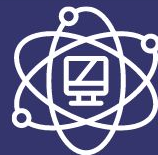


# Making Connections



Earth  
Systems



Computer  
Science



grade 6

<b>Organizing Idea</b>	<b>Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.</b>	
<b>Guiding Question</b>	<b>In what ways are abstraction, design, and coding related?</b>	
<b>Learning Outcome</b>	<b>Students examine abstraction in relation to design and coding, and describe impacts of technologies.</b>	
<b>Knowledge</b>	<b>Understanding</b>	<b>Skills &amp; Procedures</b>
<p>The process of <b>abstraction</b> includes</p> <ul style="list-style-type: none"> <li>• determining what details to keep and what to ignore</li> <li>• removing unnecessary details</li> <li>• identifying important information</li> <li>• generalizing patterns</li> </ul> <p>Information is data that is organized to be more useful.</p> <p>An <b>abstraction</b> is a simplified version of something complex.</p> <p><b>Abstractions</b> can make daily life easier; e.g.,</p> <ul style="list-style-type: none"> <li>• simple controls on appliances</li> <li>• light switches</li> <li>• steering wheels</li> <li>• apps</li> </ul> <p>Computational artifacts can be designed to address societal needs and wants; e.g.,</p> <ul style="list-style-type: none"> <li>• weather modelling</li> <li>• communications</li> <li>• automotive controls</li> <li>• medical research</li> <li>• apps</li> </ul>	<p><b>Abstraction</b> is used in design and coding of computational artifacts to make problems easier to think about.</p>	<p>Apply <b>abstraction</b> during the design process.</p> <p>Identify examples of <b>abstractions</b> encountered in daily life.</p> <p>Discuss the role of design and coding in society.</p> <p>Use a visual block-based language to design code that includes relevant design structures.</p>

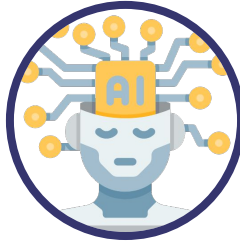
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<b>Knowledge</b>	<b>Understanding</b>	<b>Skills &amp; Procedures</b>
<p>Structures used in coding include</p> <ul style="list-style-type: none"> <li>• sequences</li> <li>• conditionals (if-then-else statements)</li> <li>• loops</li> </ul> <p>Sequence structures are ordered sets of instructions within code.</p> <p>Conditional structures are statements that tell computers to complete different actions based on different situations.</p>	<p><b>Abstraction</b> is used in design and coding of computational artifacts to make problems easier to think about.</p>	<p>Apply <b>abstraction</b> during the design process.</p> <p>Identify examples of <b>abstractions</b> encountered in daily life.</p> <p>Discuss the role of design and coding in society.</p> <p>Use a visual block-based language to design code that includes relevant design structures.</p>

<b>Organizing Idea</b>	<b>Computer Science: Problem solving and scientific inquiry are developed through the knowledgeable application of creativity, design, and computational thinking.</b>	
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<b>Knowledge</b>	<b>Understanding</b>	<b>Skills &amp; Procedures</b>
<p>The use of computers, coding, and technology can have impacts that are</p> <ul style="list-style-type: none"> <li>• personal</li> <li>• social</li> <li>• environmental</li> <li>• economic</li> </ul> <p>Impacts of computers, coding, or technology may be intentional or unintentional.</p>	<p>Computers, coding, and technology can be used in ways that have positive or negative impacts.</p>	<p>Discuss how computers, coding, or technology have had impacts.</p> <p>Predict possible impacts of computers, coding, or technology.</p>

# Computational Thinking

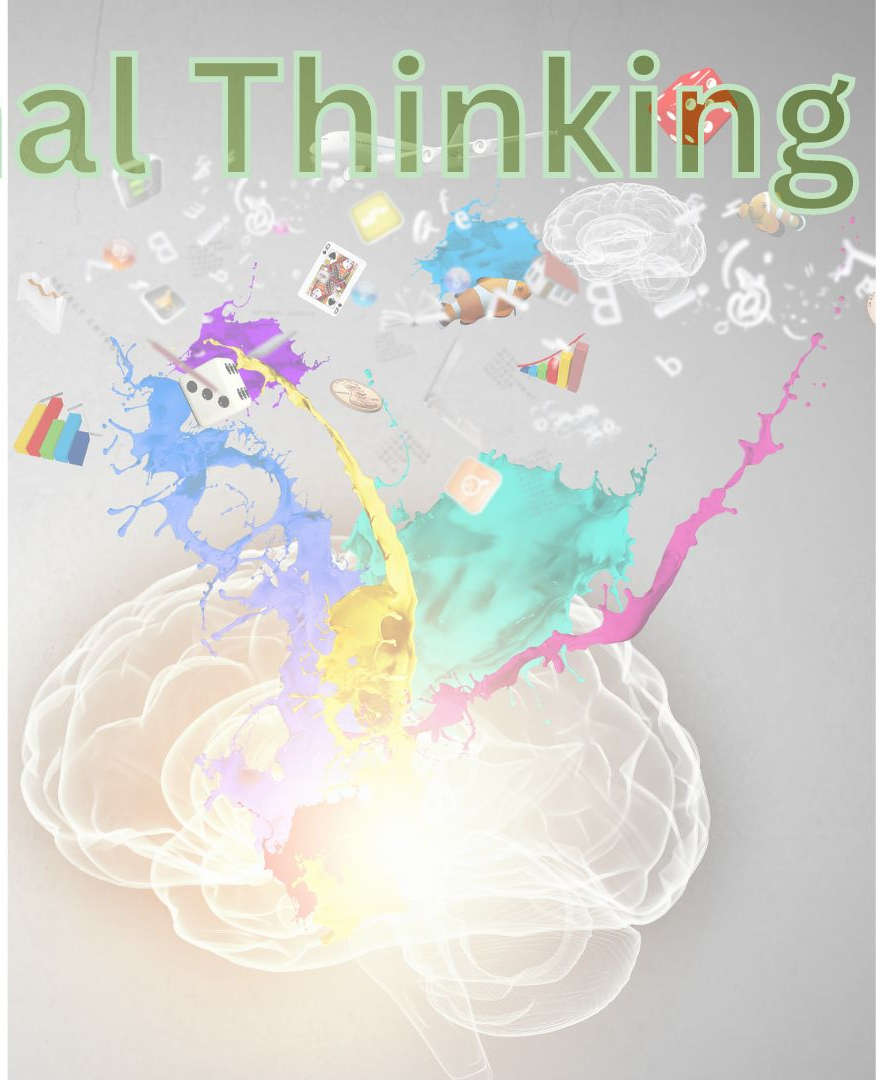
Decomposition



Pattern Recognition

Pattern Abstraction

Algorithm Design





# *Design Thinking Process*



*Learn About  
Your Audience*



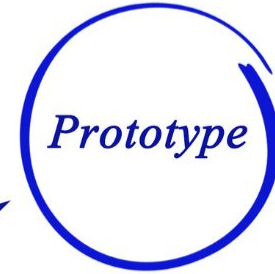
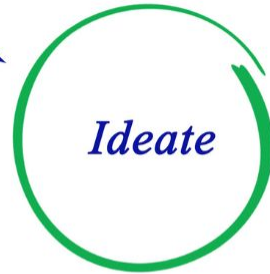
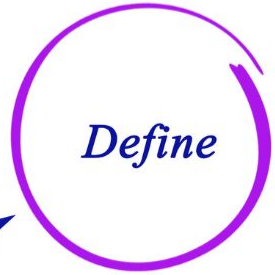
*Brainstorm and  
Come up with  
Creative Solutions*



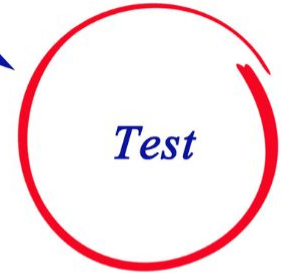
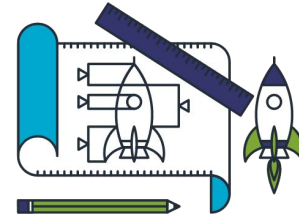
*Test Your Ideas*



*Construct Point  
of View Based  
on User Needs*



*Build  
Representation  
of Your Ideas*



# Creativity

Finding different ways to reach the same outcome.

Problem solving to overcome obstacles to achieve a desired outcome.



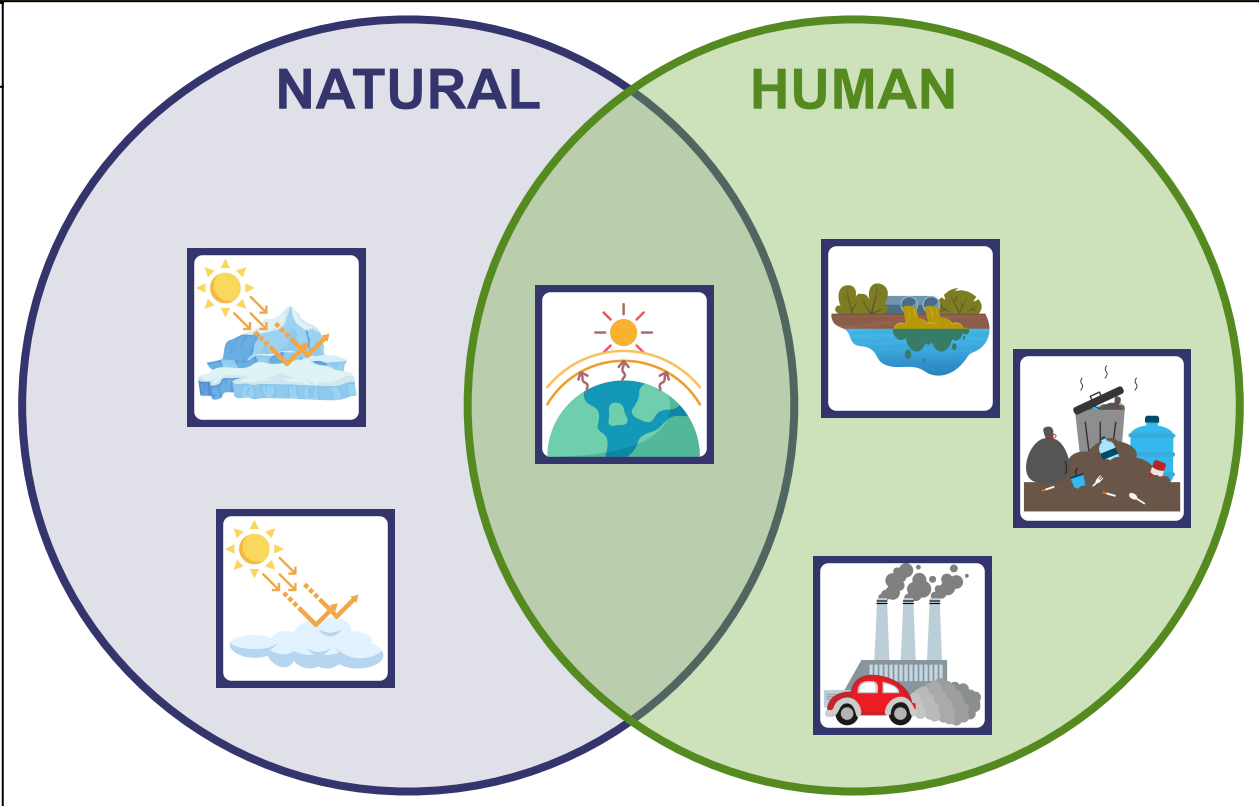
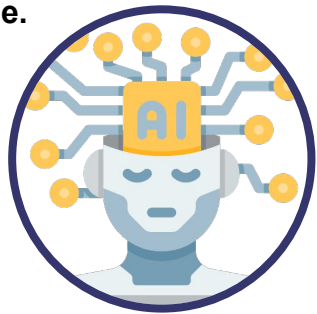
<b>Organizing Idea</b>	<b>Earth Systems:</b> Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.
<b>Guiding Question</b>	<b>What relationships exist between climate and changes on Earth?</b>
<b>Learning Outcome</b>	<b>Students investigate climate, changes in climate, and the impact of climate change on Earth.</b>

**Skills & Procedures**

**Describe possible impacts on climate due to interactions between the Sun and Earth's systems.**

**Relate impacts of natural processes and human activities on climate change.**

**Identify personal actions that may affect global climate change.**





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**Skills & Procedures**

**Compare historical observations and measurements of weather and environmental conditions to current data.**

Relate extreme weather events to specific locations in Canada and on Earth.

**Identify and discuss technologies that are used to track and predict extreme weather events.**

**Identify examples of abstractions encountered in daily life.**



SKILLS & PROCEDURES



**The weatherman we watch on TV abstracts the complicated weather data into something easy for us to understand.**



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



SKILLS & PROCEDURES



**Discuss the role of design and coding in society.**



SKILLS & PROCEDURES



**Scientists use advanced computer technology to monitor weather, analyze data and predict extreme weather events.**

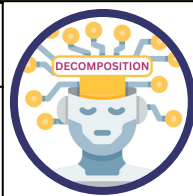
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**Skills & Procedures**

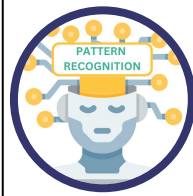
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Relate extreme weather events to specific locations in Canada and on Earth.

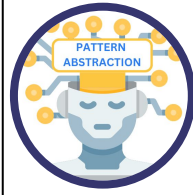
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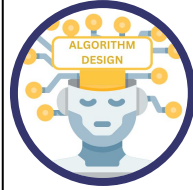
What are the properties of extreme weather events?



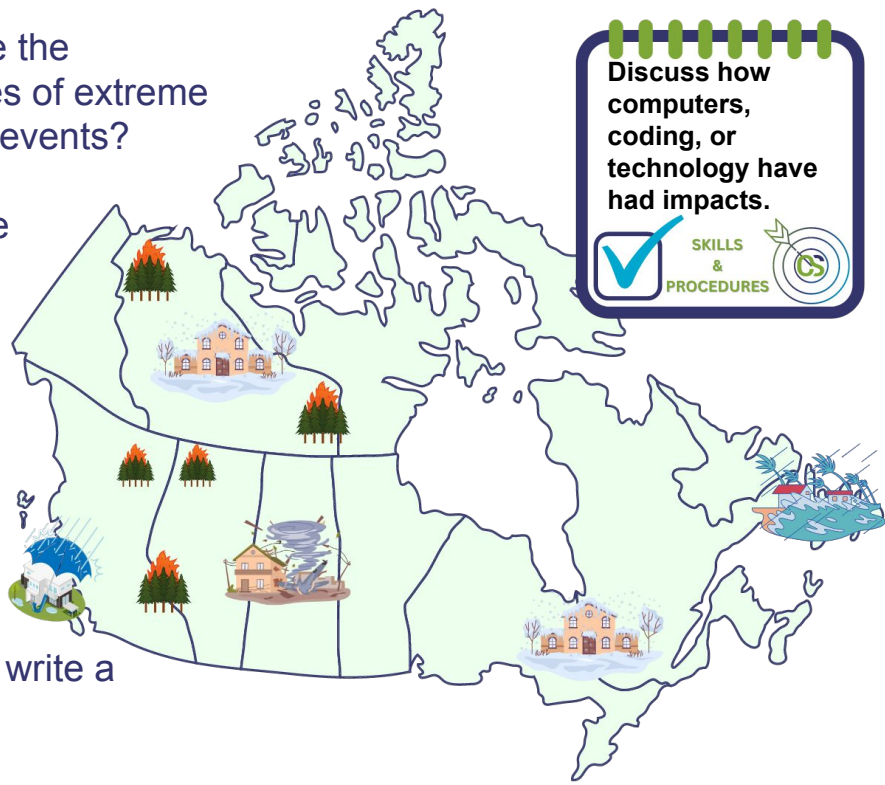
Compare extreme weather events



What matters?



Can you write a rule?



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

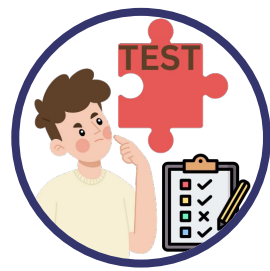
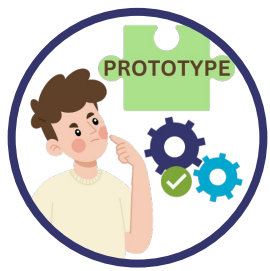
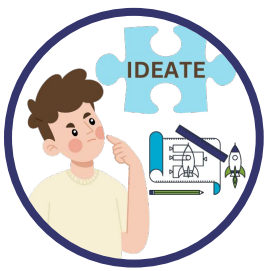
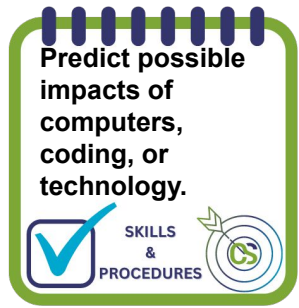
**SKILLS & PROCEDURES**

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**Skills & Procedures**

**Discuss how scientists, Elders, and traditional Knowledge Keepers can collaborate to develop deeper awareness of the effects of weather on people and environments.**

**Propose ideas on how local Elders, traditional Knowledge Keepers, and scientists can collaborate to support awareness of local climate and climate change.**

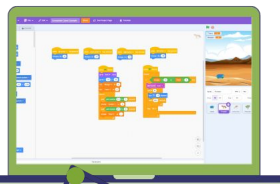


<b>Organizing Idea</b>	Earth Systems: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions. Energy: Understandings of the physical world are deepened by investigating matter and energy.	
<b>Guiding Question</b>	How are energy resources used?	
<b>Learning Outcome</b>	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.**



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

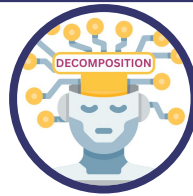
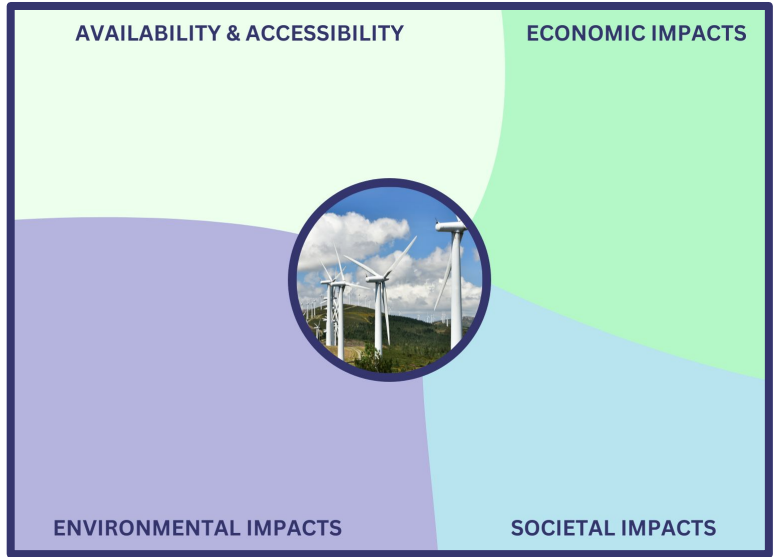
**Bridging Gaps**

**Apply abstraction during the design process.**

SKILLS & PROCEDURES

**Identify examples of abstractions encountered in daily life.**

SKILLS & PROCEDURES



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**Skills & Procedures**


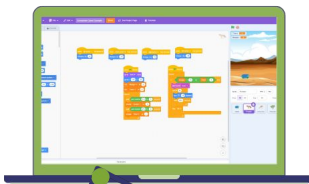

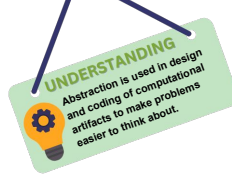

**Examine management of energy resources in various contexts.**

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.


- minimal disruption to nature
- restoration of extraction areas
- waste management practices
- respect for land and resource rights



<b>Organizing Idea</b>	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.
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**Skills & Procedures**

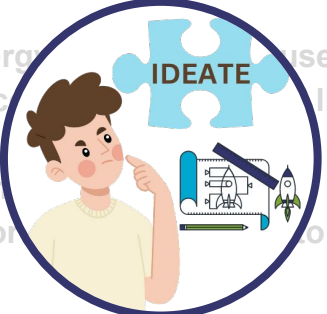
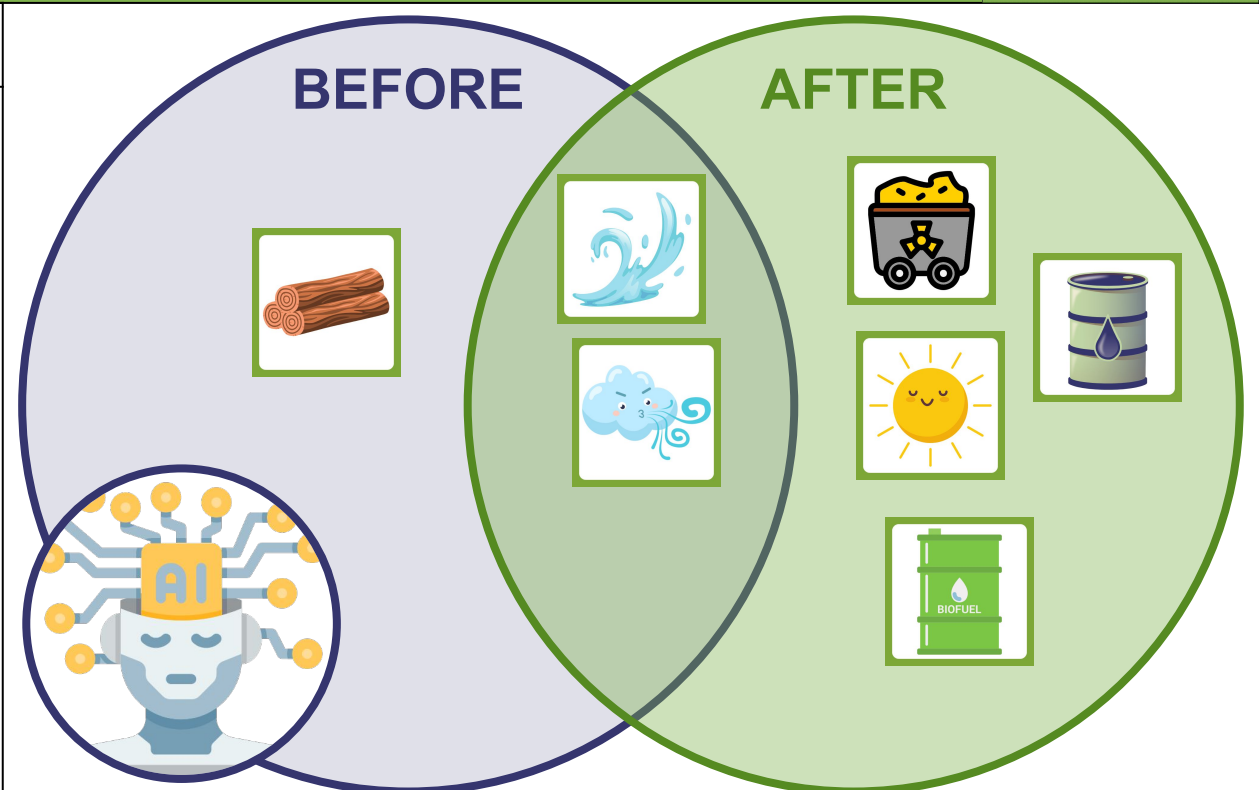
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Discuss ways energy is used by individuals or communities in daily life.

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

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**Skills & Procedures**

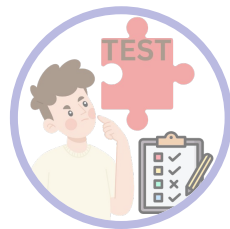
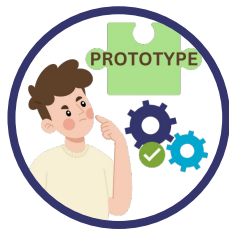
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**Design a device that uses an energy resource, before or after processing, to solve a problem.**



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.**