



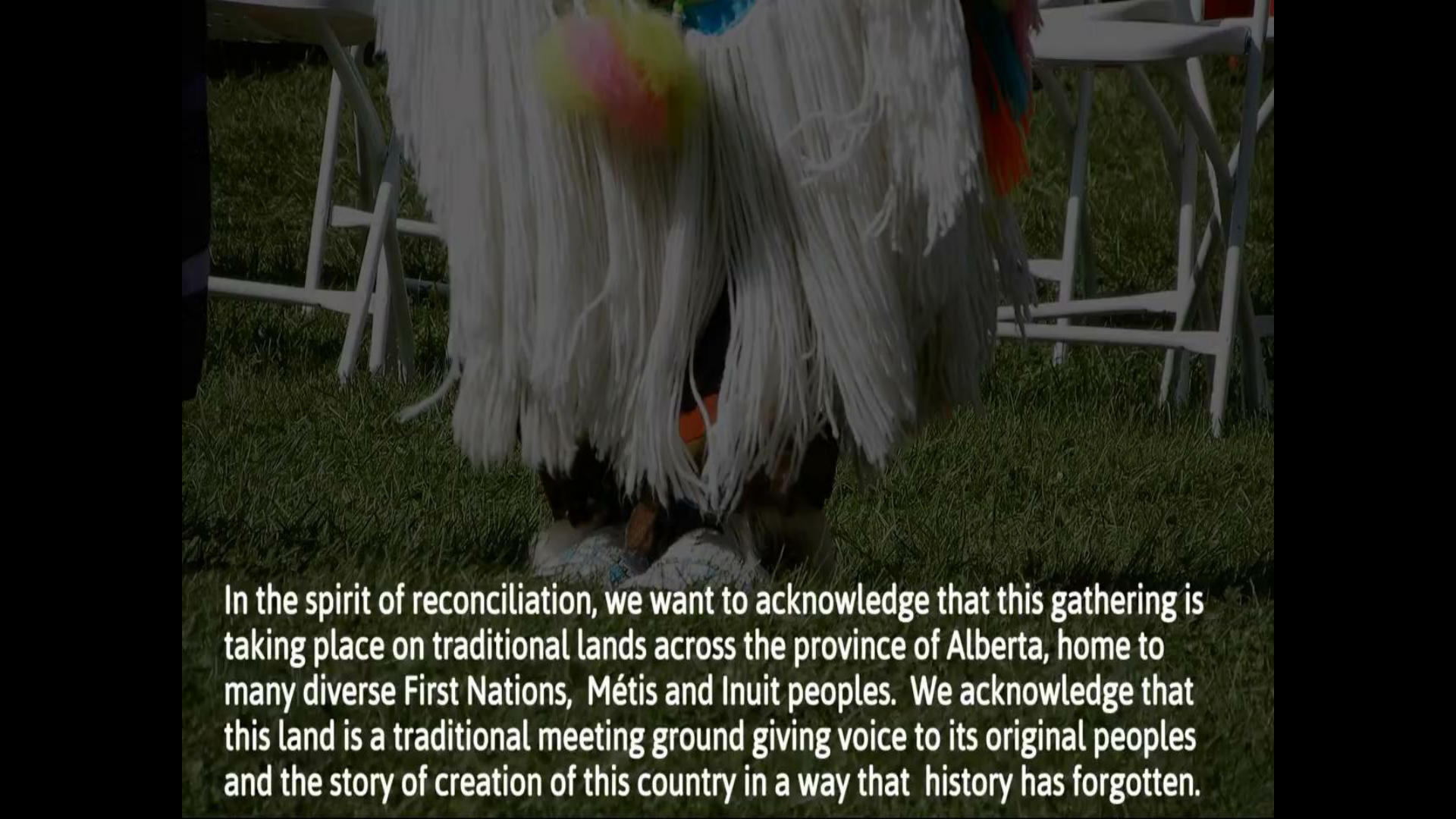
Wait? What? I'm teaching Computer Science?



Yes YOU can!



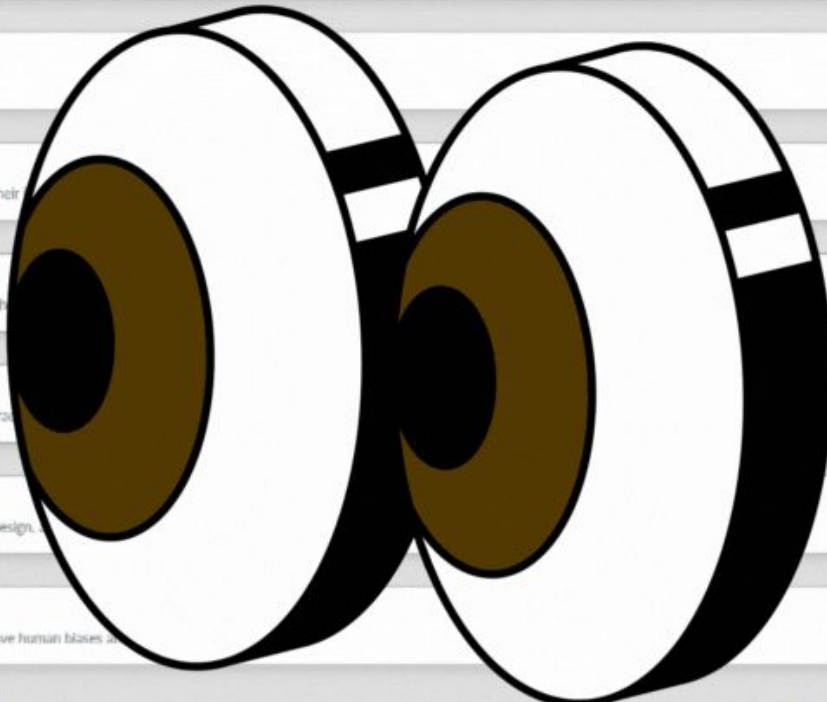
Slides:

A person wearing a white fringed costume with a colorful pom-pom on top is standing on a grassy field. The person is surrounded by white folding chairs. The scene is outdoors and appears to be a gathering or event.

In the spirit of reconciliation, we want to acknowledge that this gathering is taking place on traditional lands across the province of Alberta, home to many diverse First Nations, Métis and Inuit peoples. We acknowledge that this land is a traditional meeting ground giving voice to its original peoples and the story of creation of this country in a way that history has forgotten.

Have you looked?

- ORGANIZING IDEA**
Matter: Understandings of the physical world are deepened through investigating matter and energy.
- ORGANIZING IDEA**
Energy: Understandings of the physical world are deepened through investigating matter and energy.
- ORGANIZING IDEA**
Earth Systems: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.
- ORGANIZING IDEA**
Living Systems: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.
- ORGANIZING IDEA**
Space: Understandings of the living world, Earth, and space are deepened through investigating natural systems and their interactions.
- ORGANIZING IDEA**
Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and technology.
- ORGANIZING IDEA**
Scientific Methods: Investigation of the physical world is enhanced through the use of scientific methods that attempt to remove human biases and errors.





Organizing Idea	Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.	
Kindergarten	Guiding Question	How can instructions be used?
	Learning Outcome	Children interpret instructions in various environments.
Grade 1	Guiding Question	How can instructions affect outcomes?
	Learning Outcome	Students follow instructions and relate them to outcomes.
Grade 2	Guiding Question	How can creativity support design?
	Learning Outcome	Students apply creativity when designing instructions to achieve a desired outcome.
Grade 3	Guiding Question	How does creativity contribute to computational thinking?
	Learning Outcome	Students investigate creativity and its relationship to computational thinking.
Grade 4	Guiding Question	How can design meet needs?
	Learning Outcome	Students examine and apply design processes to meet needs.
Grade 5	Guiding Question	In what ways can design be used to help achieve desired outcomes or purposes?
	Learning Outcome	Students apply design processes when creating artifacts that can be used by a human or machine to address a need.
Grade 6	Guiding Question	In what ways are abstraction, design, and coding related?
	Learning Outcome	Students examine abstraction in relation to design and coding, and describe impacts of technologies.

Bridging Gaps



Bridging Gaps



6

5

4

3

2

1

K

	Knowledge	Understanding	Skills & Procedures
KCS1.1	<p>Instructions are directions that can be followed.</p> <p>Instructions may be experienced in many different contexts, such as</p> <ul style="list-style-type: none"> • home • learning environments • games • experiences in nature <p>Instructions can be given in many ways and presented through</p> <ul style="list-style-type: none"> • speaking • pictures • gestures • traditional teachings 	<p>Following instructions can help people be safe, complete a task, and know what to do.</p>	<p>Recognize when actions do not correspond to instructions.</p> <p>Match an action to the corresponding instruction.</p> <p>Engage in activities that involve following instructions in various contexts.</p> <p>Identify instructions that help keep people safe in various contexts.</p> <p>Engage in activities that involve following instructions presented in various ways.</p>
KCS1.2	<p>Instructions have one or more steps.</p>	<p>The order in which instructions are followed can affect the outcome.</p>	<p>Follow a sequence of two steps related to a learning experience.</p> <p>Identify differences in outcomes when the order of two steps is changed.</p> <p>Communicate a sequence of two steps for a given purpose.</p>

Knowledge

Understanding

Skills & Procedures

KCS1.1

Instructions are directions that can be followed.

Instructions may be experienced in many different contexts, such as

- home
- learning environments
- games
- experiences in nature

Instructions can be given in many ways and presented through

- speaking
- pictures
- gestures
- traditional teachings

Following instructions can help people be safe, complete a task, and know what to do.

Recognize when actions do not correspond to instructions.

Match an action to the corresponding instruction.

Engage in activities that involve following instructions in various contexts.

Identify instructions that help keep people safe in various contexts.

Engage in activities that involve following instructions presented in various ways.

KCS1.2

Instructions have one or more steps.

The order in which instructions are followed can affect the outcome.

Follow a sequence of two steps related to a learning experience.

Identify differences in outcomes when the order of two steps is changed.

Communicate a sequence of two steps for a given purpose.

Knowledge

Understanding

Skills & Procedures

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Engage in activities that involve following instructions in various contexts.

Identify instructions that help keep people safe in various contexts.

Engage in activities that involve following instructions presented in various ways.

KCS1.2

Instructions have one or more steps.

The order in which instructions are followed can affect the outcome.

Follow a sequence of two steps related to a learning experience.

Identify differences in outcomes when the order of two steps is changed.

Communicate a sequence of two steps for a given purpose.

grade 1

Guiding Question

How can instructions affect outcomes?

Learning Outcome

Students follow instructions and relate them to outcomes.

Knowledge

Understanding

Skills & Procedures

1CS1.1 Instructions are directions that can be followed and given in various forms, including

- verbal
- audio
- visual
- written

The form in which instructions are given may not affect the outcome.

Follow instructions with two or three steps given in different forms.

1CS1.2 Many types of instructions need to be in a specific order, such as

- directions
- recipes
- computer programs
- safety protocols

Instructions are ordered in a way that will produce a desired outcome.

Determine if instructions with two or three steps given in different orders still produce the desired outcome.

Sequence two or three instruction steps to achieve a desired outcome.

Exchange ideas for creating three-step instructions that achieve a desired outcome.

1CS1.3 Following instructions is a way to demonstrate respect and safety during investigations.

Instructions help to keep people safe.

Follow instructions during investigations.

grade 2

Guiding Question

How can creativity support design?

Learning Outcome

Students apply creativity when designing instructions to achieve a desired outcome.

Knowledge

Understanding

Skills & Procedures

2CS1.1

Creativity is the ability to generate something original, such as

- ideas
- technology
- tools
- products

Creativity can be used to design instructions for

- games
- sports
- investigations
- recipes
- computer programs

Collaboration can result in improved ideas, which may enhance creativity and problem solving.

Instructions are designed using creativity and problem solving, which can be enhanced through collaboration.

Identify ways creativity is used to design instructions.

2CS1.3

Many daily activities include repeated steps, such as

- brushing teeth
- tying one shoe and then using the same process on the other shoe

Instructions may be simplified by repeating steps.

Describe a situation in which repetition simplifies instructions.

Exchange ideas to design clear three- to four-step instructions, including repetition, to achieve a desired outcome.

grade 2

Guiding Question

How can creativity support design?

Learning Outcome

Students apply creativity when designing instructions to achieve a desired outcome.

Knowledge

Understanding

Skills & Procedures

2CS1.2

Precise **instructions** have a variety of components, including

- verbs
- simple language
- clear steps
- a starting and stopping point

Reliability of **instructions** means they consistently lead to the same desired outcome.

Efficiency of **instructions** refers to **designing** in a way that yields desired outcomes with the least amount of energy, time, or steps.

The reliability and efficiency of **instructions** can be affected by how they are communicated, including

- form; e.g., verbal, visual, written
- order
- clarity

Many people, individually or in groups, can create **instructions**, such as

- teachers
- parents
- students
- computer programmers

Many activities at school and in the workplace require **creativity** and collaboration to improve ideas.

Debugging is the process of identifying and removing errors in a set of **instructions** to achieve a desired outcome.

Debugging can increase the reliability of **instructions**.

Instructions can be created to be precise, reliable, and efficient to achieve the desired outcome.

Work individually or in groups to create **instructions** using precise words, pictures, or diagrams.

Create three-step to four-step **instructions** that achieve a desired outcome.

Predict the outcome of **instructions** that have three to four steps.

Refine **instructions** to more efficiently achieve a desired outcome.

Test **instructions** with three to four steps to verify that a desired outcome is achieved.

Debug any errors in a set of **instructions** to achieve a desired outcome.

Exchange ideas for creating three-step **instructions** that achieve a desired outcome.

Knowledge

Understanding

Skills & Procedures

3CS1.1

- Computational thinking includes
- breaking a task into smaller chunks
 - finding patterns and similarities in tasks
 - identifying the important details when reading or solving a problem
 - designing instructions
 - working backward if a mistake is made

Computational thinking can be used by humans to communicate with computers more efficiently; e.g., apps, virtual reality, and robotics.

Computational thinking is a problem-solving process that uses creativity.

Create a set of instructions that could be followed by a human or a machine to complete a task.

Identify computational thinking used to solve problems or achieve desired outcomes.

3CS1.2

The same outcome, such as arriving at school, can be achieved in different ways.

Divergent thinking is the process of generating multiple unique ideas or solutions.

Creativity is an important part of computer science, technology, and engineering; e.g., computer programming, robotics.

Creativity involves combining, changing, or reapplying existing ideas to produce something new.

Canadians are responsible for many creative inventions, such as the Canadarm.

Creativity involves divergent thinking and can be used to develop different ways to achieve the same outcome.

Creativity involves imagination, observation, and making connections.

Collaborate to write two different sets of instructions that achieve the same outcome.

Relate creativity to engineering, computing, and the development of new technologies.

Create something new by combining, changing, or reapplying existing ideas.

Examine a Canadian invention.

Identify examples of creativity in computer science, technology, or engineering.

Knowledge

Understanding

Skills & Procedures

4CS1.1

Design processes include

- understanding the problem
- forming ideas (ideating)
- planning
- creating
- analyzing
- testing
- troubleshooting

Feedback helps to ensure all needs are considered during the design process.

An algorithm is a sequence of instructions.

Artifacts are objects or products made by humans, machines, or computers through the process of design.

Design can produce many artifacts, including

- algorithms
- models
- prototypes
- blueprints
- programs
- experiments
- objects

Design can deal with complex problems.

Availability of materials and costs are considerations in design.

Design involves processes that can transform ideas into artifacts that meet needs.

Plan and create an artifact to meet a need.

Provide feedback to others during the design process.

Test an artifact to confirm that it meets intended needs.

Collaborate to design an algorithm to solve a problem.

Examine availability and cost of materials during design.

Knowledge

Understanding

Skills & Procedures

5CS1.1

A **computational artifact** is anything created by a human using a computer, such as

- computer programs and code images
- audio video
- presentations
- web pages

Design can be used to create algorithms and translate them into code.

Code is any language that can be understood by and run on a computer.

There are many ways to code, including using visual block-based languages.

Visual block-based languages are a form of code in which prepared chunks of **instructions** are in drag-and-drop blocks that fit together like puzzle pieces to **design** a program.

A computer cannot think for itself and must rely on code for all that it does. A loop is a repetition of **instructions** used in an algorithm.

Design can be used by humans or machines to meet needs.

Engage in the **design process** to create **computational artifacts**.

Relate a block of code to an outcome or a behaviour.

Explain what will happen when single or multiple blocks of code are executed.

Translate a given algorithm to code using a visual block-based language.

Design an algorithm that includes a loop and translate it into code.

Knowledge

Understanding

Skills & Procedures

5CS1.2

Design process can be influenced by various factors, including

- safety
- functionality
- usability
- reliability
- efficiency
- aesthetics

Functionality is the quality of being useful to do the job for which something was designed.

Usability is the degree of ease with which something can be used to achieve an outcome.

Design processes that support the development of multiple iterations include

- enhancing
- refining

Design can be improved through collaboration.

Design can better meet needs through the development of multiple iterations.

Discuss examples of designs that have been enhanced or refined to better meet needs.

Evaluate an artifact based on various factors.
Design an artifact to meet a need.

Propose enhancements and refinements to an artifact in collaboration with others.

Develop multiple iterations of an artifact.

Knowledge

Understanding

Skills & Procedures

6CS1.1

The process of abstraction includes

- determining what details to keep and what to ignore
- removing unnecessary details
- identifying important information
- generalizing patterns

Information is data that is organized to be more useful.

An abstraction is a simplified version of something complex.

Abstractions can make daily life easier; e.g.,

- simple controls on appliances
- light switches
- steering wheels
- apps

Computational artifacts can be designed to address societal needs and wants; e.g.,

- weather modelling
- communications
- automotive controls
- medical research
- apps

Structures used in coding include

- sequences
- conditionals (if-then-else statements)
- loops

Sequence structures are ordered sets of instructions within code.

Conditional structures are statements that tell computers to complete different actions based on different situations.

Abstraction is used in design and coding of computational artifacts to make problems easier to think about.

Apply abstraction during the design process.

Identify examples of abstractions encountered in daily life.

Discuss the role of design and coding in society.

Use a visual block-based language to design code that includes relevant design structures.

Guiding Question

In what ways are abstraction, design, and coding related?

Learning Outcome

Students examine abstraction in relation to design and coding, and describe impacts of technologies.

Knowledge

Understanding

Skills & Procedures

6CS1.2

The use of computers, coding, and technology can have impacts that are

- personal
- social
- environmental
- economic

Impacts of computers, coding, or technology may be intentional or unintentional.

Computers, coding, and technology can be used in ways that have positive or negative impacts.

Discuss how computers, coding, or technology have had impacts.

Predict possible impacts of computers, coding, or technology.

Attack of the Kidbots

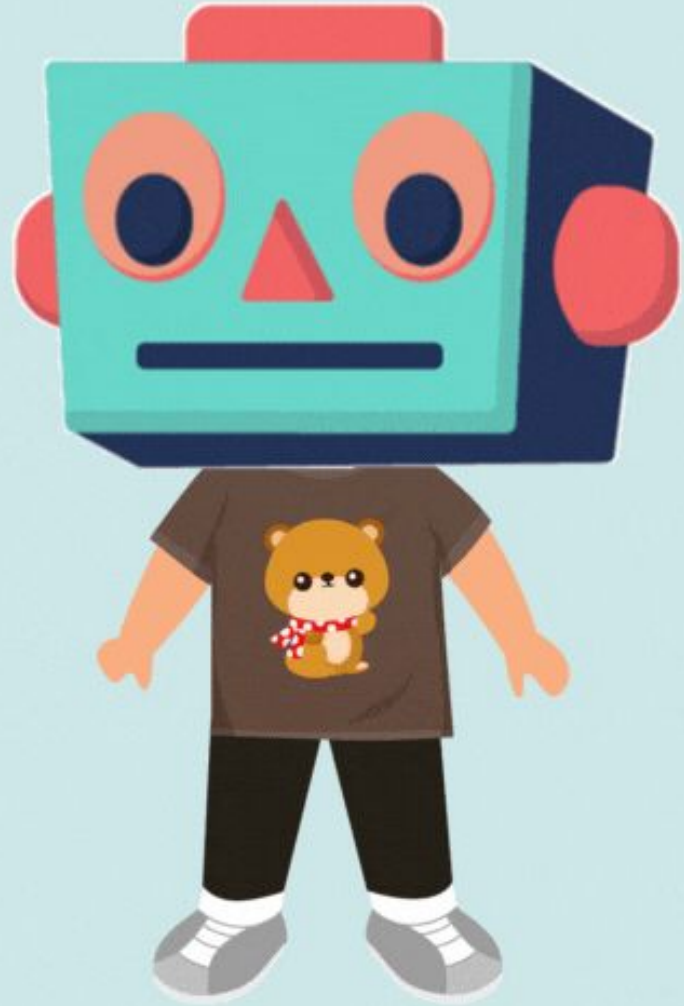
Classroom routines

Learning instructions

Other subject areas

Outside of school

- Community
- Family
- The world
- In nature



Creativity

Creativity involves divergent thinking and can be used to develop different ways to achieve the same outcome.

Creativity involves imagination, observation, and making connections.

3.CS1.2



Ears

To listen to the ideas of others

Eyes

To make observations

Mouth

To collaborate & share your conclusions with others

Hands

To do experiments & record observations

Curious Mind

To make predictions & hypothesis. To think deeply about the world.

Strong Heart

To be brave and take chances!

Tools

Beakers, Chromebooks, pencils, magnifying glasses & more

Feet

To move safely



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To listen to the ideas of others

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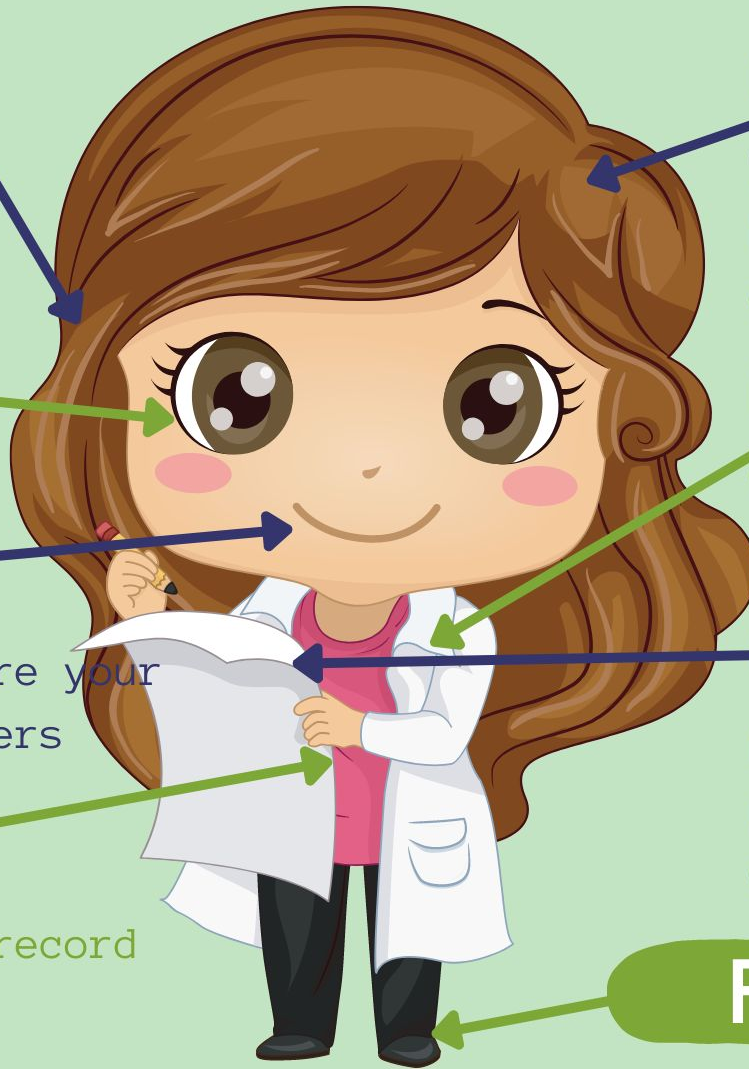
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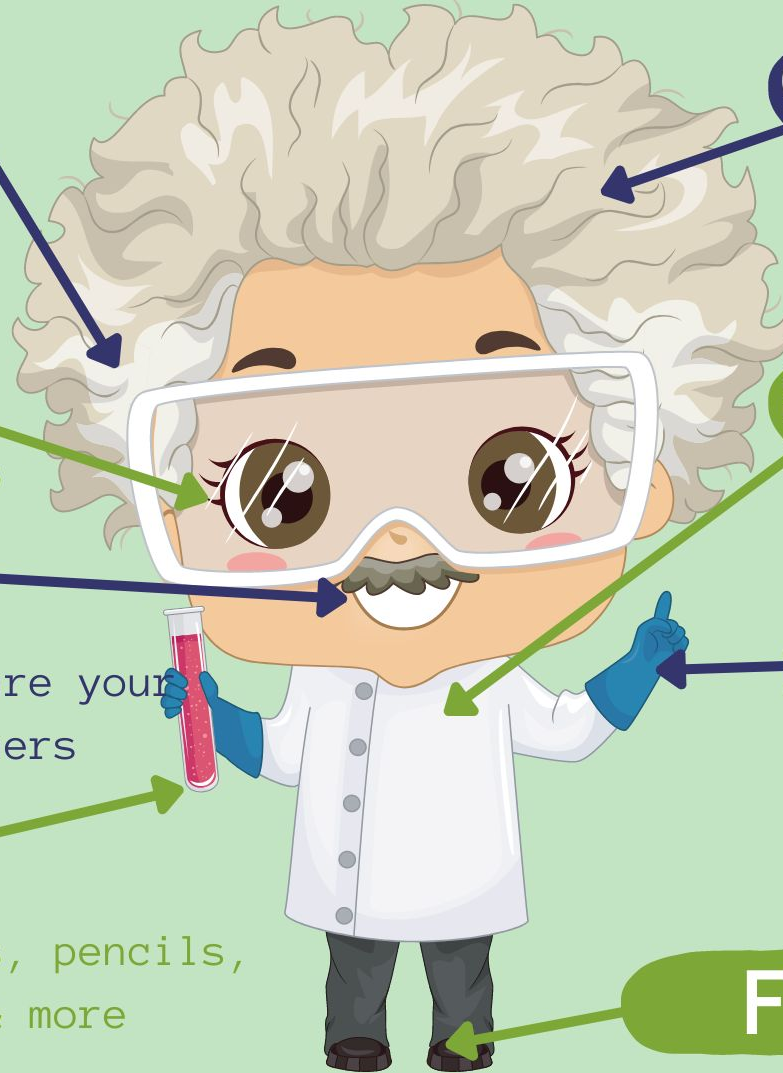
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Feet

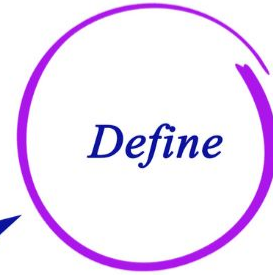
To move safely



Design Thinking Process



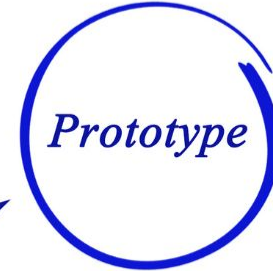
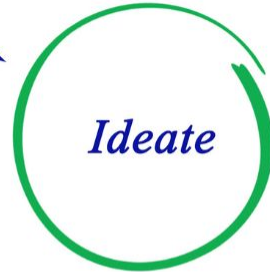
*Learn About
Your Audience*



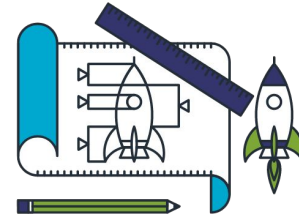
*Construct Point
of View Based
on User Needs*



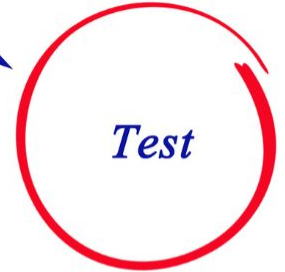
*Brainstorm and
Come up with
Creative Solutions*

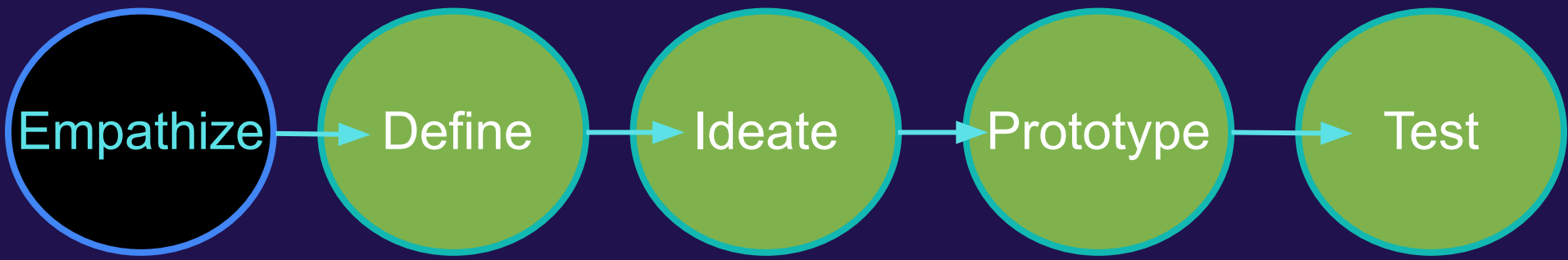


*Build
Representation
of Your Ideas*



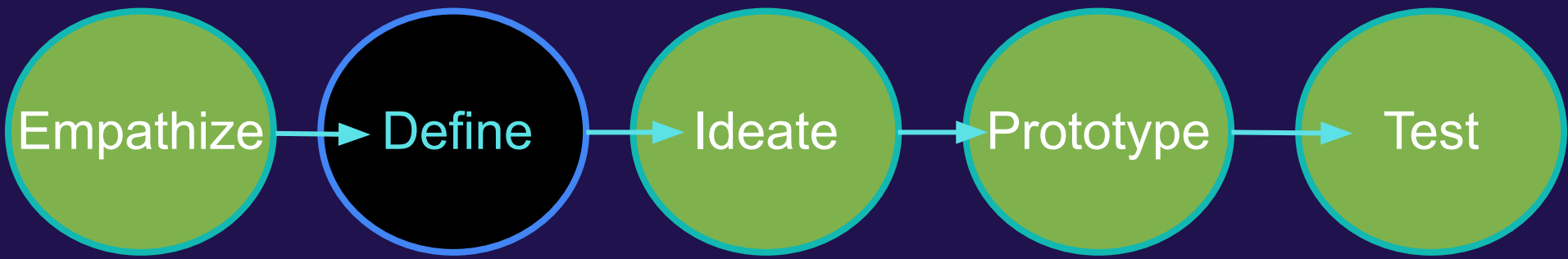
Test Your Ideas



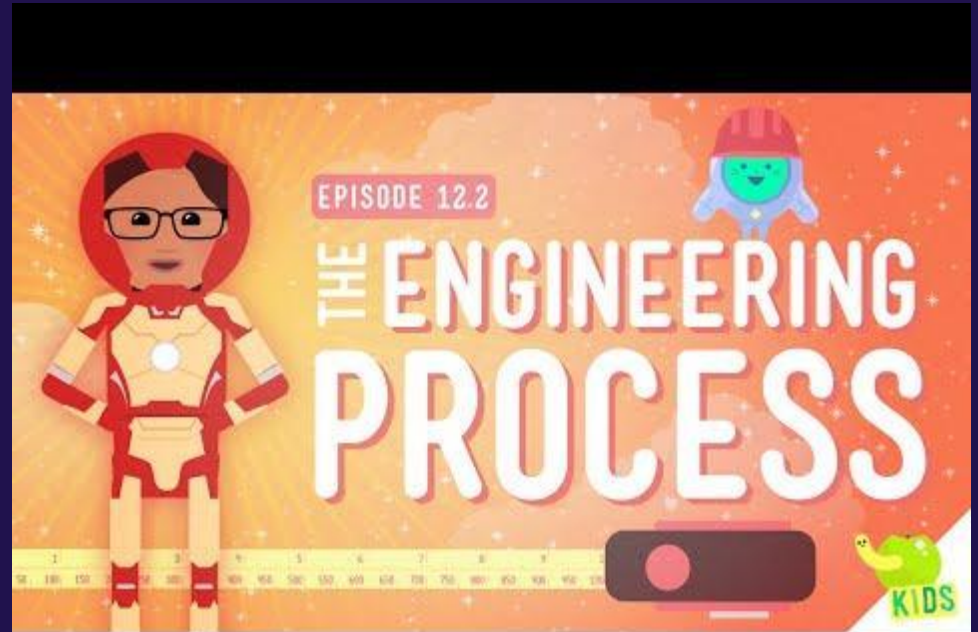


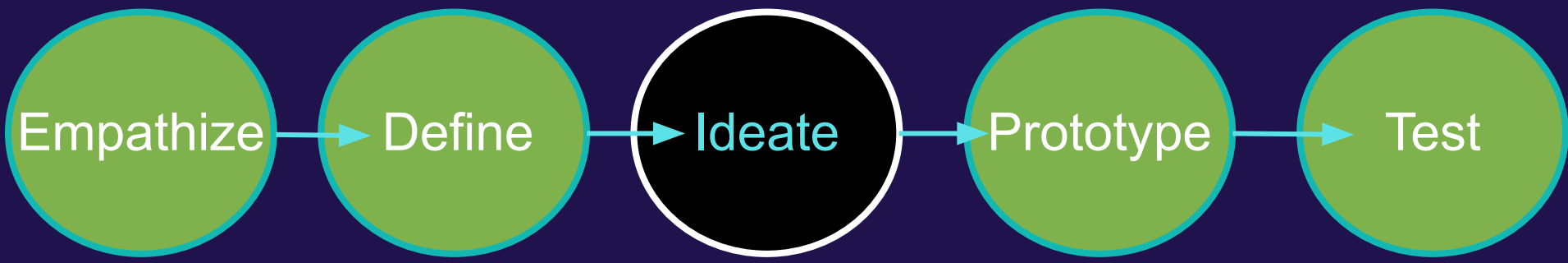
Learn about the audience for whom you will be designing.

Walk a mile in their shoes.



Use what you know about your audience to determine exactly what the problem you are going to solve is.





*Think about
your
audience's
needs!*

*There are
NO bad
ideas!*



*Quantity
over
Quality!*

*Ideas!
Ideas!
Ideas!*

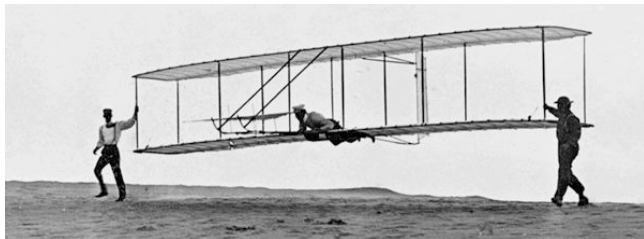
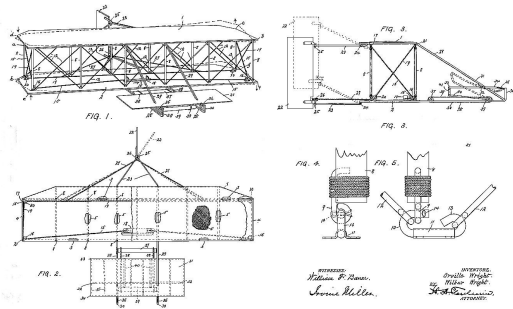
Empathize

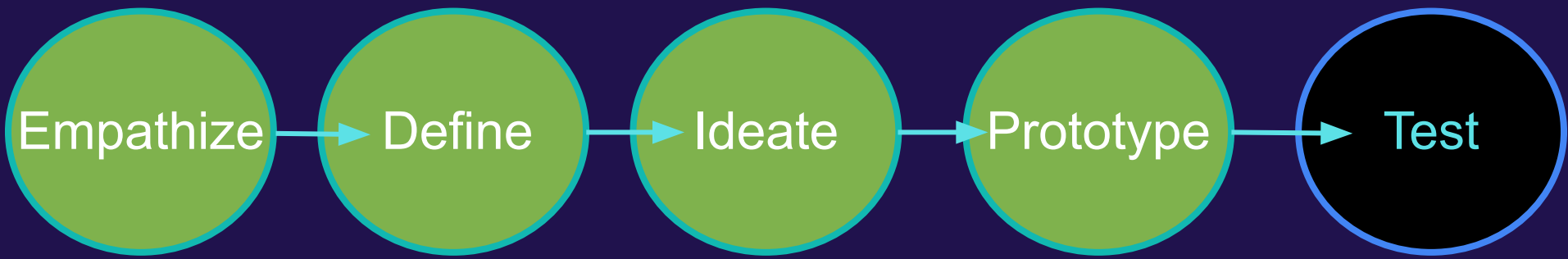
Define

Ideate

Prototype

Test





If at first you don't
succeed,
TRY
TRY
Again...and again...
and again.

**Did you know? The
Wright Brothers had 2
failures before they were
successful with flight.**



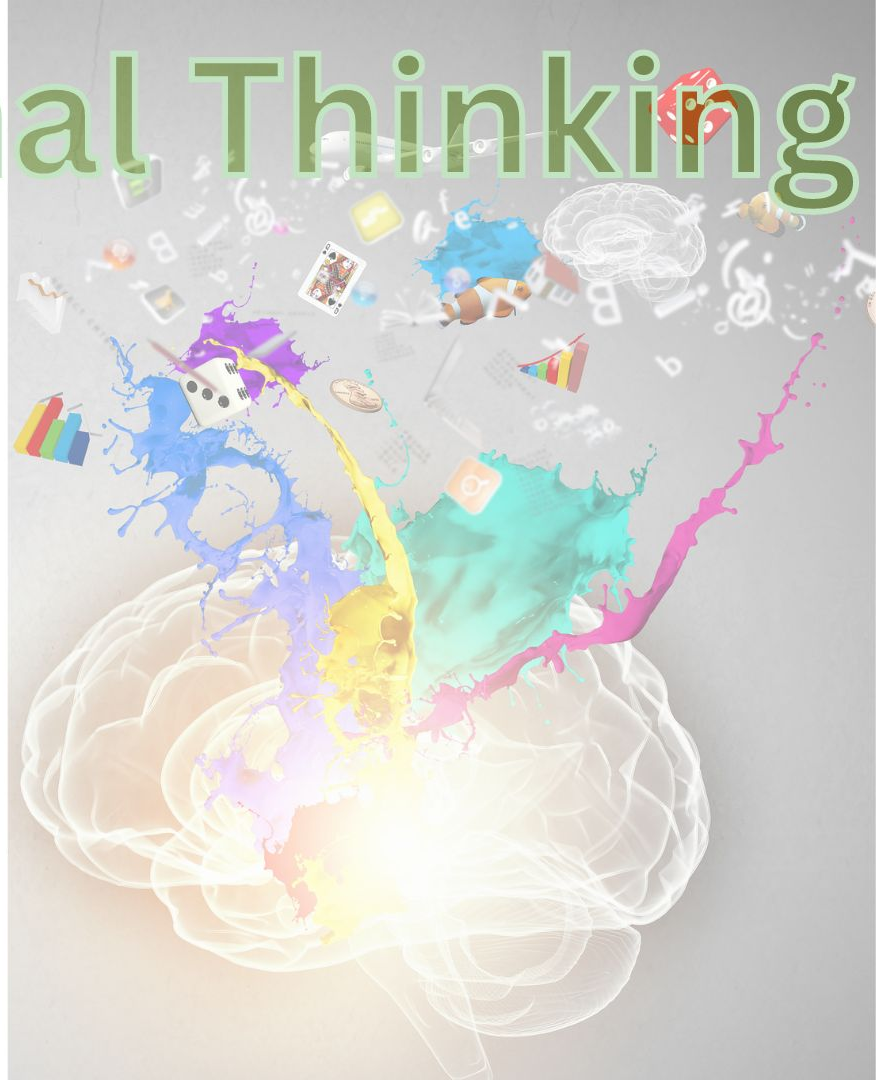
Computational Thinking

Decomposition

Pattern Recognition

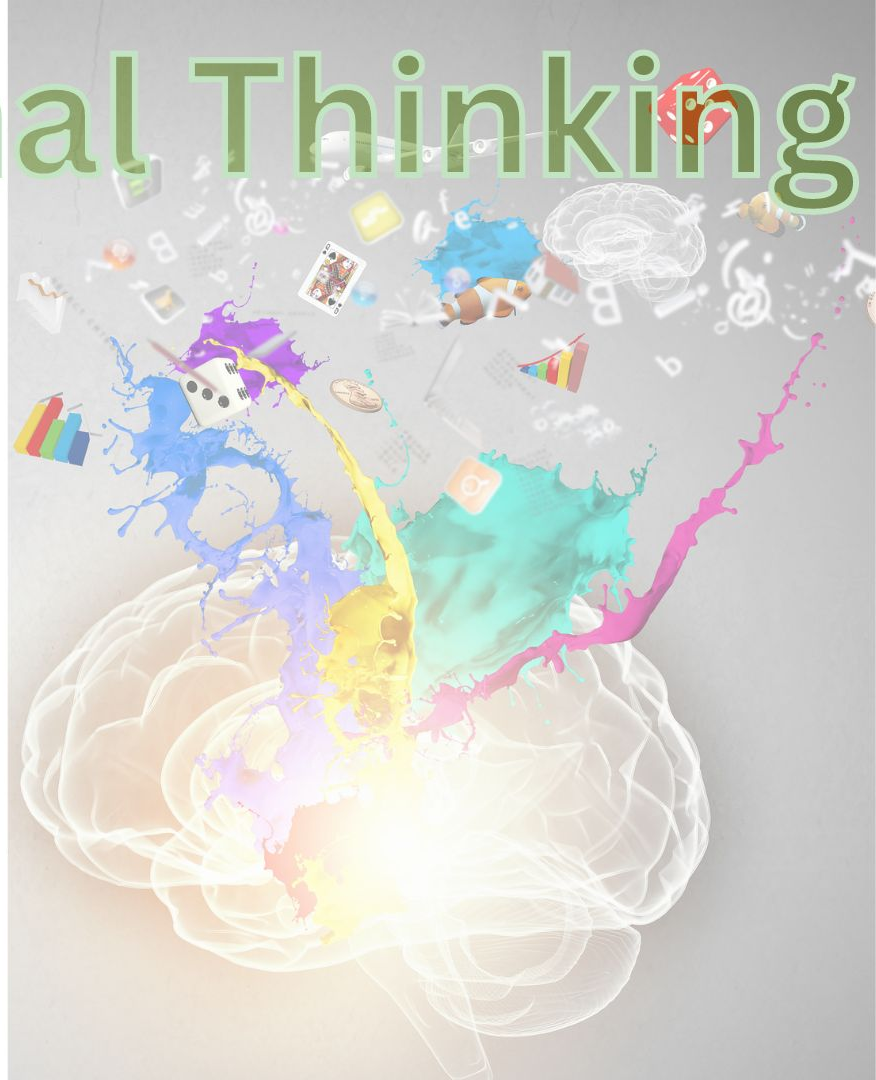
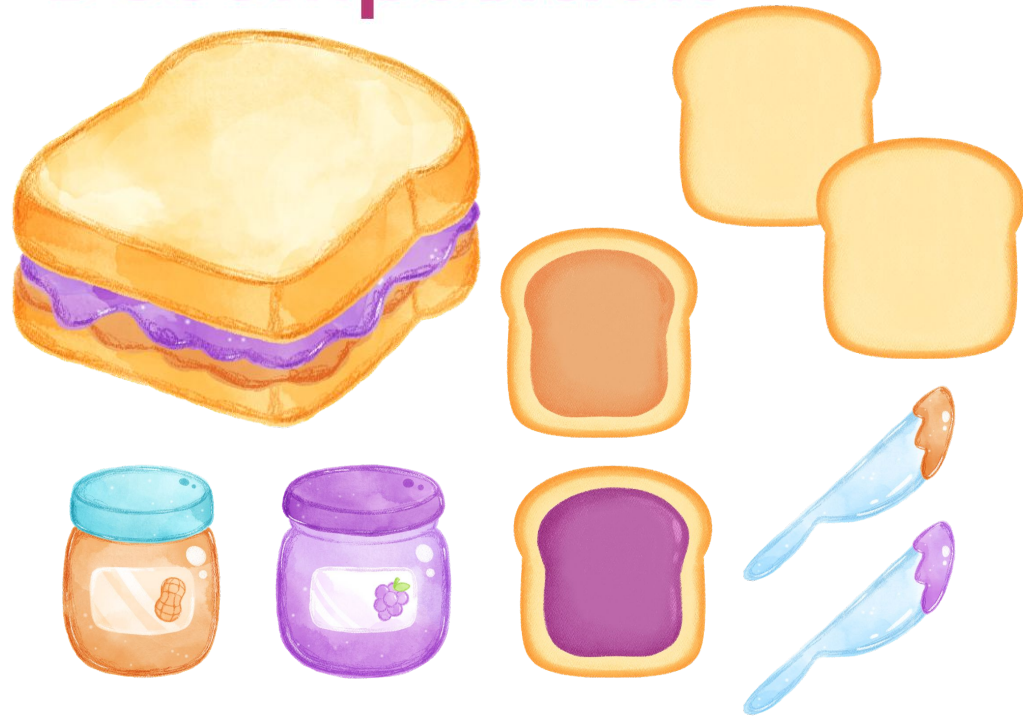
Pattern Abstraction

Algorithm Design



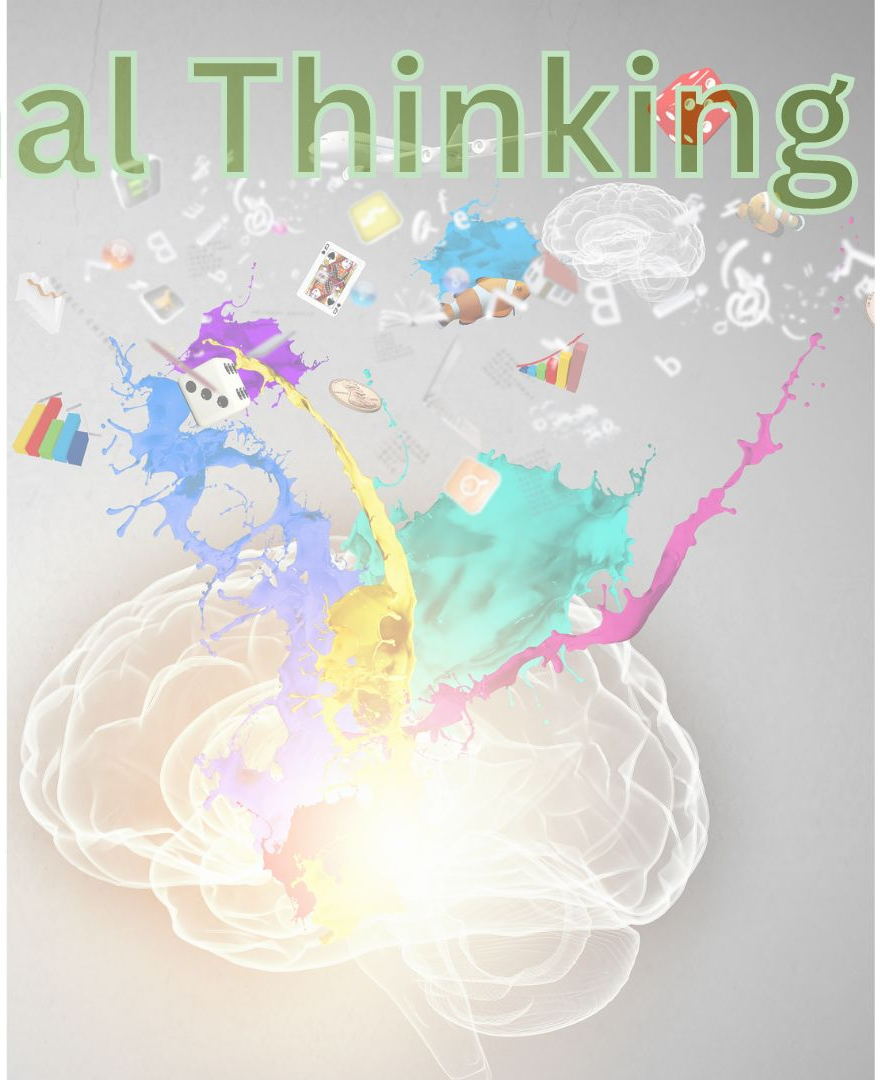
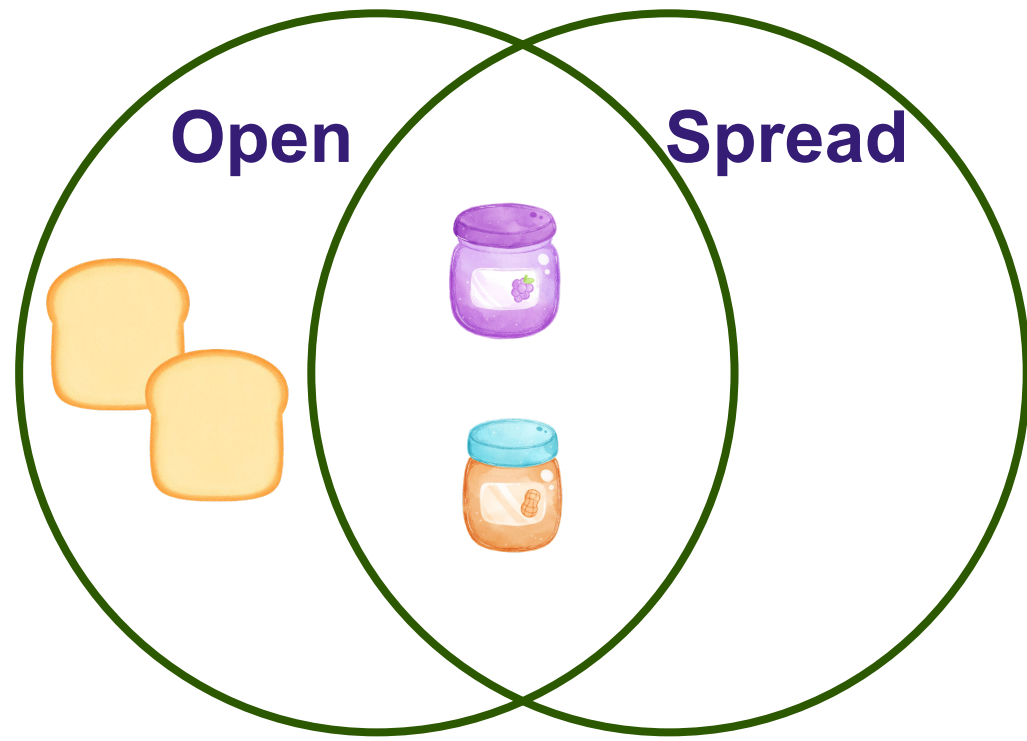
Computational Thinking

Decomposition



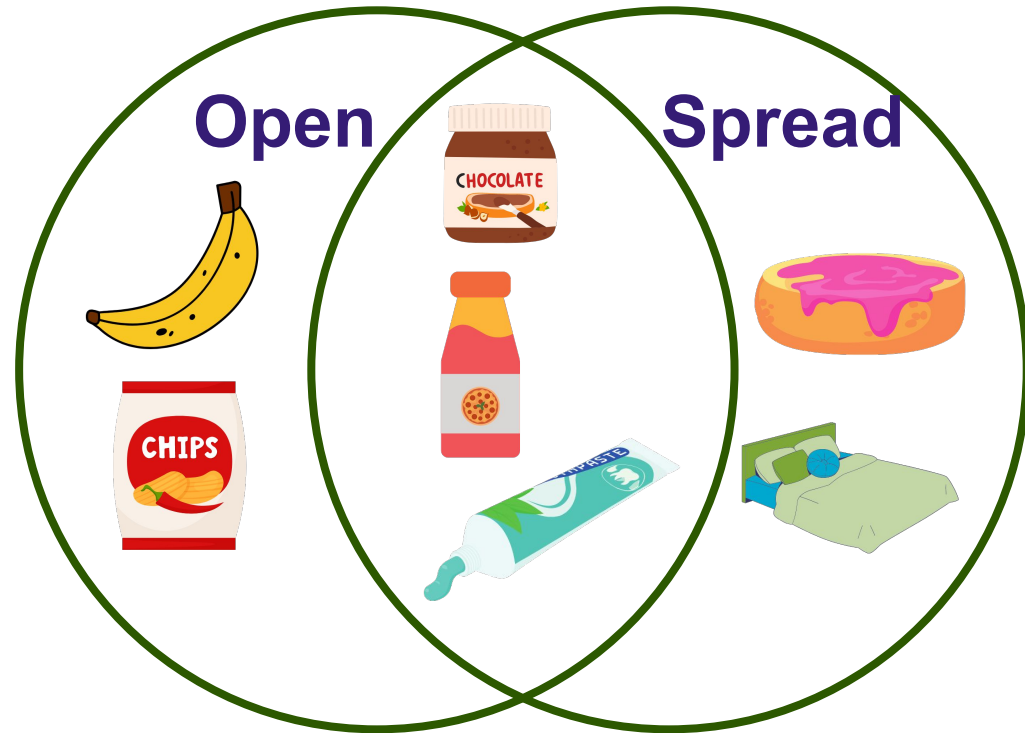
Computational Thinking

Pattern Recognition



Computational Thinking

Pattern Abstraction



Computational Thinking

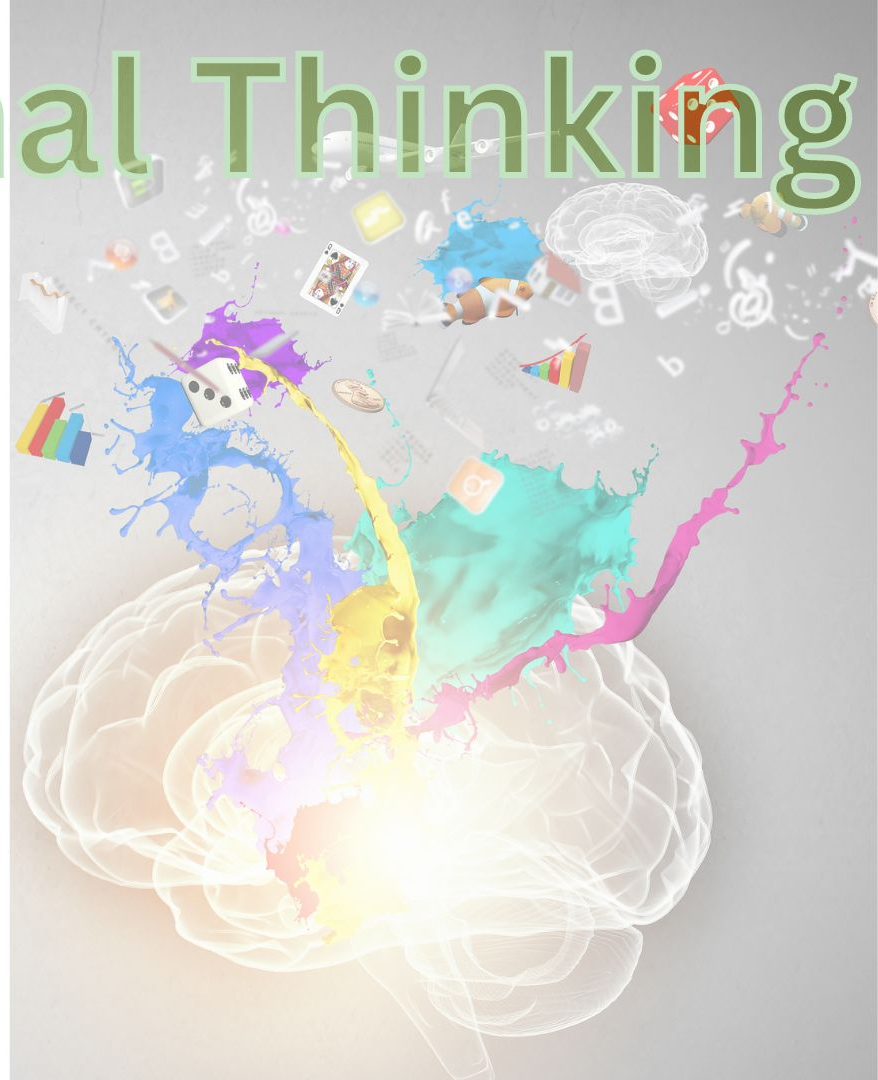
Pattern Abstraction






Computational Thinking

Algorithm Design





1. Get out everything you will need
 - a. If it is in a container or bar then open it
2. Build the sandwich
 - a. Lay out 2 slices of bread
 - b. Dip knife in peanut butter and spread on 1 slice of the bread
 - c. Dip another knife in jelly and spread on the other slice of bread.
 - d. Put the peanut butter bread face down onto the jelly bread.
3. Close the containers and bag.



Design

-  Find a solution for a problem
-  Know your audience
-  Plan
-  Prototype
-  Test
-  Refine
-  Test
-  Refine
-  Test
-  Final product

Computational

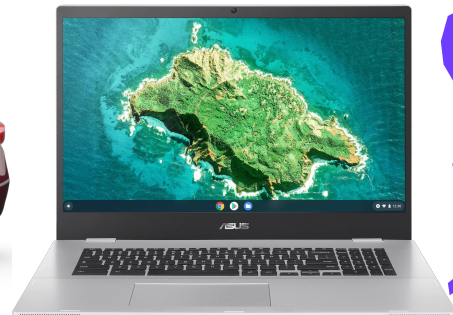
-  Decompose
 -  Pattern Matching
 -  Abstraction
 -  Algorithm
- First this then that.
If this then that.

Critical Thinking

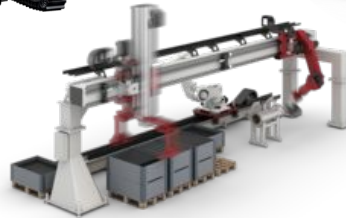
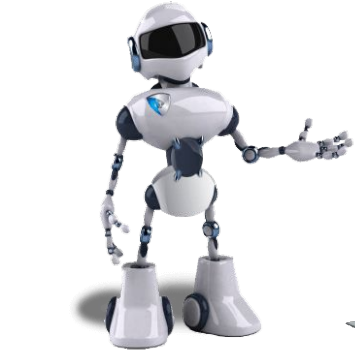
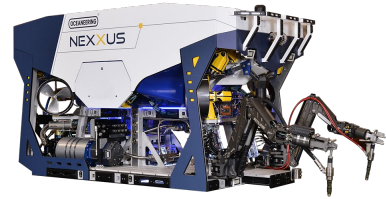
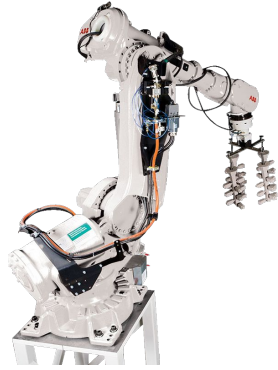
Coding consists of many languages that computers understand.

```
a.length; c++) {  
& b.push(a[c]);  
function h() {  
#User_logged").a(),  
place(/+(?=)/g, ""),  
c = 0; c < a.le  
[ ], (a[c], b) && b  
i = a.
```



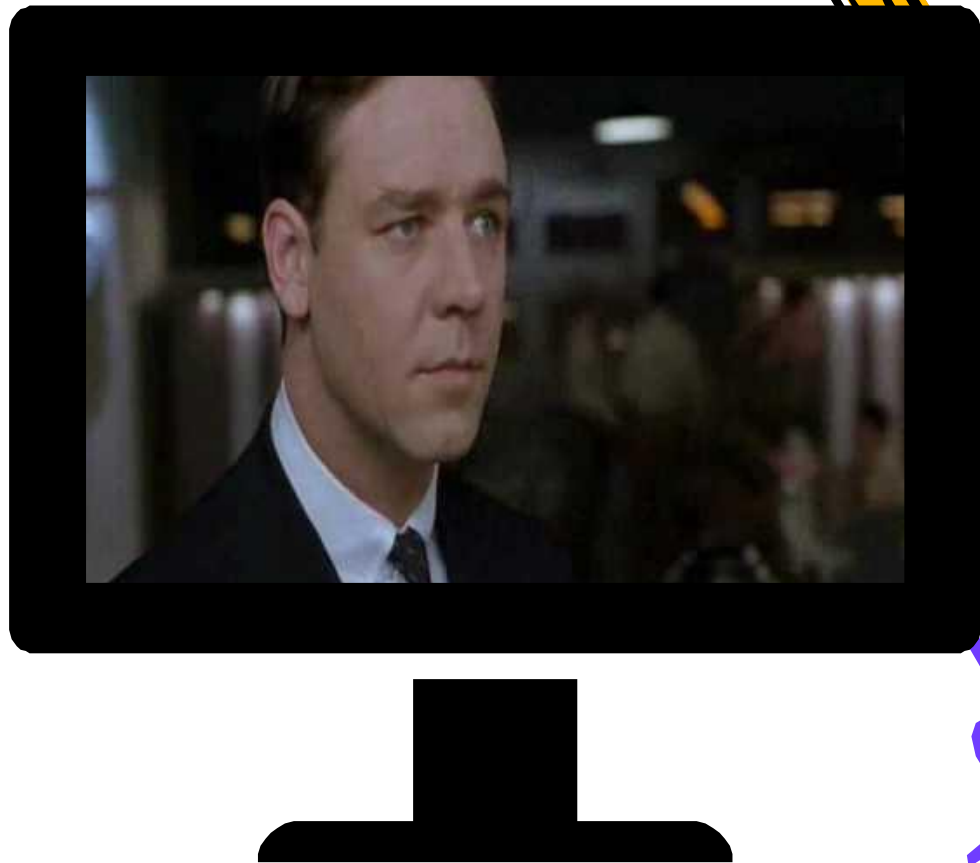


ROBOTS!!!

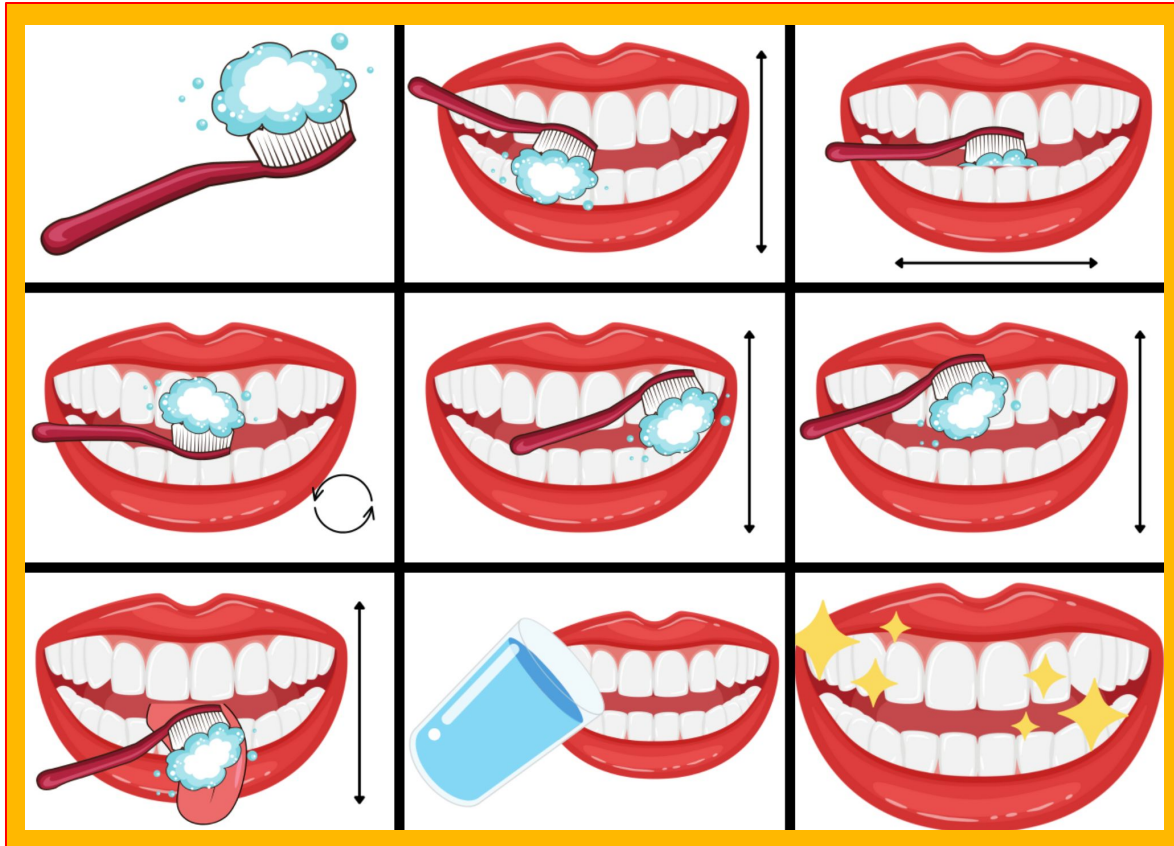
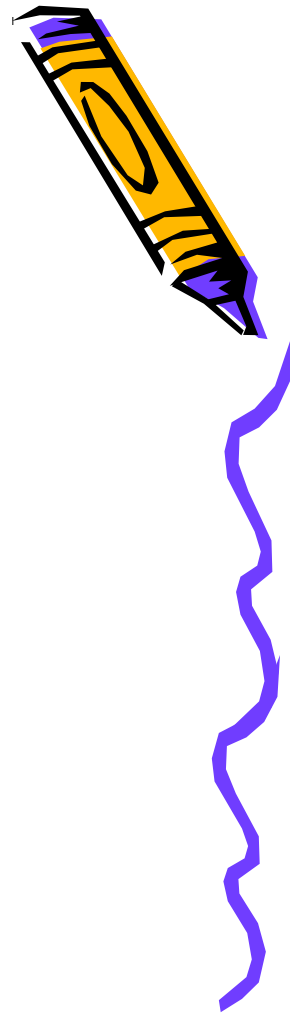


Coding

What we think it is...



What Coding Really is



Computer Science Vocabulary

Algorithm

A set of instructions to be followed, especially by a computer.

Loop

An algorithm or part of an algorithm that repeats a certain number of times, forever or until a condition is met.

Event

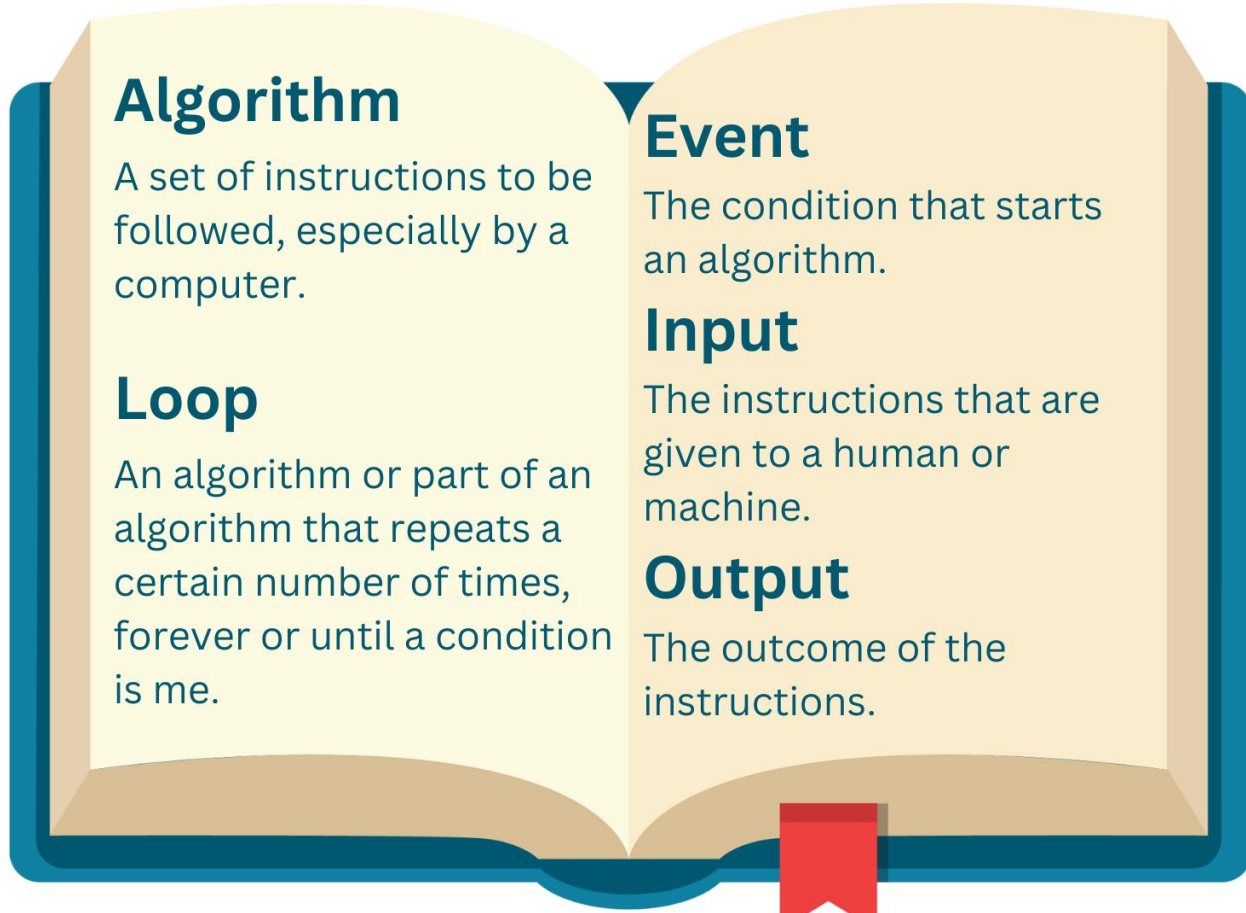
The condition that starts an algorithm.

Input

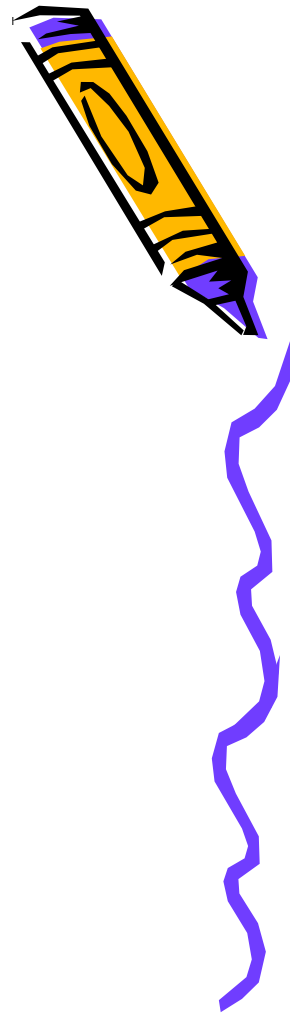
The instructions that are given to a human or machine.

Output

The outcome of the instructions.



Algorithm



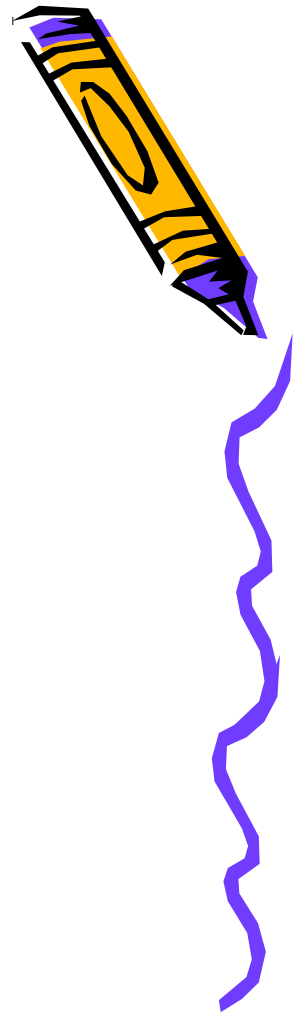
Algorithm



START



R



Algorithm



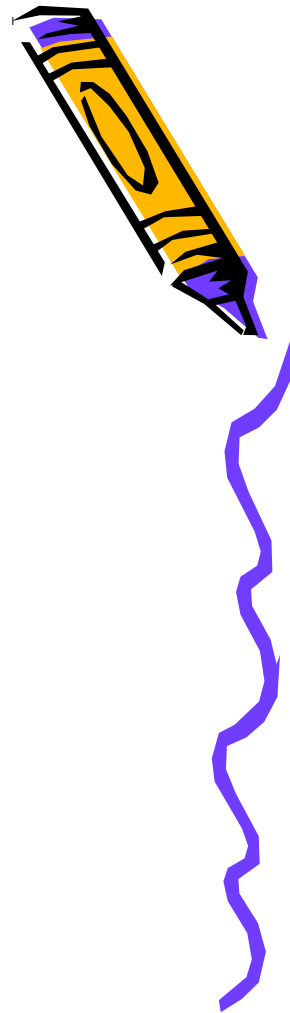
START



R



L



Algorithm



START



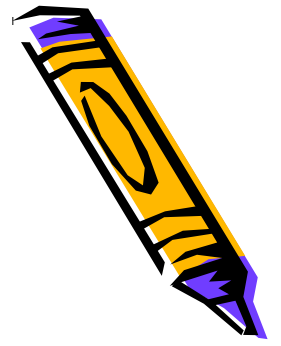
R



L



H



Algorithm



R



L



H



START



R

H

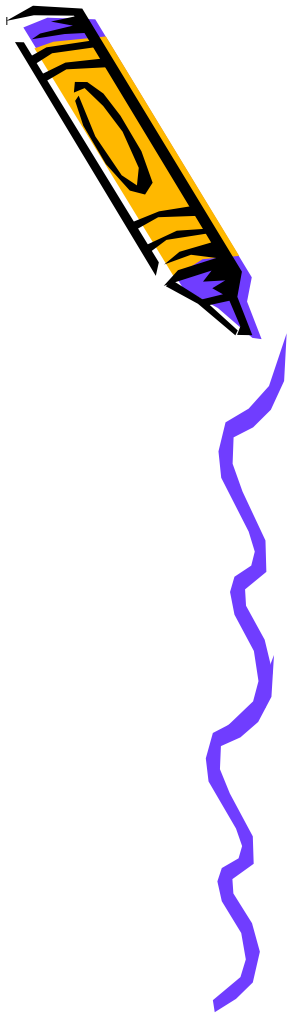


START



L

H



START



L

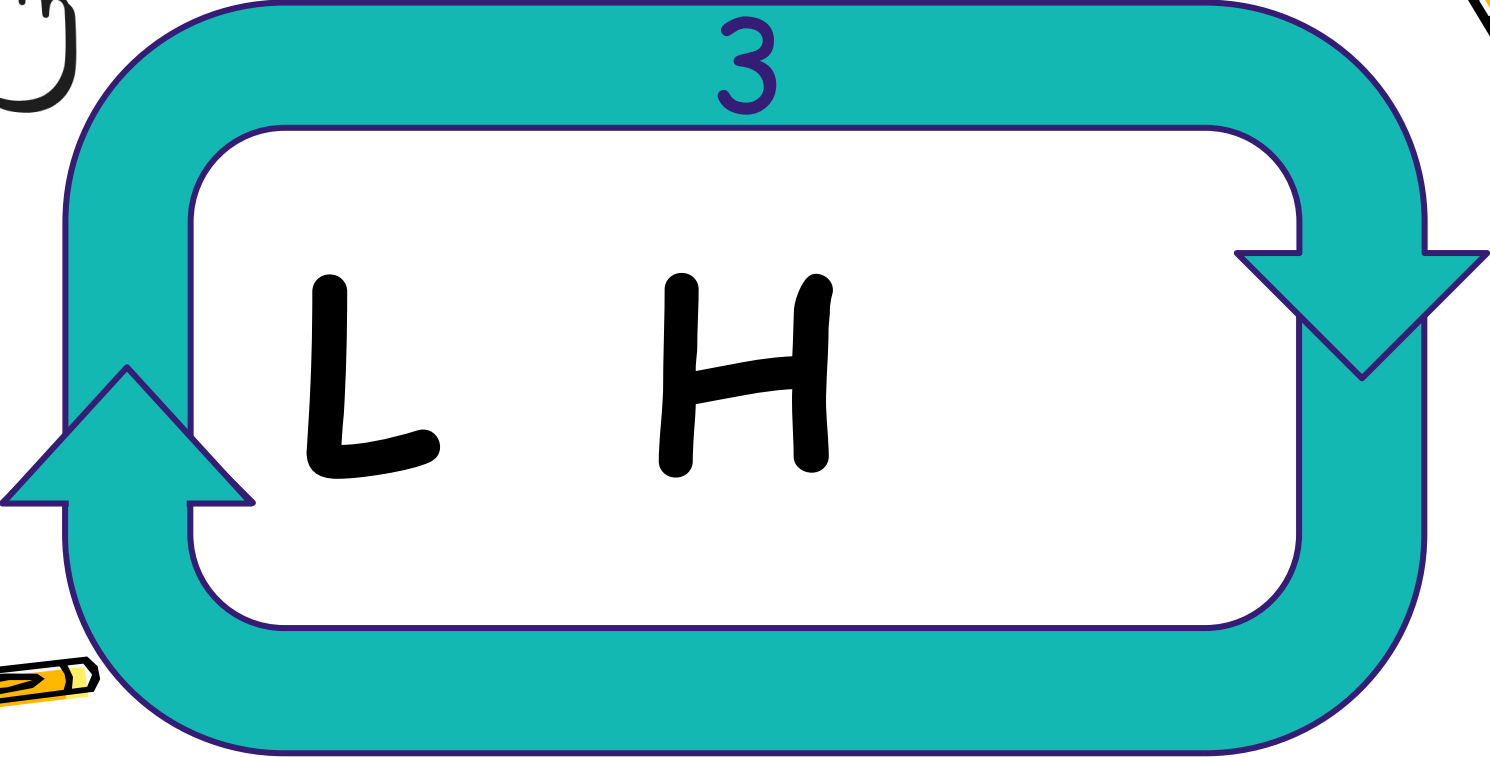
H

R

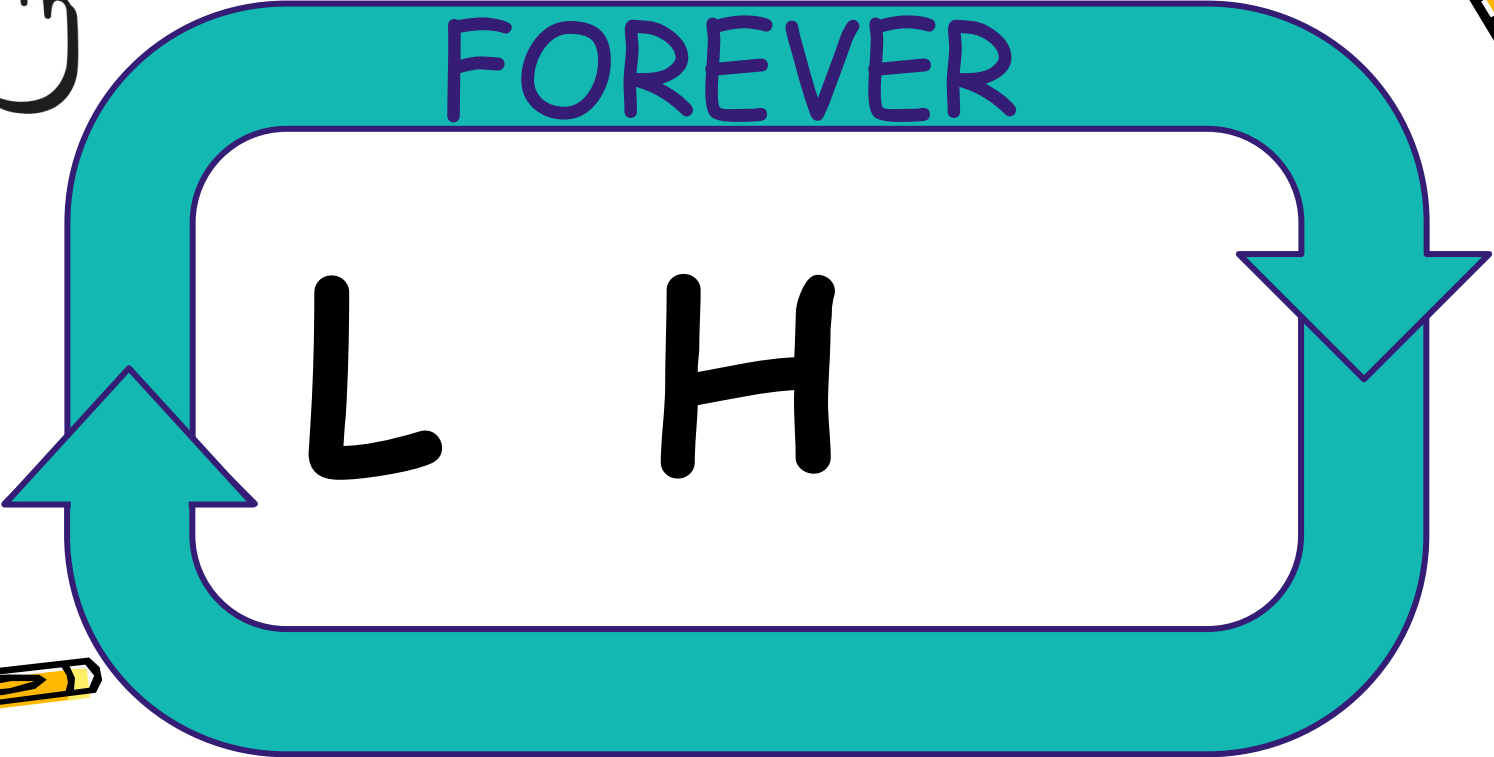




START



START



START



FOREVER

L H

STOP



START



FOREVER

R L H



START



FOREVER

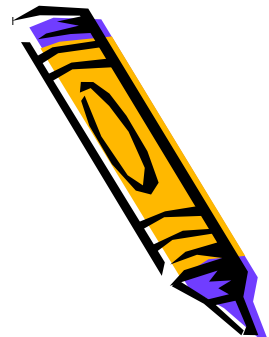


START

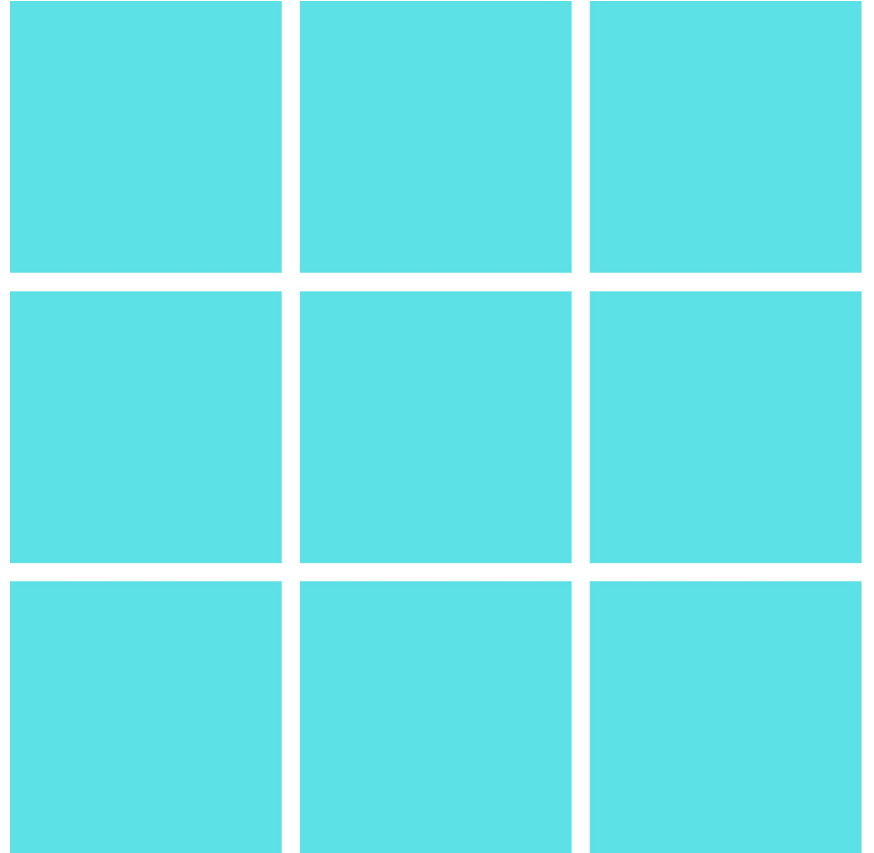
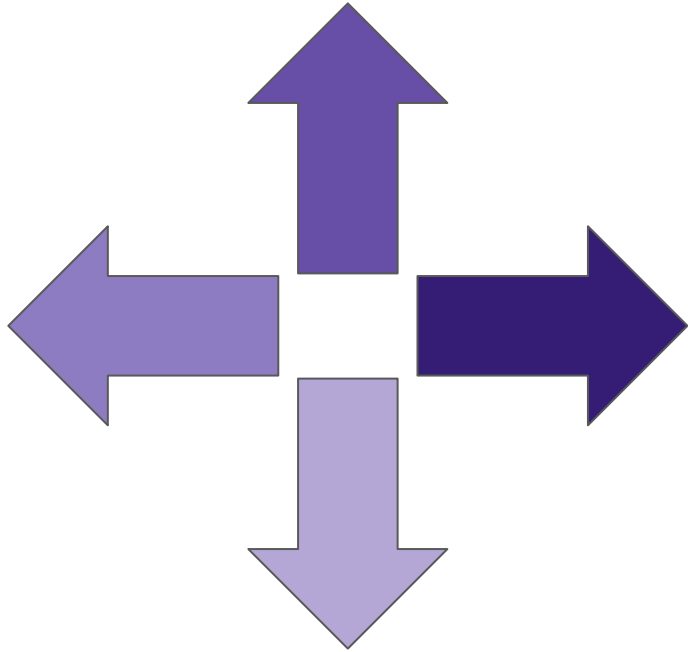


FOREVER

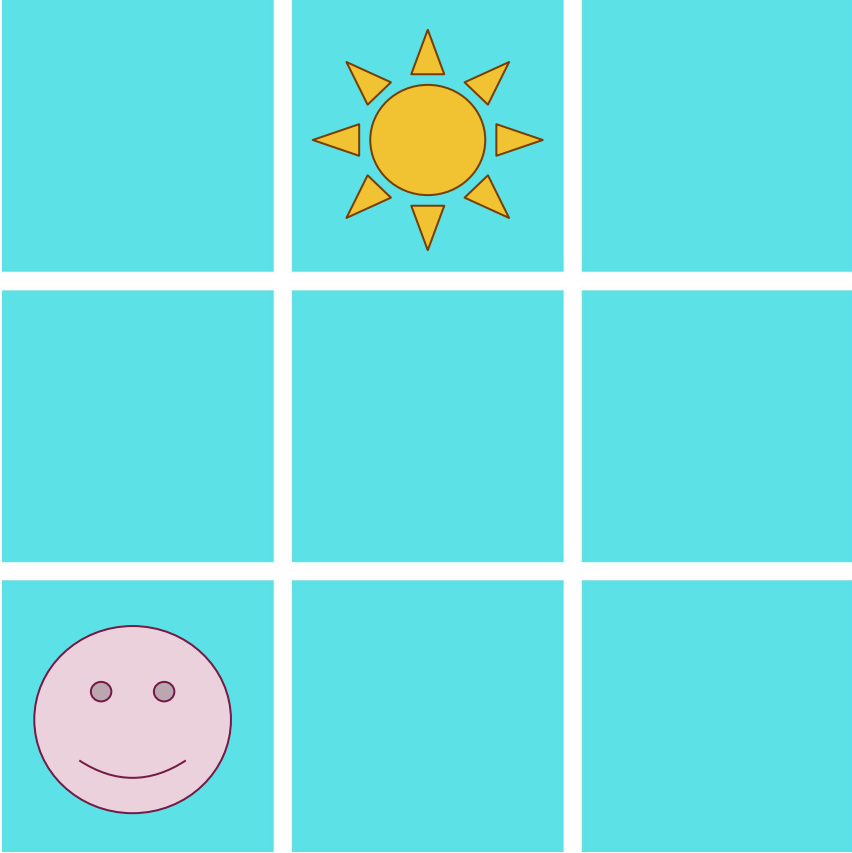
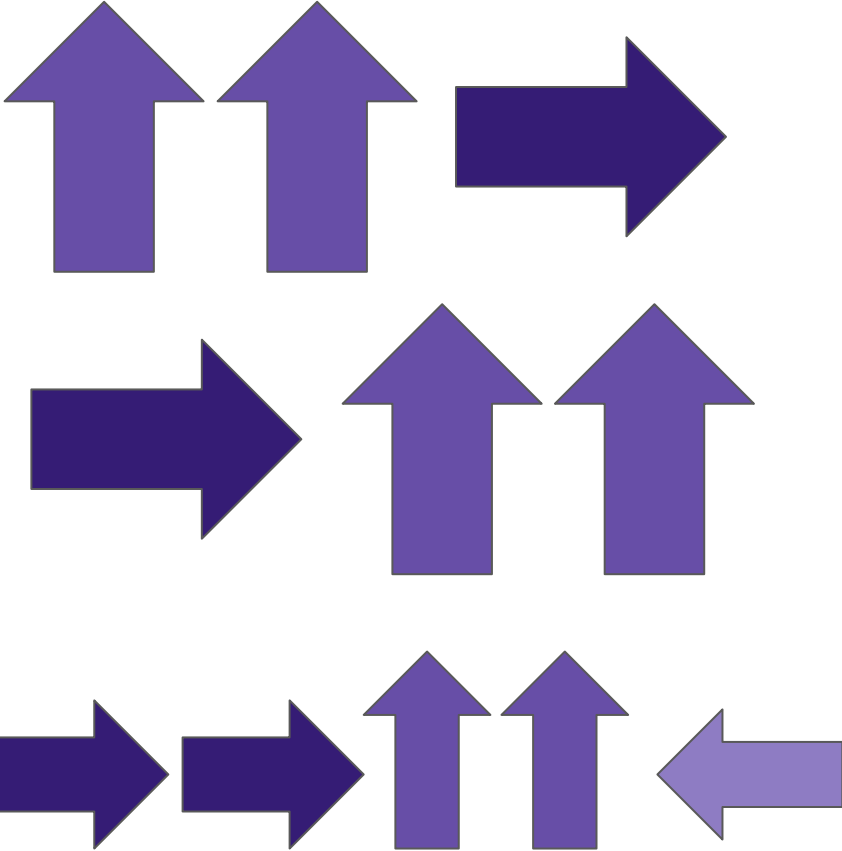
STOP



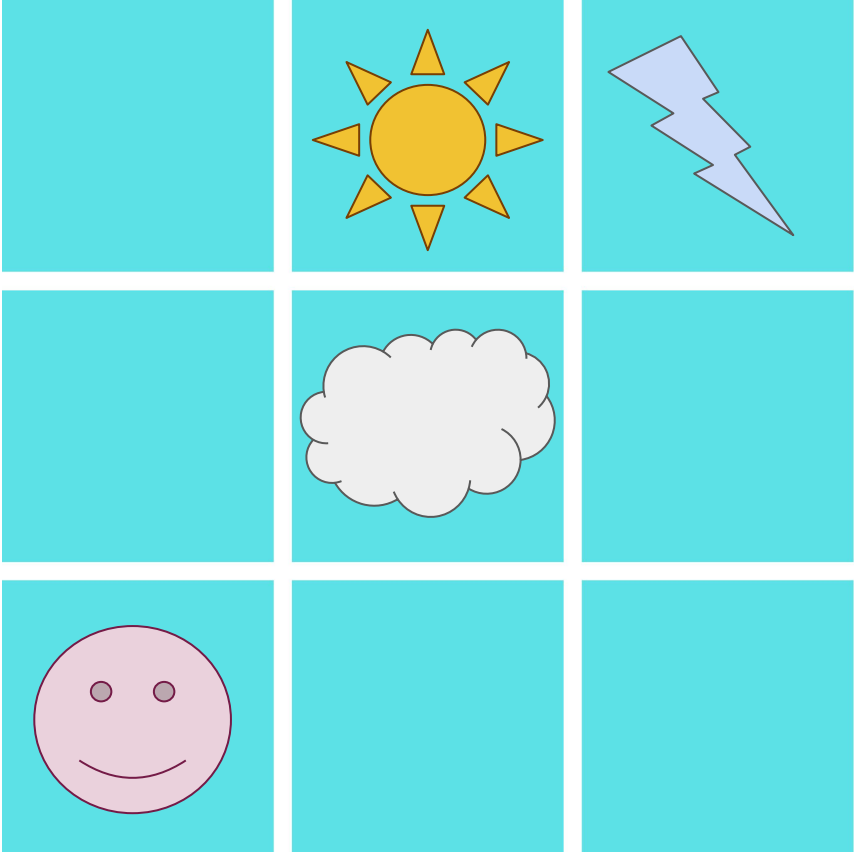
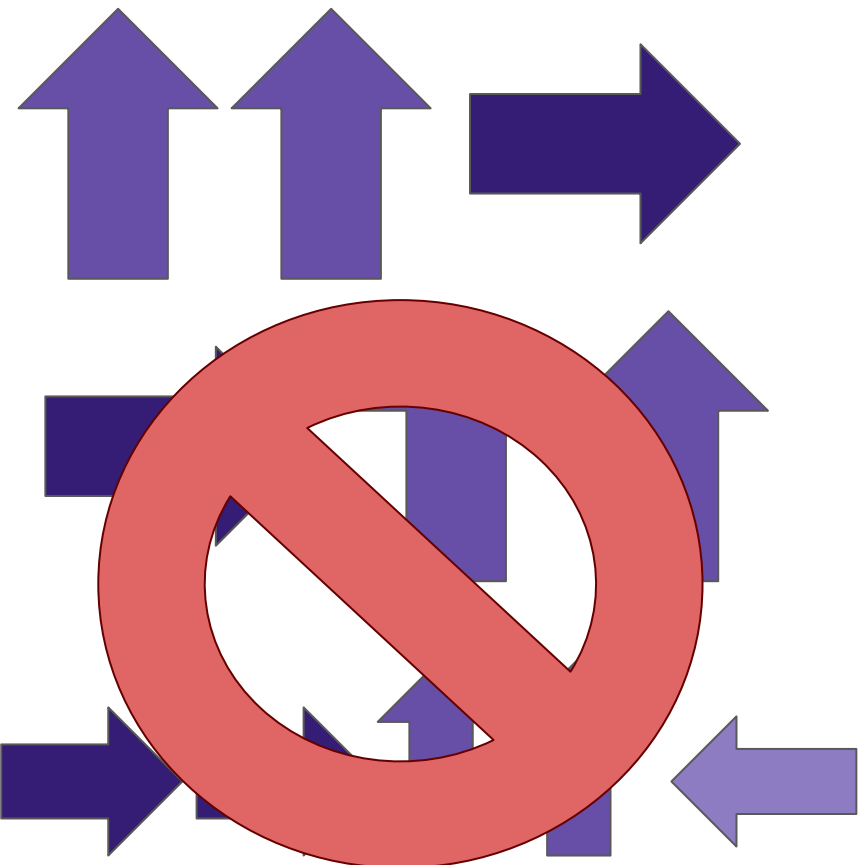
No tech? No problem.



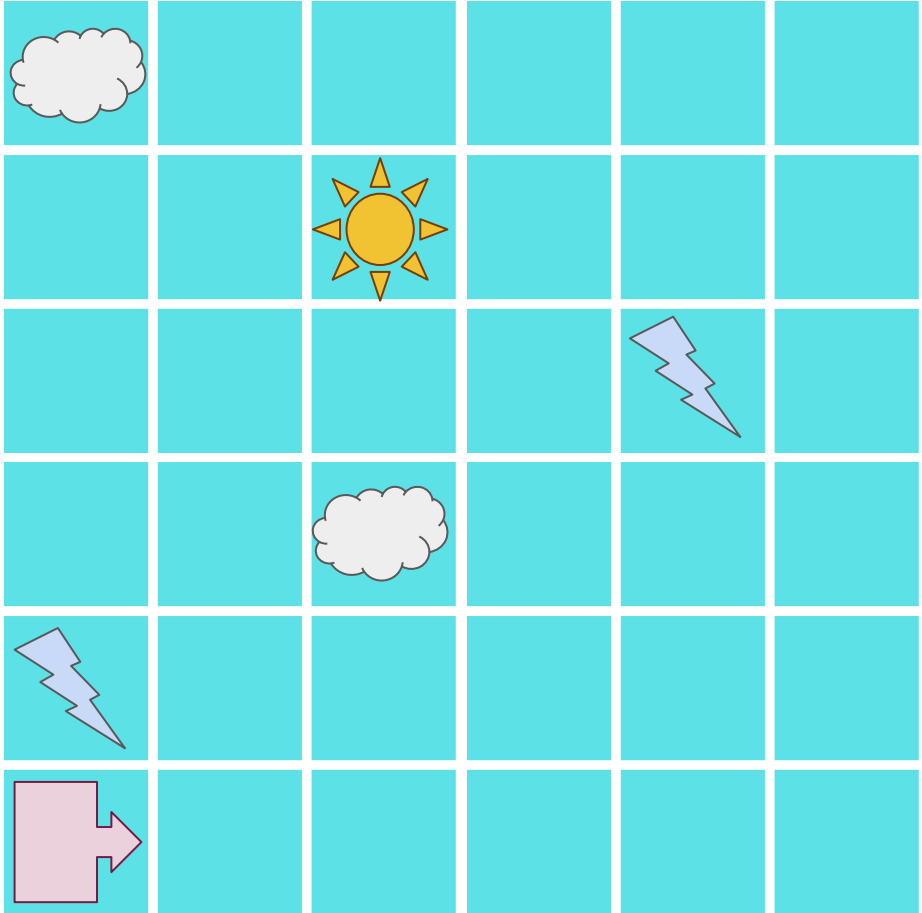
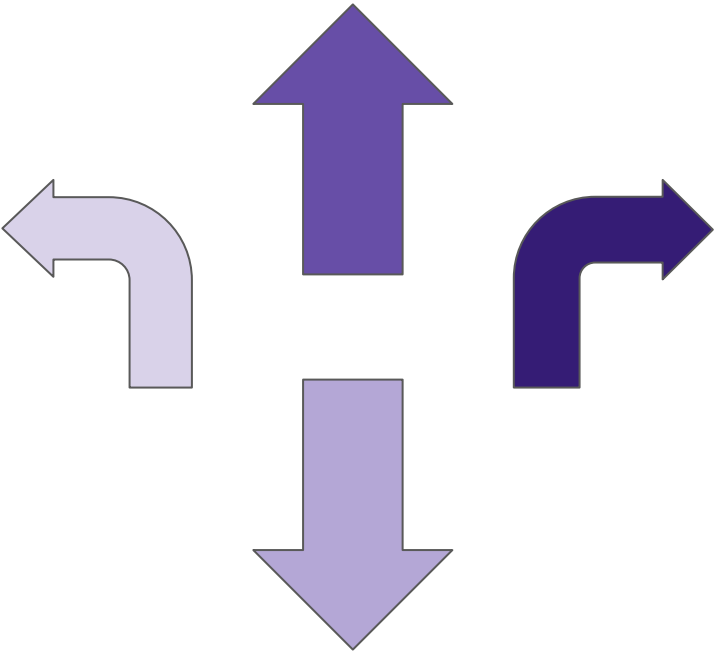
No tech? No problem.

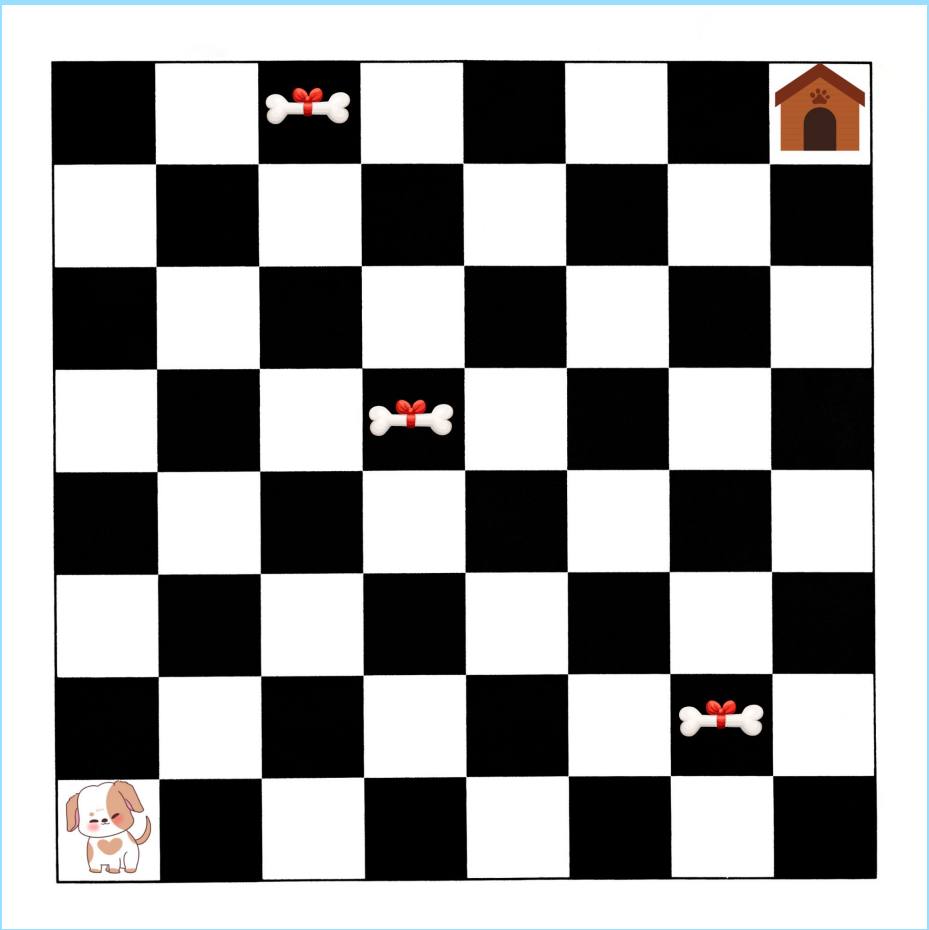


No tech? No problem.



No tech? No problem.

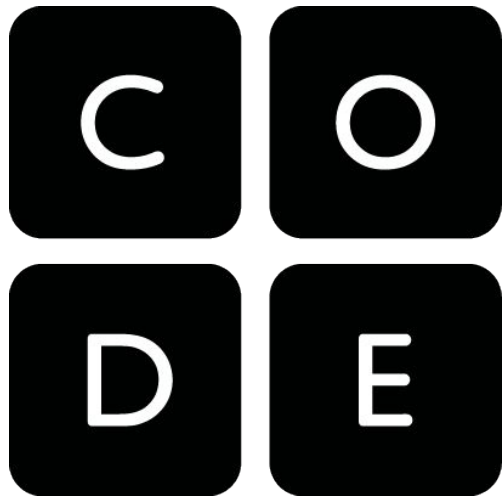




No tech? No problem.

- Sudoku
- Code a Drawing
- Code math counting or equations
- Eye spy and other guessing games
- Code a friend/family member/teacher
- Hand signals & actions

Chromebook Coding & Computational Thinking



"Getting Started with CS First" video series

In this series, we'll take an in-depth look at CS First resources available for teachers and learn how to use sample activities and themes in a classroom setting.

[What is CS First?](#)

Video 1 · 2:43

In this video, we'll cover: an introduction to CS First, why CS First works for students, and how CS First is built for teachers.

[How to create a teacher account](#)

Video 2 · 2:43

In this video, we'll cover: how to create a teacher account, how to set up a class, and how to choose a lesson.

[What's inside the CS First curriculum](#)

Video 3 · 2:00

In this video, we'll cover: what's inside the CS First curriculum, how students can engage with activities, and how the curriculum can become part of your teaching.

Toys!!!

Your ATA Library

 The Alberta Teachers' Association

Kits in Your ATA Library

Makerkits A-D

Makerkits E-G

Makerkits H-L

Makerkits M-O

Makerkits P-S

Makerkits T-Z



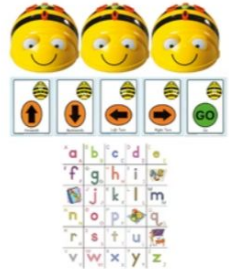
BeeBots



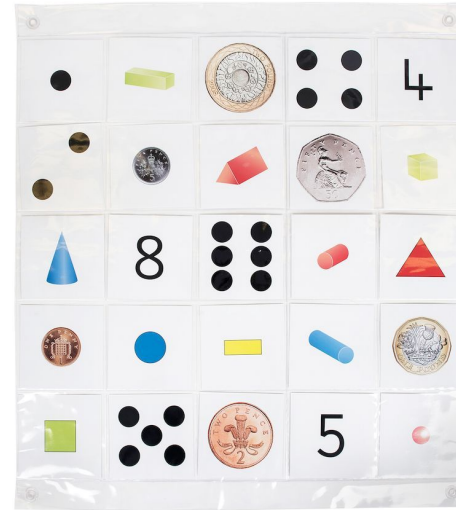
I highly recommend!



\$134.95
Bee Bot - Programmable Floor Robot - See & Say Version!
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\$495.95
Bee-Bot (3 Robot Pack)- Robot Bundle with Mat & Command Cards
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Code&Go Robot Mouse

I highly
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