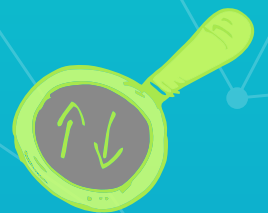
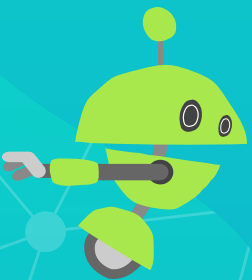
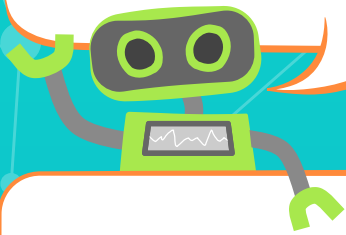


Vocabulary Book

Computer Science Edition




Directions: The purpose of this book is to build a common vocabulary around computer science words and principles. These pages can be changed to fit your needs as you explore computer science. Each vocabulary word is organized to emphasize the definition and to see the word in action. Use this workbook to allow your students to learn and practice the vocabulary words through matching, illustrations, writing, and more.



Vocabulary to Explore:

- | | |
|----------------------------|-------------------------|
| 1. Abstraction | 10. Decomposition |
| 2. Accessibility | 11. Digital Citizenship |
| 3. Algorithm | 12. Ethics |
| 4. Artificial Intelligence | 13. Iteration |
| 5. Cipher | 14. Loop |
| 6. Conditional | 15. Patterns |
| 7. Cyberbullying | 16. Safeguards |
| 8. Cryptography | 17. Sequencing |
| 9. Debugging | 18. Variable |



Computational Thinking

Computational Thinking is all about problem solving. Whenever you have a task or a problem, you know that you can break it down, or follow a process to solve it. The next few pages will explore the vocabulary of computational thinking.



Abstraction



Iteration



Algorithm



Loop



Conditional



Patterns



Debugging



Sequencing



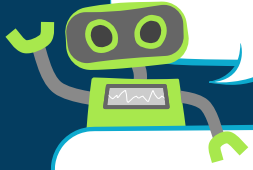
Decomposition



Variable

Abstraction

Abstraction is a process of making something simpler. It is a way of thinking that helps us understand the information better. Think of it like focusing your camera on something. If you focus on something really close it might look a little different than if you were to zoom out a bit to see more of what the lens can see. In this activity, you are going to look at pictures and then zoom out to see if your guesses are right as to what the image is.

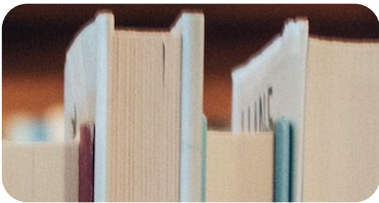


Zooming Out Activity

1. Look at the image on the left closely.
2. Write down your guess as to what it is
3. Then, click and move the green square to reveal the zoomed out image
4. If you were right, draw a circle around the image. If you got it wrong, write a sentence describing what made you think it was something else.



Your Guess: _____



Your Guess: _____



Your Guess: _____

You practiced zooming out on images to understand abstraction. Now write in your own words what you think abstraction means:

You practice abstraction in the classroom all the time! Some examples include:

- Writing a summary or a book review of a book you read
- Classifying animals
- Creating models or images using clay or other tools
- Analyzing data to understand the information around you
- Circling key words and numbers to solve a word problem

Your turn. Give one example of how you use abstraction:

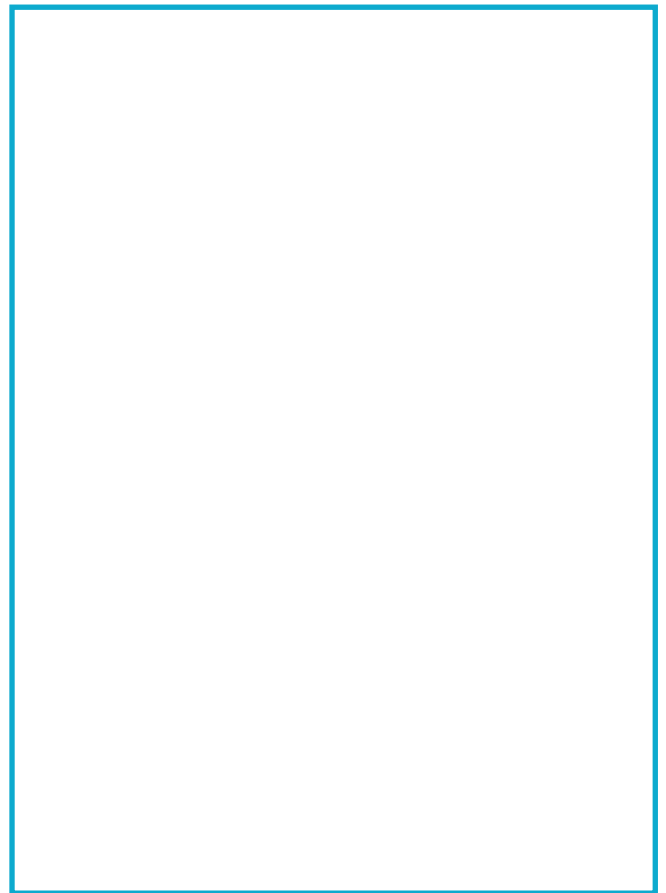
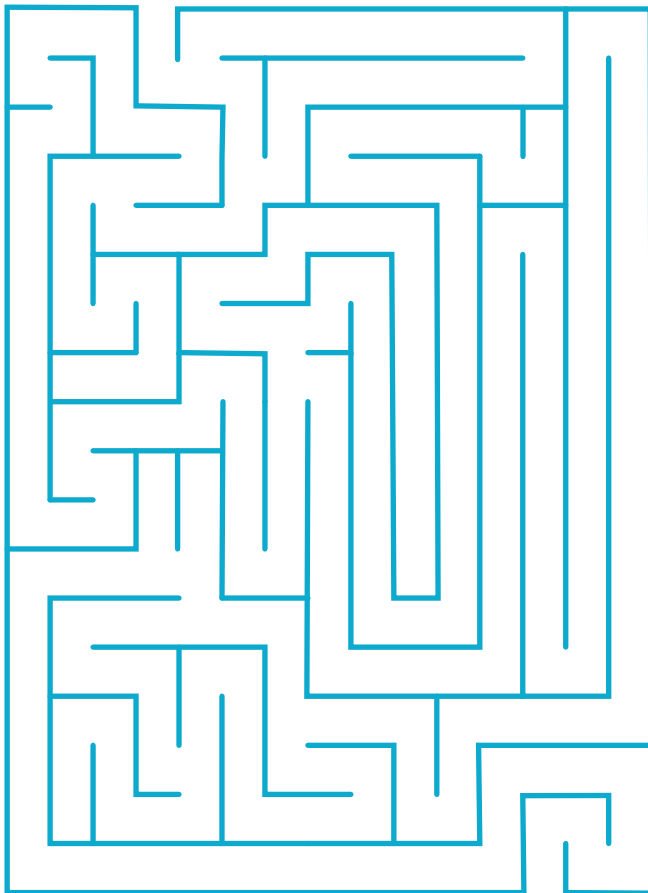
Algorithm

An algorithm is a set of rules that help you complete something. Think about something you follow a step by step procedure like tying your shoes or making a snack. You can also use step by step instructions to create a recipe or create a dance. Let's explore algorithms together. **You will need a partner for this activity.**



Pathfinders

You and your partner are going to work together to get out through the maze. You will need to create the algorithm that will help you showcase the path through the maze. Use the space on the right to either write directions (Move forward, turn left, etc) or draw arrows to show directions to turn and move. Once you and your partner write all of the directions, use the Drawing Tool to try out your algorithm. If it is correct, put a sticker over your maze to showcase you did it! If not, 'debug' your algorithm to help you get through the maze. Bonus, create your own maze to challenge each other beyond this maze activity.



You practiced writing algorithms by getting through the maze. Now write in your own words what you think algorithm means:

Algorithms are used in your every day life. Here is just a short list of algorithms you may use every day. Write your idea on the last line.

1. Setting the table
2. Using GPS in your car or on your phone
3. Using search on your computer.
4. Getting dressed to go outside
5. _____

Conditionals

Conditionals use statements like 'if-then' to help us make decisions and choices. For example, if you see your teacher talking with another adult, then you will wait patiently until they are done to ask them a question. You use conditionals a lot when you play games and make decisions daily.

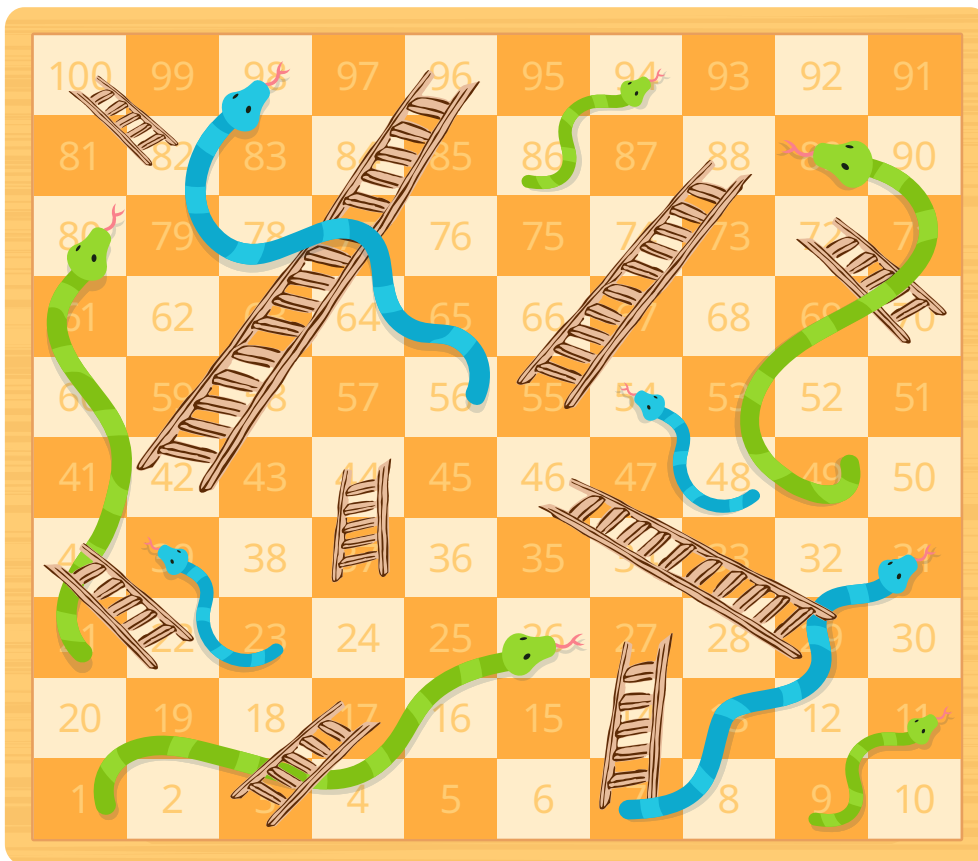
Even and Odd Expedition

In this fun game you climb the ladders or slide down the snakes. But be aware of the numbers too! You will need to follow the directions to move along the board. First person to 100 is the winner!

Additional Materials: a dice (use virtual or physical)

Grab a partner or two for this activity. Each player will roll a dice to move across the board.

- If they land on an even number they give an 'if statement' that their opponent has to create a 'then statement' for. For example, you land on even and you say IF it's raining outside...then your opponent says THEN I better bring a raincoat! Record your statements using the voice comment button.
- If you land on an odd number they have to move back 1 space.
- First person to 100 wins!



Player 1



Player 2



Player 3



You make decisions every day which means you also use conditionals! Here are some examples of conditionals in real life:

1. Picking out your clothing based on the weather
2. If you finish your homework, you will be able to play with a friend
3. If you are craving a sweet treat you will pick something different then if you wanted a salty one

Your turn, write down your definition of conditionals and give one example of one in every day life:

Debugging

Debugging is a term that we use to talk about finding and fixing our mistakes in a program, a task, or even our writing. Any time something doesn't go as planned, we need to fix the problem. In computers, it could be a line of your code that is confusing to the computer that needs fixing!



Mixed Up Recipe

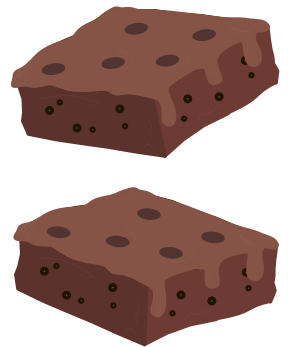
Oh no! We need to bake brownies for the class party, but our recipe seems to have gotten mixed up! Can you find the errors and debug our recipe? We really need your help!

Ingredients:

2 cups _____
2 cups sugar
8 eggs
2 cups flour
1 cup _____
1 tsp baking powder
1 tsp salt
2 tsps vanilla extract
2 cups _____

Steps:

1. Preheat your freezer to 180°C. Grease a large baking pan.
2. Melt 2 cups butter over low heat and let it cool.
3. Mix the melted butter with 2 cups sugar and only 1 egg.
4. Sift in 2 cups water, 1 cup cocoa powder, 1 tsp baking powder and salt. Mix until combined.
5. Add 2 tsp lemon extract and 2 cups chocolate chips.
6. Pour batter into the frying pan and spread evenly.
7. Bake for 30-35 seconds.
8. Cool and cut into squares. Enjoy!



Rewrite the recipe now that it has been debugged.

Now that you have practiced debugging, write down a definition in your own words.

You already use debugging strategies to:

1. Check your spelling
2. Solve a puzzle or fix an error in a math problem
3. Fixing your bicycle, untangling your necklace or jump rope, or something you built
4. Fixing a glitch on your computer or video game

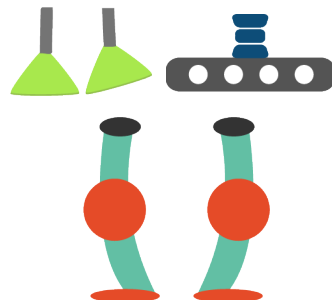
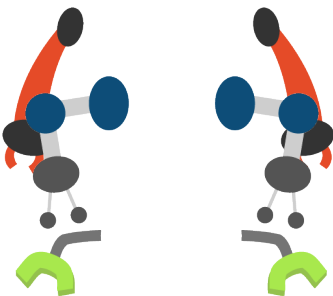
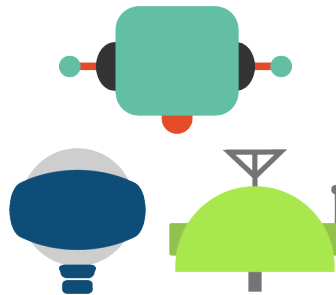
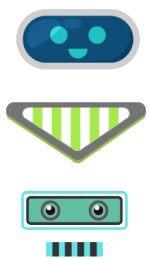
What is one way you use debugging in your life:

Decomposition

Every time you break down a problem into smaller parts you are practicing decomposition. Think of it like a puzzle. When you first take the pieces out of the box you might sort by color, shapes, or you may complete the border first. You are decomposing a bigger problem into a smaller one.

Robot Mash Up

Oh no! Your robot has been decomposed. It's up to you to put him back together! Drag the robot parts into the box to create your robot. Then, add 3 more features using the Drawing Tool and write a sentence stating what is unique about your robot.



Write your sentence here:

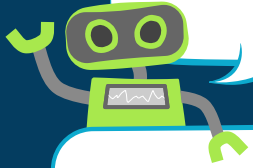
You practice decomposition often in your daily life. Some examples are:

1. Making a to do list
2. Solving a big math problem
3. Drawing something in art class
4. Doing research and experiments in a science project

Add one more example:

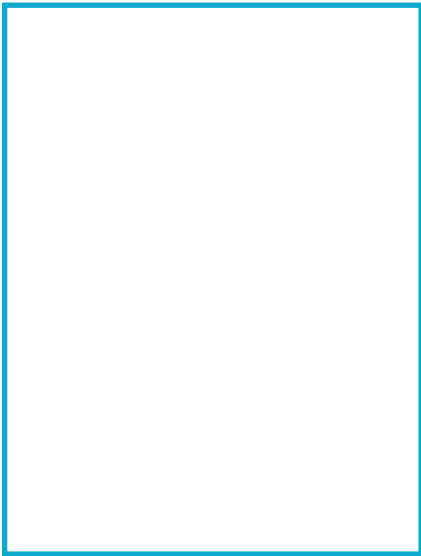
Iteration

Have you ever played a video game over and over just so you can go up more levels or get a higher score? If so, then you have used iteration. Iteration is just repeating a task or process multiple times to get better at it or making improvements. The more you practice or iterate, the better you get at it!



Computational Capers

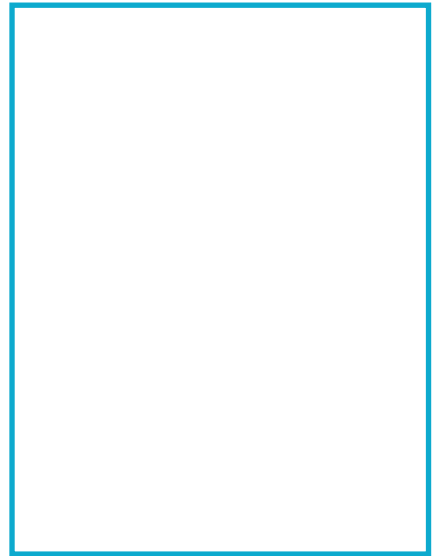
Do you have a favorite sport? If so, you are going to draw about it in the boxes below. Think about how you throw a baseball, jump over a hurdle, or kick a goal.



Draw a picture of you playing your favorite sport.



Add 3 changes to your drawing that will improve your abilities.



Iterate again and by changing the size, features or elements of you playing the sport.



Write a sentence that says what you could do at first, and after the iterations, what you can do now. Then, add in a background and redraw in the box above with the sentence.

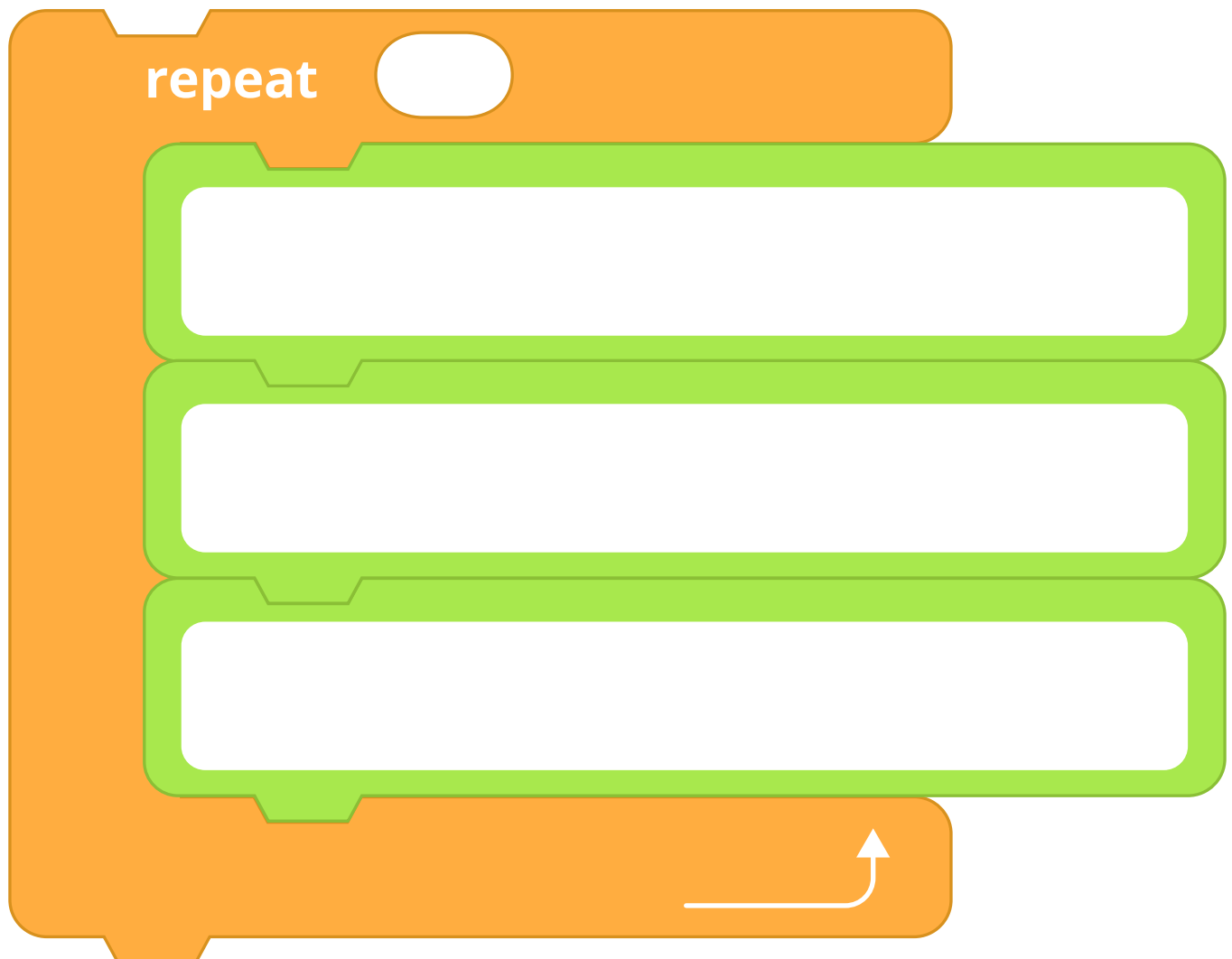
Every time you choose to try again, make changes and add more details, you are iterating. The more you choose to embrace the practice, the more creative you will be! You are also working on your critical thinking and problem solving abilities.

Loop

Think about a rubber band or a hair tie. Where does it start and end? Loops are like that in computer programming. It is where you do the same set of steps multiple times. We use loops so we don't need to write the same steps over and over. It saves us time and makes our computer programs work faster and easier.

Dance in a Loop

For this activity, you are going to use computer coding blocks to create your own looping dance. In the green blocks below add in one dance move. Then, add a number to the box next to the word repeat to decide how many times you will do these steps. Record you and your friend doing the dance and add it here.



A Scratch-style 'repeat' coding block. It is orange with a white oval at the top right for a connector. The word 'repeat' is written in white. Inside the block are three green rectangular boxes for dance moves. At the bottom right is a white box for a number, followed by a white arrow pointing up and to the left, indicating the loop structure.

Loops are used every day! You probably used them in one of your routines:

1. Shuffling through your music playlist until they have all been played
2. You got up and got ready for school
3. If you were in a vehicle today the engine rotated in loops to get you to your destination
4. Your teacher used a loop when they took attendance
5. When you read aloud you might have taken turns until everyone has had a chance to read.

Add one more example:

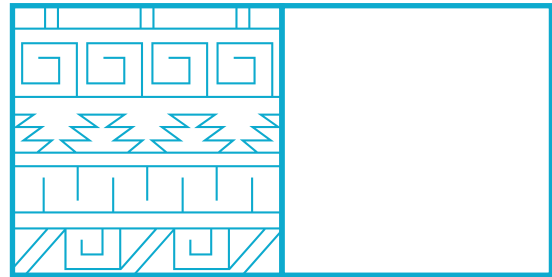
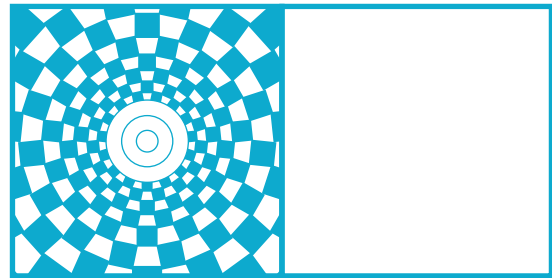
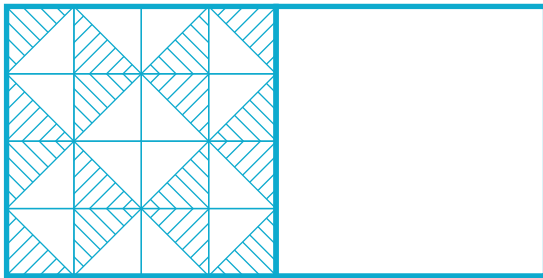
Patterns

Being able to find patterns or create patterns can help you organize and understand information. Just like when you play a game or solve a puzzle you can find a strategy or trick that helps you win more often. In computer programming, programmers organize their code in patterns to make it easier to understand and work with.

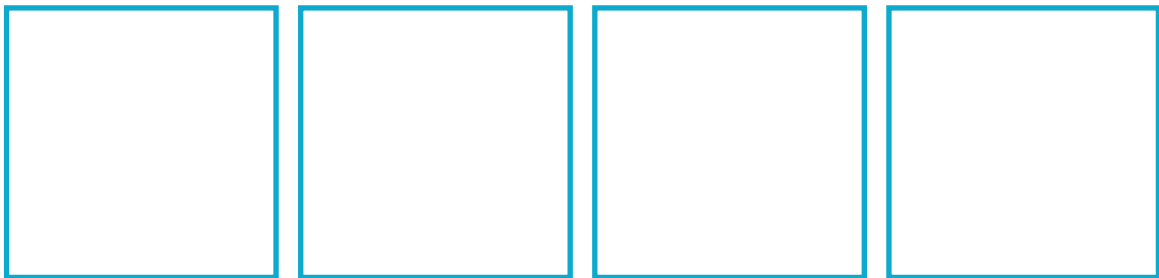


Zentangles

Create the same patterns below in the blank boxes on the right.



You can then create your own zentangles in the blank space.



Patterns are found everywhere!
Look around your classroom and
find a pattern. Take a picture of
the pattern and share it here!

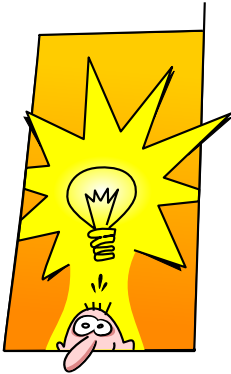
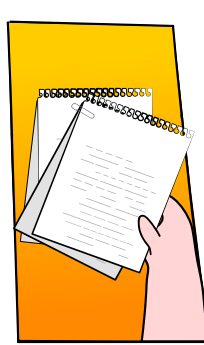


Sequencing

Have you ever taken time to think about the steps to complete a task? For example, when you write a story, there is a beginning, a middle, and an end. Your stories follow a sequence.

Sequence Sleuths

Take a look at the parts of the story below. Your job is to put them into the right sequence. Then, write your own short story that has a beginning, a middle, and an end.

☐☐☐☐

Now write your own story. Make sure your story has a clear beginning, middle, and end to follow a sequence.

	→		→	
	←		←	

You follow a ton of sequences throughout the day. Let's identify times you use a sequence. Then, add your own on the last line.

1. Getting up in the morning
2. Completing a math problem
3. Following a recipe
4. _____

Variables

In computer science you use a variable like it's a container to hold a value. It can be a number, a character, or even something more complex like an array or an object. They are an important part of programming because they make the writing easier for the programmer.

Variable Catcher Game


Look at the objects below. Decide how to sort them into the buckets at the bottom of the page. Then, label the buckets as the variable it identifies.



We use variables in every day life. Think about times you may use a variable. Use the example below to help you:

1. Candy in a jar: the variable 'candy' can tell you how many pieces of candy is in the jar. Even if you eat a piece or add more, the variable is still 'candy' even though the number has changed.

Your turn:



Impacts of Computing

Think about how often you use technology every day. Ask a grown up about the technology they used when they were your age and the world will seem very different. Technology can help us do so many things that would not be possible without it. But, there are also risks we have to think about.

Technology can help us:

- solve difficult problems
- play games
- learn and research new ideas
- stay connected
- create

But we also have to think about:

- our privacy
- too much time on a screen
- time we are wasting
- how to be safe online

Let's explore the following vocabulary terms to learn more:

1. Accessibility
2. Artificial Intelligence (AI)
3. Cyberbullying
4. Ethics

Accessibility

When you think about the word accessibility, think about the root word, access. It's about giving access for people who experience disabilities. It can be a tool, a device, a service, or even a change in the environment. Let's explore the features right here in Kami to learn ways to make things more accessible.

Text to Speech (Read Aloud)

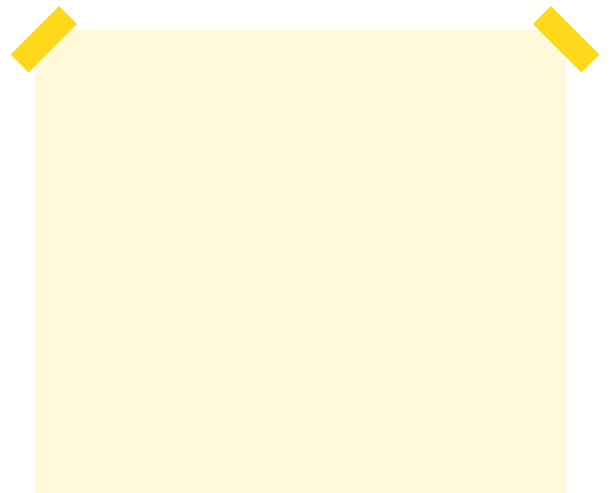
Use text to speech so you can listen to anything written on the page

How can text to speech help others? How would you use it?

Choices

Choose the Text, Drawing, Voice, or Video Comment Tool to explain how to draw a shape

How can having more than one way to answer a question help others?
Which choice was your first and your last? Why did you choose them?



Changing Text

Type your name _____ and change the color, the size, and the font to something that you would like to read.

How can changing the text features help others? What do you like about the color, size and font you chose?

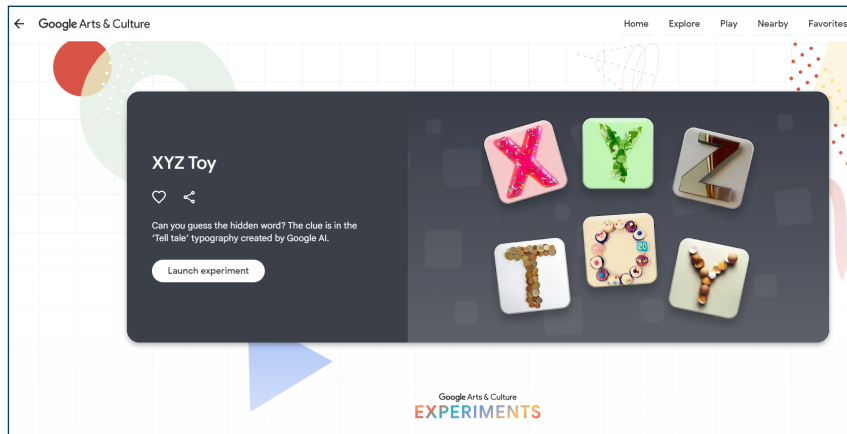
You have explored some of the ways to make your school work more accessible. What are accessibility features in your classroom or your school? Take photos of what you notice and add them here. Then, write a sentence, create a video, or use speech to text to explain how your photo shows accessibility.



Artificial Intelligence

Artificial intelligence has to do with machines learning, chat bots, and problem solving. Artificial intelligence is all around us. Imagine you have a really smart computer that can do things almost like how people do them. It can learn and think, all on its own! We call this special computer "Artificial Intelligence" or "AI" for short. It's like having a super clever robot friend who can help with all sorts of tasks!

For this activity, try your hand a game first. This game uses images that are created using artificial intelligence. The images are clues for you to use to figure out the word. You can do this with a partner or on your own to try to solve the picture clues.



<https://artsandculture.google.com/experiment/xyz-toy/UwE3Im4koBD7Q>

How did you do?

Now it is your turn. Create a picture word below using the Drawing Tools in Kami. You can pick any word you would like. Then, ask your partner to see if they can solve it!

Artificial Intelligence is in a lot of the technology we use today. Think about where AI helps you in school and at home. List them here.

1. Amazon Alexa and Siri
2. Rhumba vacuums
3. Auto correct
4. _____
5. _____

Cyberbullying

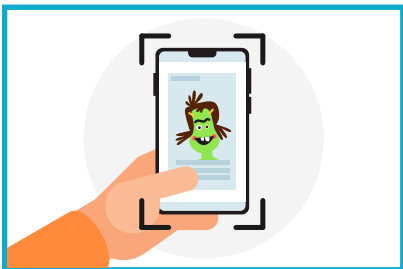
Cyberbullying is bullying that happens on your cell phones, computers and tablets. It can happen in your favorite apps, games and websites. It includes sending or posting mean, harmful, or false things about another person. It can also be sharing of images, or personal information. Sometimes cyberbullying can cross a line into being against the law.

Let's start by watching this video from stopbullying.gov



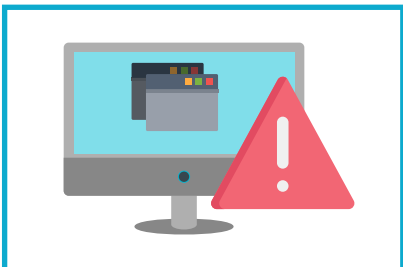
<https://youtu.be/vtfMzmkYp9E>

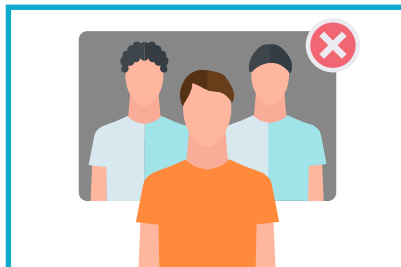
Let's talk about what to do if you see or experience cyberbullying. Below, identify 6 things you can do if you see cyberbullying. Use the clues from the video to help you remember.













Take a moment and spread kindness! Turn to a neighbor and give them a compliment. Then, next time you are online, say something kind to someone there too! Spread kindness like confetti!

Ethics

Ethics is a big word that means good behavior. It also has to do with making sure that we are being inclusive and that anything we build online doesn't have unintended impacts or bias against others.

Let's start by brainstorming what is good and what is not good behavior online. This can be done with a partner or on your own. Add in 3 things you should and three things you should not do online.

Good

Bad

Using the Drawing Tools, draw a pet robot that can help others make good decisions. Under the image, write three things that your pet robot will do to help others make those good decisions.