Making Connections

Energy

Computer Science

grade 6

Organizing Idea	**Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.**
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
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	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.

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Knowledge	Understanding	Skills & Procedures
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.

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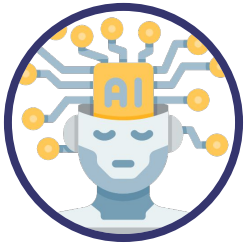
Knowledge	Understanding	Skills & Procedures
The use of computers, coding, and technology can have impacts that are • personal • social • environmental • economic Impacts of computers, coding, or technology may be intentional or unintentional.	Computers, coding, and technology can be used in ways that have positive or negative impacts.	Discuss how computers, coding, or technology have had impacts. Predict possible impacts of computers, coding, or technology.

Computational Thinking

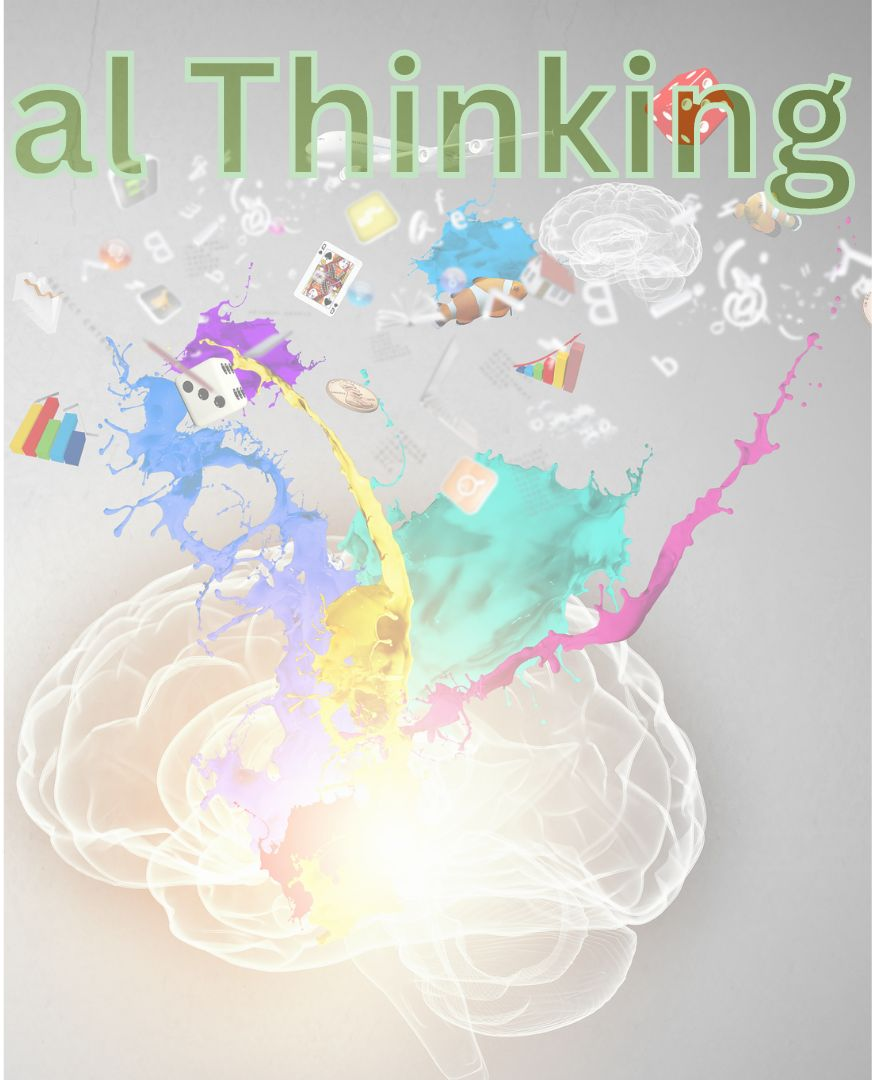


Decomposition

Pattern Recognition

Pattern Abstraction

Algorithm Design



Design Thinking Process

Learn About
Your Audience

Empathize

Define

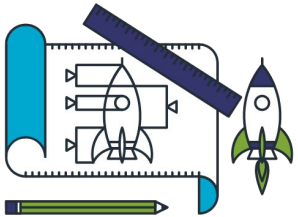
Construct Point
of View Based
on User Needs

Brainstorm and
Come up with
Creative Solutions

Ideate

Prototype

Build
Representation
of Your Ideas



Test Your Ideas

Test

Creativity

Finding different ways to reach the same outcome.

Problem solving to overcome obstacles to achieve a desired outcome.

Organizing Idea	Energy: Understandings of the physical world are deepened by investigating matter and energy.
Guiding Question	In what ways can interactions lead to physical change?
Learning Outcome	Students analyze forces and relate them to interactions between objects.

Skills & Procedures

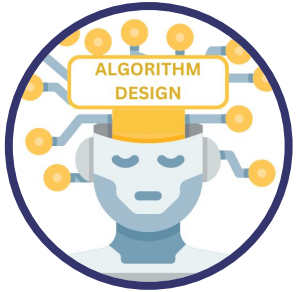
Conduct investigations to answer questions about the effects of external and internal forces on objects during an interaction.

Identify forces that act on an object during an interaction.

Use materials, tools, and equipment safely while experimenting with forces in interactions.

Understanding how all motion can be categorized into simpler groupings.

ie: push & pull are applied force



Come up with a set of instructions for completing the experiment safely.

Write a set of instructions that a machine could follow to complete the experiment.

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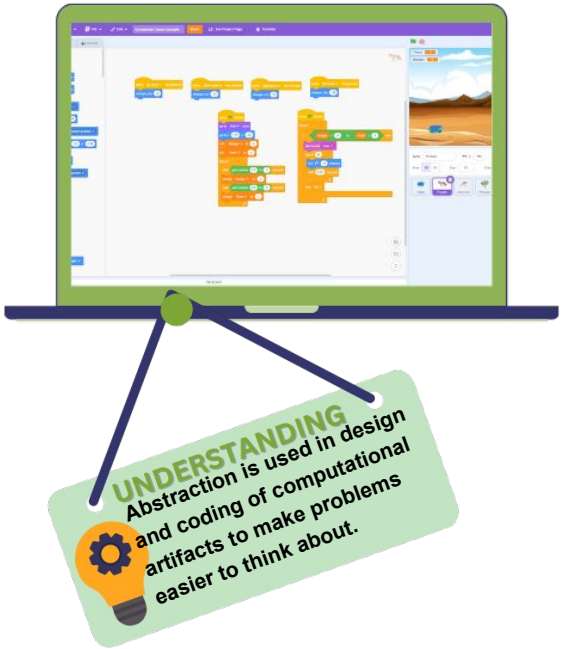

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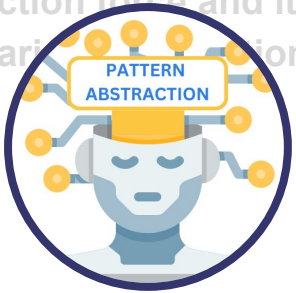
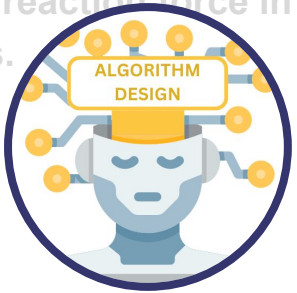
Skills & Procedures

Differentiate between temporary and permanent changes.

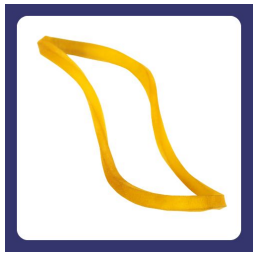
Test the plasticity and elasticity of objects.

Demonstrate and represent an action force and its reaction force in vari ions.





ELASTICITY



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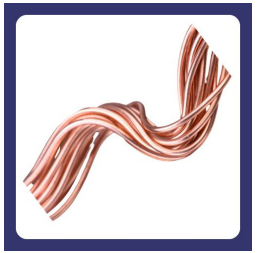

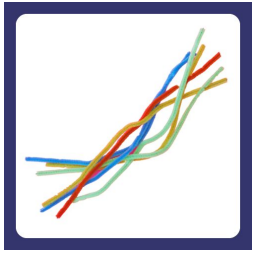

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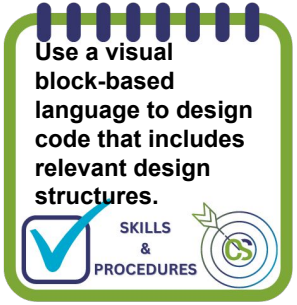
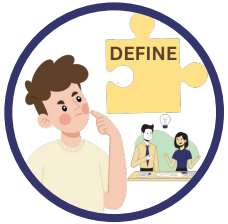
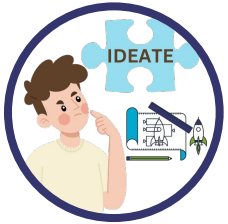
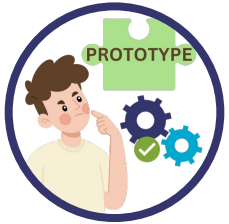
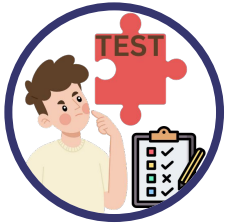








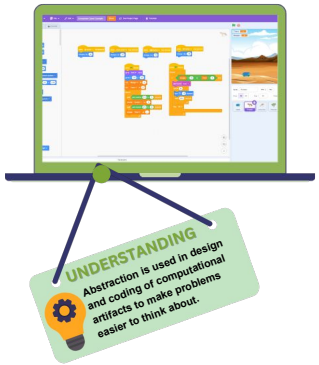


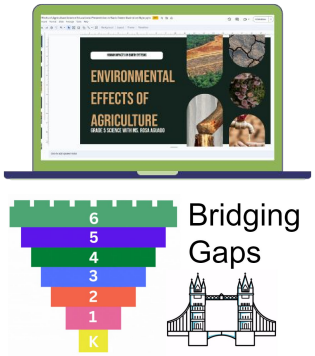
Organizing Idea	**Earth Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.** **Energy: Understandings of the physical world are deepened by investigating matter and energy.**	
Guiding Question	How are energy resources used?	
Learning Outcome	Students investigate energy resources and explain factors that influence their use.	

Skills & Procedures

Investigate factors that influence selection of energy resources.

Examine factors that influence selection of principal energy resources used in Alberta.



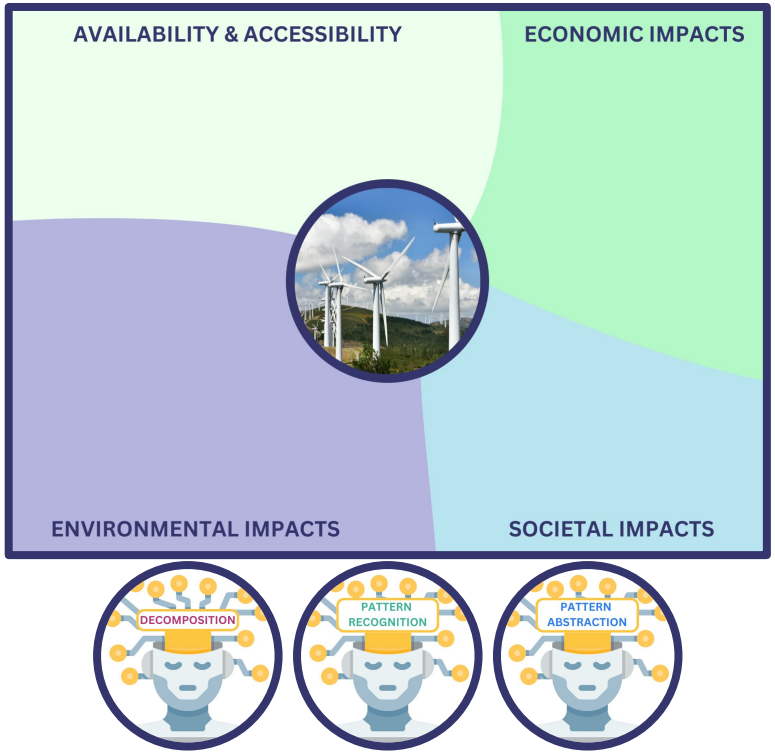


Apply abstraction during the design process.

SKILLS & PROCEDURES

Identify examples of abstractions encountered in daily life.

SKILLS & PROCEDURES



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Skills & Procedures

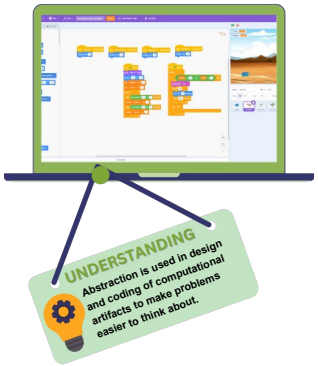
Examine management of energy resources in various contexts.

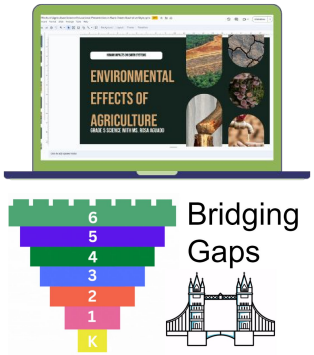
Classify energy resources as being used before or after processing.

Compare the use of an energy resource before and after processing.

Discuss ways energy resources are used by individuals or communities in daily life.

Design a device that uses an energy resource, before or after processing, to solve a problem.





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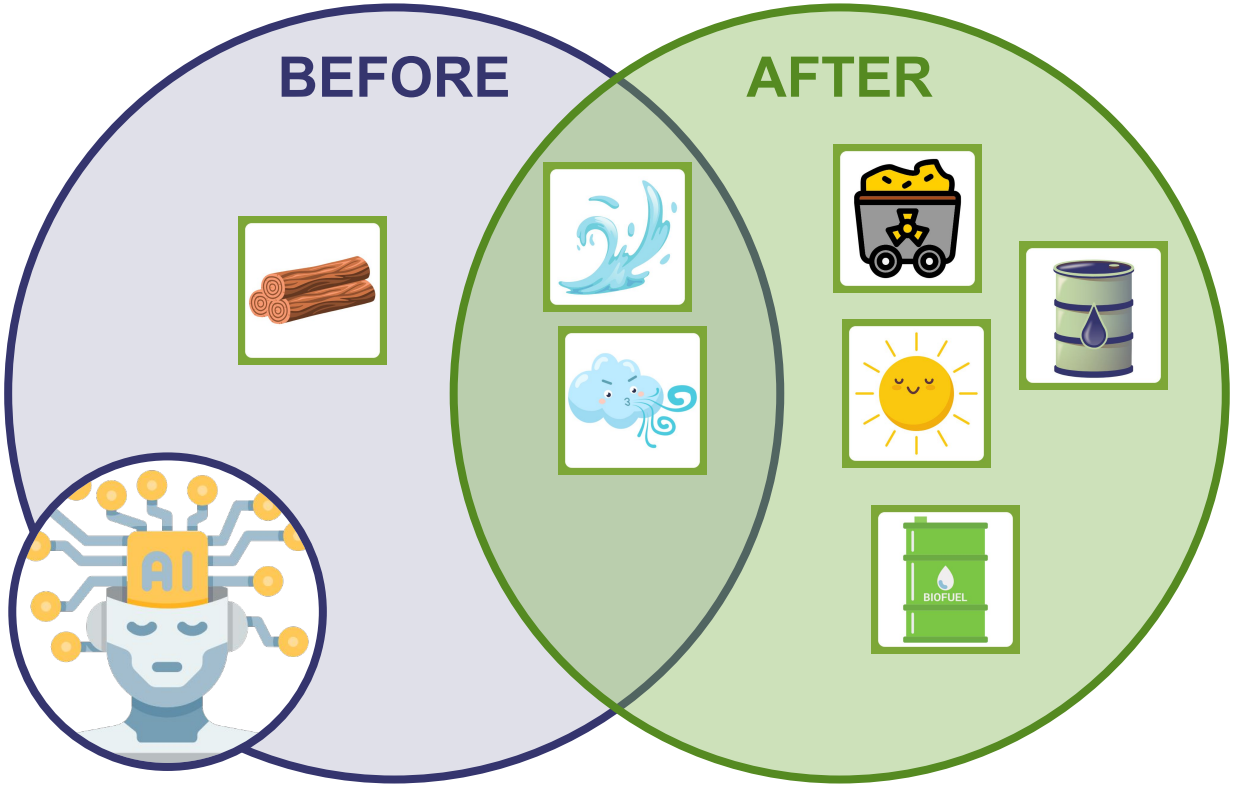

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Name _____ Date _____

STEM Challenge
Balloon Rocket Challenge

Objective

To build a balloon-powered rocket and test its speed and distance.

Materials

- Drinking straw
- Balloon
- Tape
- String or fishing line
- Stopwatch or timer

Instructions

- Attach one end of the string or fishing line between two fixed points, creating a "track."
- Thread the drinking straw onto the string so that it can move freely along the track.
- Inflate the balloon and pinch the end to prevent air from escaping.
- Tape the balloon to the straw, ensuring it points in the direction of the track.
- Release the balloon, and time how long it takes for the rocket to travel from one end of the track to the other.

Challenge Questions

- How did the size of the balloon affect the rocket's speed and distance?
- What happens to the rocket as the air escapes from the balloon?
- How could you change the design to make the rocket go faster or farther?
- Can you calculate the average speed of the rocket based on the recorded times?

Apply abstraction during the design process.

SKILLS & PROCEDURES

Power Up Your Magnet Game: Electromagnet Lab

Objective: To understand the concept of electromagnetism and how electric current can create a magnetic field.

Research Question	What is the effect of the number of wire coils on the strength of an electromagnet?
Materials	1 iron nail 1 insulated copper wire (20-24 gauge) 1 D-cell battery 1 battery holder Small paperclips Test items: staples, hairpins, safety pins, small bolts, small screws

Creating the electromagnet:

1. Wrap the copper wire around the iron nail from one end to the other, leaving about 10 cm of wire on each end.
2. DO NOT overlap the coils of wire.
3. Connect one end of the wire to the positive (+) terminal of the D-cell battery holder and the other end to the negative (-) terminal.
4. Insert the D-cell battery into the holder.

When you pick up the electromagnet, pick it up by the battery, the wire will get hot.