	The pancake batter was a smooth and pale liquid	The pancakes were solid and fluffy. They are darker and some bits are burnt.	This is a chemical change because heating up the pancake batter changed it into something new. Cooking and burning are chemical changes.
Cutting up apple slices	The apple was whole, solid, and looked red and shiny.	The apple slices are solid. The skin is red and shiny, the inside is white.	This is a physical change because the substance is still apple, only the shape changed.
Leaving apple slices out on the counter.	The inside is white, the skin is red.	The inside looks brown, the skin is still red.	This is a chemical change because something different and new was created. There was a chemical reaction between the air and the apple that changed things.

This activity continues on the next page!

SLO : 5-2-01, 5-2-10, 5-2-11

Activity	Before	After	What type of change is this? Why?

For this activity you are **sorting** the changes into two categories, physical or chemical. Did you know that computers can be super helpful when sorting data? Humans can write computer code with instructions on how to compare and sort certain data, using logic statements like **“if”**, **“else”**, and **“not”**. These logic statements are based on what the data is and how they want to organize things. This is especially helpful when there is a LOT of data to sort through, because after the code instructions are written, the computer can quickly sort through everything and do all the work!

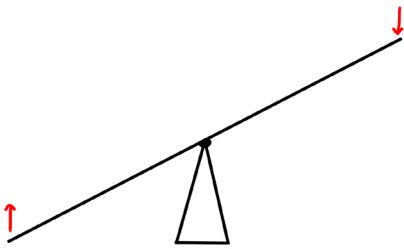
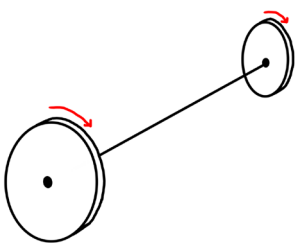
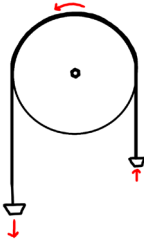
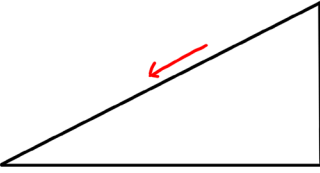

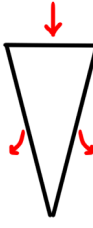


## Simple Machines Adventure

You are going on a wilderness journey! To help you along, you've packed a big collection of supplies. These supplies include lots of simple machines that will come in handy for different situations. Simple machines like levers, pulleys, and wedges can be used to apply force and help complete a task. We can see examples of simple machines in everyday life!

How well do you know all the simple machines? Fill in the blanks with which item would be the best choice, then check the answers at the back of the book to see how well you did. But be careful! Each tool can only be used once, and you also have a few tools/items you won't need at all.

Here are all the simple machine supplies you have:

		
<p>Lever</p> <ul style="list-style-type: none"> <li>• Crowbar</li> <li>• Wooden board on a rock</li> <li>• Seesaw</li> </ul>	<p>Wheels &amp; Axles</p> <ul style="list-style-type: none"> <li>• Skateboard</li> <li>• Motorcycle</li> <li>• Wagon</li> </ul>	<p>Pulleys</p> <ul style="list-style-type: none"> <li>• Fishing rod</li> <li>• Sailboat sail rigging</li> <li>• Zipline</li> </ul>
		
<p>Inclined Planes</p> <ul style="list-style-type: none"> <li>• Ramp</li> <li>• Playground slide</li> </ul>	<p>Screws</p> <ul style="list-style-type: none"> <li>• Glass jar and lid</li> <li>• Metal screws</li> </ul>	<p>Wedges</p> <ul style="list-style-type: none"> <li>• Axe</li> <li>• Shovel</li> <li>• Knife</li> </ul>

To start off your adventure, you hike into the forest. The trail is a bit muddy, but it doesn't seem to be too bad. It is a nice sunny day, and you see beautiful flowers and butterflies everywhere you look. As you walk along, you get distracted by a squirrel and slip in the mud! You slide off the trail and down a hill, until you land in a deep ditch with high, steep walls. It looks like you might be stuck down there. But no worries! You know just what to do. Instead of attempting to climb up the walls, you use a \_\_\_\_\_(1) to get out, and continue on your journey.

The next hour is very easy hiking, but then you come across another problem. You've found what seems to be an abandoned fishing rod on the side of the trail, but it is stuck under a huge fallen tree. You really want that fishing rod to take with you, but the tree is too heavy to lift! You struggle for a bit, then give up and sit down to rest. Then you have an idea! Instead of struggling to lift the tree on your own, you use a \_\_\_\_\_(2) to apply the lifting force and help you out! And just like that, you have a fishing rod to help you on the journey.

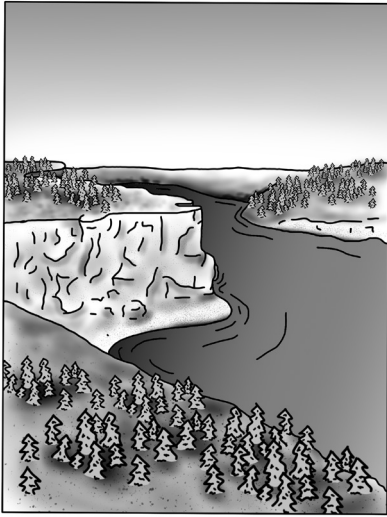
As you head deeper into the forest, you find a stream of fresh water. Since water is always good to have, you decide to collect some to save for later. You use your \_\_\_\_\_(3) to bring some water with you for the journey. After collecting the water, you look up and see something unusual sitting in the stream. It's a wooden chest! Maybe there is a pirate treasure inside? You go to take a closer look, but realize that it is nailed and shut and difficult to open. You reach into your backpack and use your handy \_\_\_\_\_(4) to pry out the nails and open it up. The inside is filled with beautiful gems and gold coins! You want to bring them with you, but it's all too heavy to carry. No worries, you have a \_\_\_\_\_(5) that you can use to bring the treasure along.



The sun is starting to set, and you should probably find a good spot to spend the night. You have a sleeping bag, blankets, and a tarp, but you need a way to hold up the tarp above you for shelter - you can see some dark clouds rolling in, and it might rain overnight!

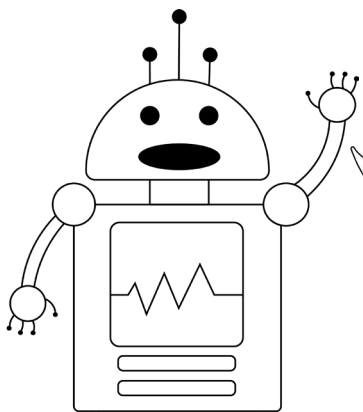
You find a comfortable spot to rest, with tall trees overhead. Looking at the branches above, you get an idea. You pull some rope out of your backpack, cut it into some pieces with your \_\_\_\_\_(6), and raise up one side of the tarp by tying the corners to tree branches. The slanted tarp will act like an inclined plane; any rain will roll right off and keep you dry underneath!

Good morning! You slept well and didn't get wet at all, thanks to your fantastic problem-solving skills. After packing up you feel pretty hungry, and decide to go back to the stream to try and catch some fish to eat. You sit down on a rock by the shore, pull out your \_\_\_\_\_(7), and wait. After a few minutes, you've got a fish for breakfast! You go for a quick walk and find a fallen tree that you chop up with your \_\_\_\_\_(8), so you can build a fire for cooking. Once you've finished eating, you put out the fire and continue your adventure.



After walking for most of the day, you reach a massive lake! From where you stand on the top of a cliff, you can see the sandy beach and bright blue water spreading out below you. But, how will you get down? It seems too steep and dangerous to try and climb, especially with all the supplies and treasure you've brought with you. Thankfully, you can use a \_\_\_\_\_(9) to get down safely with all your items. Hey, that was pretty fun! As you walk along the shore, you find an old sailboat caught on some rocks in the shallow water. It seems to be in pretty good condition, but there is a hole in the side that you'll need to fix up. You find some wooden boards inside the boat, and use some \_\_\_\_\_(10) to secure them in place. Awesome! You load up all your supplies onto the boat, push it out from the rocks, and head on your way. You raise the sail using the \_\_\_\_\_(11) and allow the wind to push you along, excited to see what the next adventure will be.

The end! Flip to the back of the booklet to check your answers and receive a final message.



Guess what? You just used variable computer skills! You practiced **optimization** by deciding what the best and most efficient choice would be for each situation. We can also compare filling in the blanks to computer code **input** and **output**. Certain inputs (the answers you wrote down) will lead to different outputs (the message you received).



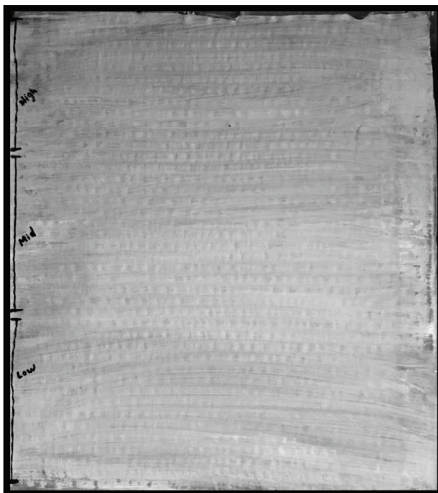
## How to Make Clouds

### Materials

- Cotton balls
- Feathers (any colour works)
- White string or yarn
- Crafting glue
- Grey and white paint
- A paintbrush
- A piece of cardboard (any size)
- Coloured paints for background (optional)

### Step 1:

Paint your piece of cardboard using any colours you have on hand. This will be your sky! Let it dry before moving onto Step 2.



### Step 2:

Split your cardboard into thirds. Draw a small line on the side to mark the lower third, middle third and top third of your cardboard.

### Step 3:

Let's start by making Cirrus clouds! Take your feathers and cut them into small wisps, removing the stem or quill. Using your paintbrush or finger, spread a little glue in the top third of your sky. Spread the feathers on the glue.

Cirrus clouds are short, detached, hair-like clouds found at high altitudes. They are wispy with a silky sheen or look like tufts of hair.



#### Step 4:

Moving down to your middle third, let's make some Nimbostratus clouds. Take some of your cotton balls and wet them with a little water. Then, dip them in some grey paint to make them heavy and grey. Spread them over most of the middle third of your sky and glue them down (when the cotton balls are dry!).

Nimbostratus clouds are large, grey and take up a lot of space. These clouds have lots of water in them, and are seen during stormy weather that release rain to the ground.



#### Step 5:

Take your white string and cut out several long pieces the same length. Glue them one under the other to make up part of the lower third of your sky.

These are Stratus clouds. Stratus clouds are very thin clouds layered on top of each other. They are spread out and cover a lot of area. When it is very humid, these clouds make light rain and snow during the winter.



#### Step 6:

In the lower third of your sky, take the rest of your cotton balls and glue them close together to make a fluffy cloud!

These clouds are called Cumulus clouds! Cumulus clouds are the biggest and fluffiest clouds, and are usually what people imagine of when they think of clouds. Cumulus clouds usually mean a partly sunny day, and they rarely make rain or snow.



## Answer Keys

### Drag and Drop Systems in the Human Body (Pages 8-9) Healthy Bodies, Coding Edition (Page 10)

When Reem receives a signal from her brain to get to the bus,  
Think I have to get up  
Place right and left foot on the ground  
Stand up, and balance using bones in toes  
Move 20 steps  
Open door with right hand  
Move 2 steps  
Close door with right hand  
Go to bus stop  
Stand

	Human	Robot
Food	Eating lots of fruits and vegetables	Charging a device or give them gas to run
Hydration	Drinking lots of water	No water
Exercise	Going on a walk every day	Using the device or machine
Taking care of our mind	Doing lots of things to make us happy	Installing anti-virus software
Heat and cooling	Staying indoors when it's too hot or cold	Giving a device a break when it starts <u>overheating</u>
Sleep	Getting 8 hours of rest every night	Turning a device off after using it

### Simple Machines Adventure (Pages 12-14)

1. Ramp.
2. Wooden board on a rock.
3. Glass jar and lid.
4. Crowbar.
5. Wagon.
6. Knife.
7. Fishing rod. (Note: This is actually more than one simple machine! The rod is a lever with a fish as the load. The bottom of the rod with the handle is the fulcrum, and you apply force when reeling in the fishing line. The act of reeling in the fish uses a pulley, with the turning wheel and the fishing line working together.)
8. Axe.
9. Playground slide or zipline. Both options would work! For a slide you could send all the supplies down before you, and for a zipline you'd just need to carefully hang onto everything.
10. Metal screws.
11. Sailboat sail rigging (ropes and pulleys that are used to move and hold parts of the sails).

#### Final messages:

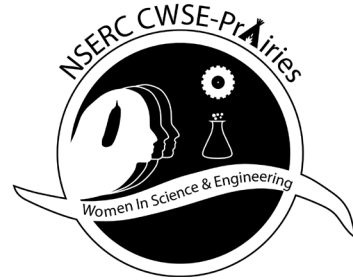
**If you got all 11 correct:** Perfect, you're a survival expert! You really know how to use simple machines, and did a great job of optimizing all your choices.

**If you got 9 or more correct:** Fantastic! You did a great job of choosing supplies. You must have a pretty good understanding of simple machines and how we can use them, but some different choices could have made your adventure easier.

**If you got between 5 and 8 correct:** Nice work! Your choices weren't the most ideal, but you still got the job done. Keep learning to better understand simple machines and how we can use them.

**If you got 4 or less correct:** Oops! Good effort, but it seems you could have made some better choices. Reflect on how certain simple machines can help us complete tasks and try again!

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