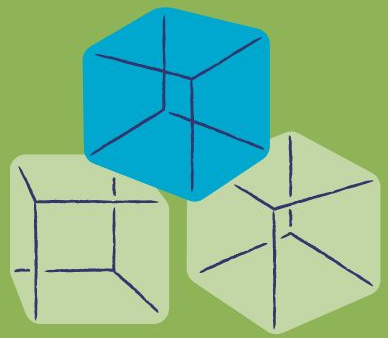
Making Connections

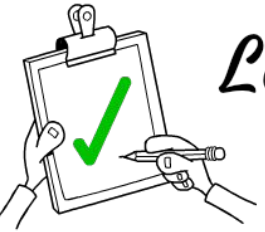


Matter

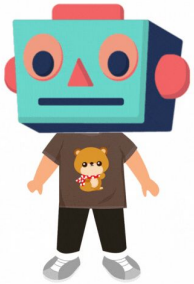
Computer Science

grade 3

Problem solving and scientific inquiry are developed through the knowledgeable application of **creativity**, **design**, and **computational thinking**.



Learning Outcomes



K *Children interpret instructions in the learning environment.*

1 *Students investigate instructions and their influence on actions and outcomes.*

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

3 *Students investigate creativity and its relationship to computational thinking.*

4 *Students investigate and apply design in the context of computer science and technology.*

5 *Students create and justify a design that could be used by a human or machine to address a challenge.*

6 *Students create and refine computational artifacts through the use of design and abstraction.*

Organizing Idea	**Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.**
Guiding Question	**How does creativity contribute to computational thinking?**
Learning Outcome	**Students investigate creativity and its relationship to computational thinking.**

Knowledge	Understanding	Skills & Procedures
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.

Organizing Idea	**Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.**
Guiding Question	**How does creativity contribute to computational thinking?**
Learning Outcome	**Students investigate creativity and its relationship to computational thinking.**

Knowledge	Understanding	Skills & Procedures
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.

Creativity

Finding different ways to reach the same outcome.

Problem solving to overcome obstacles to achieve a desired outcome.

Design Thinking Process

Learn About Your Audience

Empathize

Define

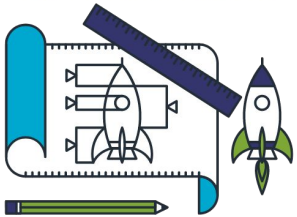
Construct Point of View Based on User Needs

Brainstorm and Come up with Creative Solutions

Ideate

Prototype

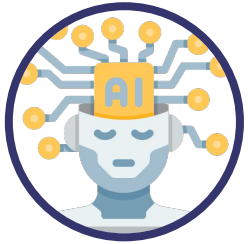
Build Representation of Your Ideas



Test Your Ideas

Test

Computational Thinking

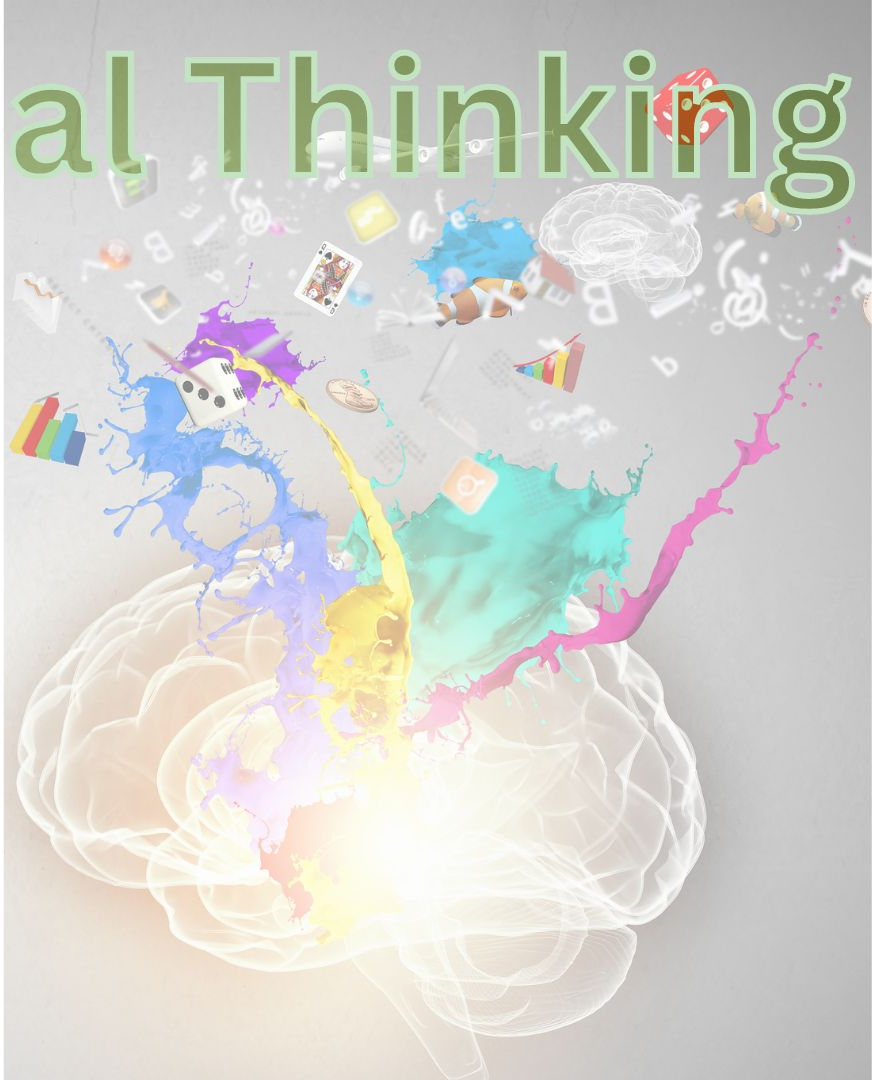


Decomposition

Pattern Recognition

Pattern Abstraction

Algorithm Design



Organizing Idea	**Matter: Understandings of the physical world are deepened by investigating matter and energy.**
Guiding Question	**How can materials change?**
Learning Outcome	**Students investigate and analyze how materials have the potential to be changed.**

Skills & Procedures

Relate a processed material to the natural material from which it originated.

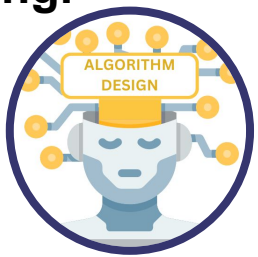
Discuss how interaction with natural materials is guided by relationships with the land for First Nations, Métis, and Inuit communities.

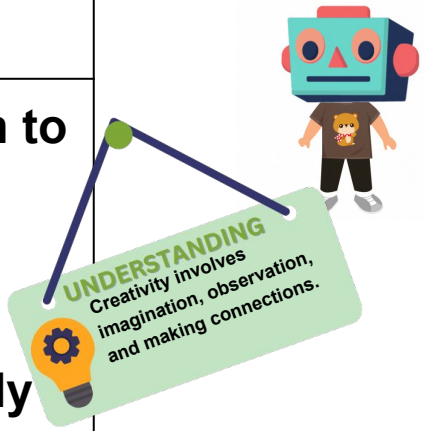
Organizing Idea	Matter: Understandings of the physical world are deepened by investigating matter and energy.
Guiding Question	How can materials change?
Learning Outcome	Students investigate and analyze how materials have the potential to be changed.

Skills & Procedures

Conduct an investigation to demonstrate changes of state.

Discuss examples of daily activities that include heating and cooling.





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

SKILLS & PROCEDURES

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

SKILLS & PROCEDURES

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

SKILLS & PROCEDURES

IF the TEMPERATURE goes up THEN is it HEATING.

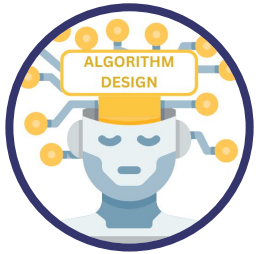
IF the TEMPERATURE goes down THEN it is COOLING.

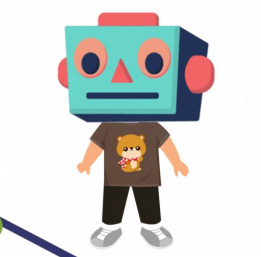
Organizing Idea	Matter: Understandings of the physical world are deepened by investigating matter and energy.
Guiding Question	How can materials change?
Learning Outcome	Students investigate and analyze how materials have the potential to be changed.

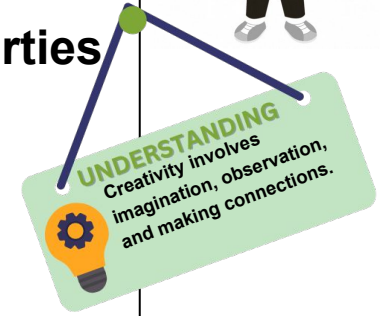
Skills & Procedures

Describe solid, liquid, and gas states of matter in terms of the properties of shape and volume.

Conduct an investigation to demonstrate the properties of the state of matter.







IF it always has the same SHAPE and VOLUME THEN it is a SOLID.

IF it can change SHAPE but always has the same VOLUME THEN it is a LIQUID.

IF it can change SHAPE and VOLUME THEN it is a gas.

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

SKILLS & PROCEDURES

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

SKILLS & PROCEDURES

Organizing Idea	Matter: Understandings of the physical world are deepened by investigating matter and energy.
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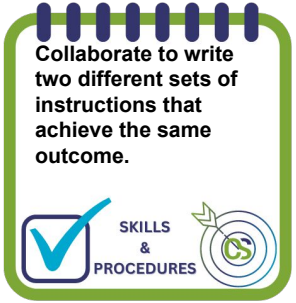
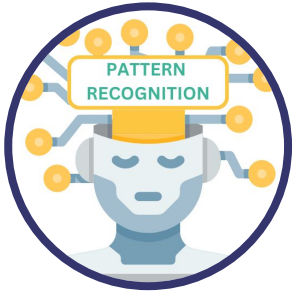
Skills & Procedures

Safely explore the melting/freezing points of various substances.

Compare the melting/freezing and boiling points of various substances, including water.

Have students come up with instructions for being safe during these activities.





Looking at similarities and differences between freezing and boiling in relation to states of matter.

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Skills & Procedures

Describe and diagram the changes of state of water using the water cycle.

Discuss ways to respect water in local environments.

Identify examples of changes in the state of water in local environments.

Discuss the importance of safety around bodies of water that have a surface of ice.

Discuss the importance of safety around bodies of water in different seasons.

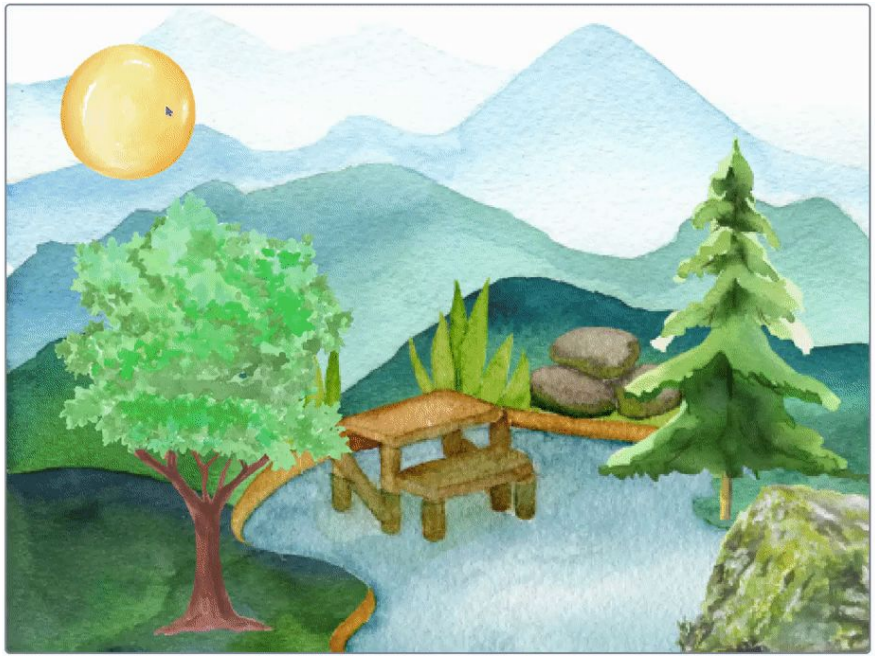
Code a Water Cycle in Scratch

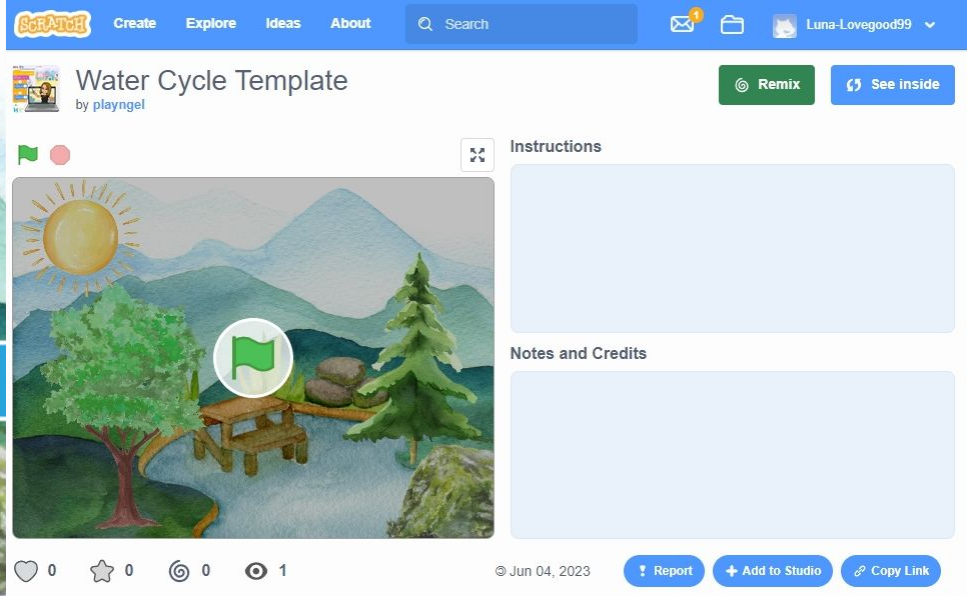
Create a set of instructions that could be followed by a human or a machine to complete a task.

SKILLS & PROCEDURES

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

SKILLS & PROCEDURES





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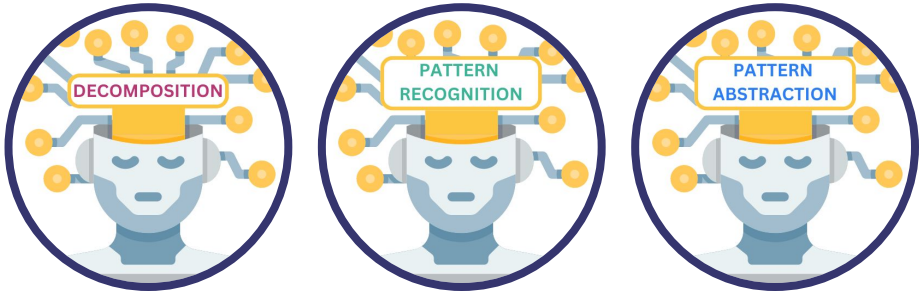
Organizing Idea	Matter: Understandings of the physical world are deepened by investigating matter and energy.
Guiding Question	How can materials change?
Learning Outcome	Students investigate and analyze how materials have the potential to be changed.

Skills & Procedures

Discuss examples of changes to materials or substances that are permanent and examples of changes to materials or substances that are reversible.

Safely perform experiments on various materials and substances and classify changes as permanent or reversible.



Make connections between things that are cooked or can be broken.

What attributes do they have in common?

Can we think of other objects with the same attributes?