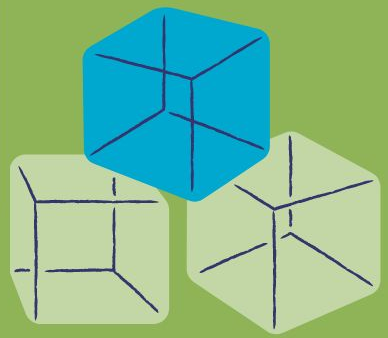
Making Connections

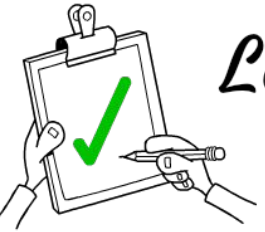


Matter

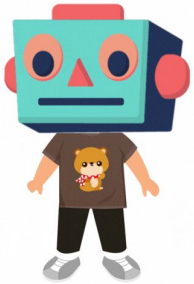
Computer Science

grade 5

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	**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.**

Knowledge	Understanding	Skills & Procedures
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.

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 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.**

Knowledge	Understanding	Skills & Procedures
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.	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.

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

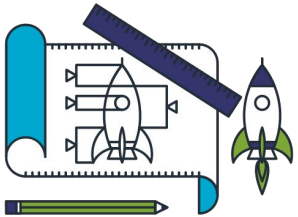
Construct Point
of View Based
on User Needs

Brainstorm and
Come up with
Creative Solutions

Ideate

Prototype

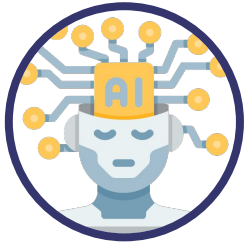
Build
Representation
of Your Ideas



Test Your Ideas

Test

Computational Thinking

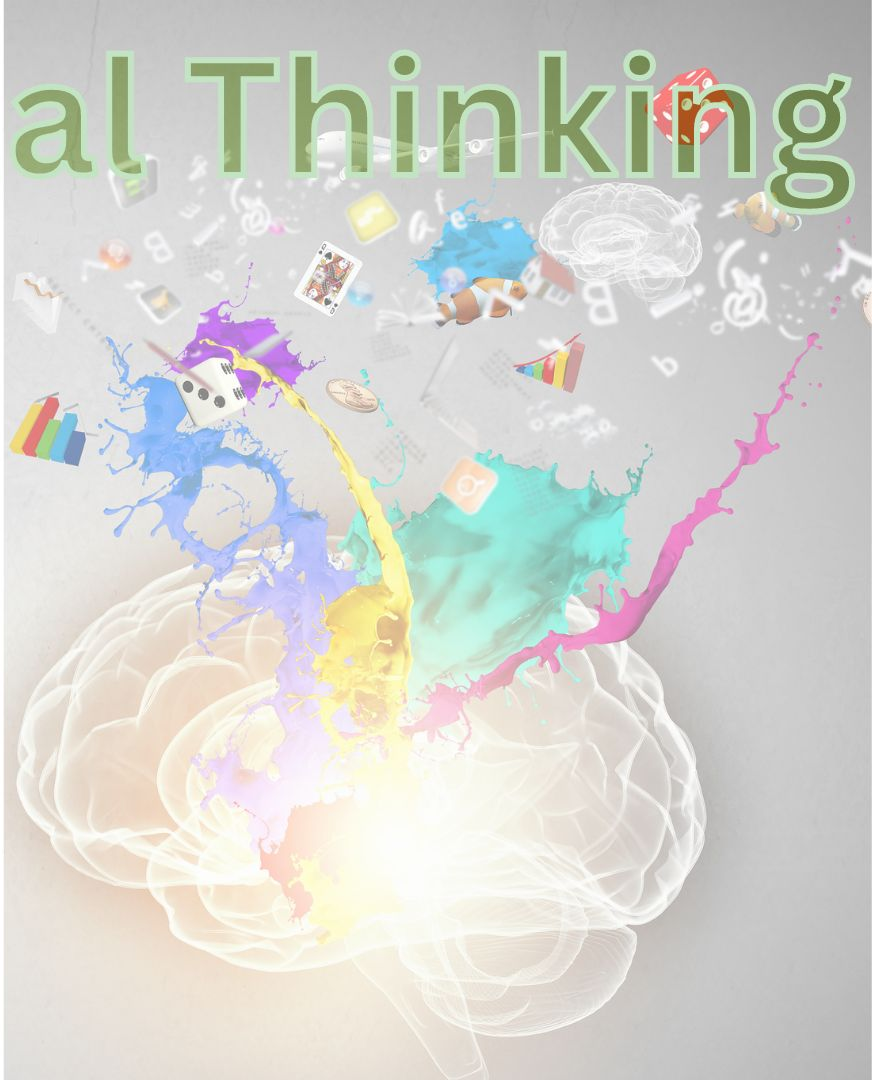


Decomposition

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 states of matter and other physical properties be explained using the particle model of matter?
Learning Outcome	Students investigate the particle model of matter in relation to the physical properties of solids, liquids, and gases.

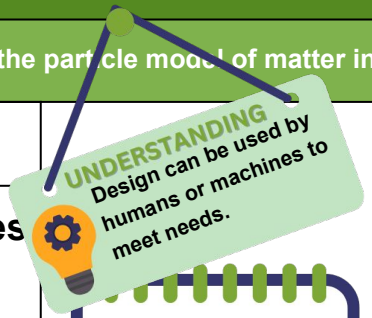
Skills & Procedures

Represent solids, liquids, and gases using the particle model of matter.

Relate the movement and arrangement of particles to the state of matter.

Describe the impact that attractive forces have on the movement and arrangement of particles in solids, liquids, and gases.

Particle Model in Scratch



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

SKILLS & PROCEDURES

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

SKILLS & PROCEDURES

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

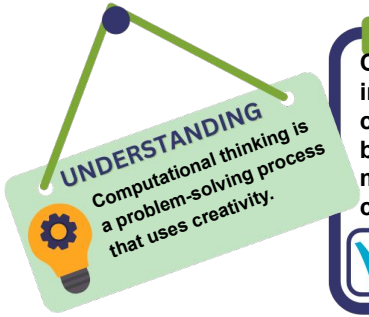
SKILLS & PROCEDURES

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

SKILLS & PROCEDURES

Engage in the design process to create computational artifacts.

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.

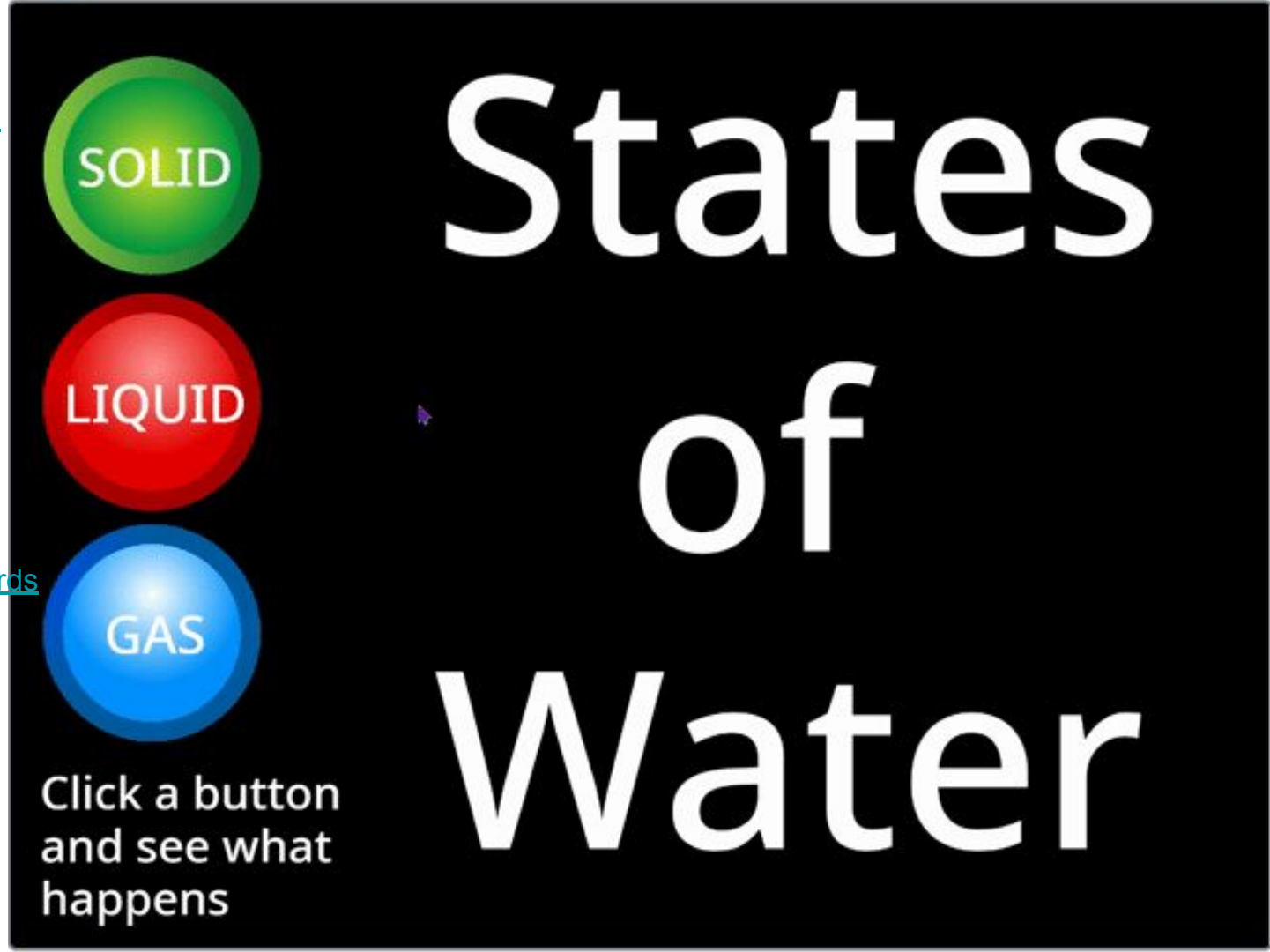
SKILLS & PROCEDURES

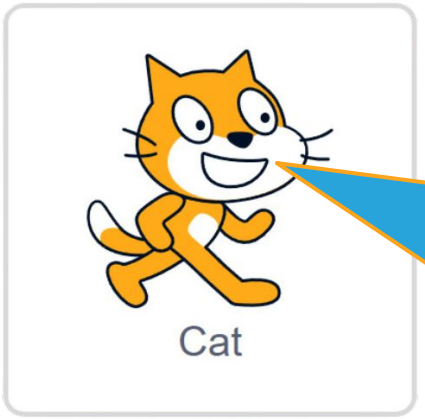
Scratch Template

http://bit.ly/MrsDWaterState

Project Cards

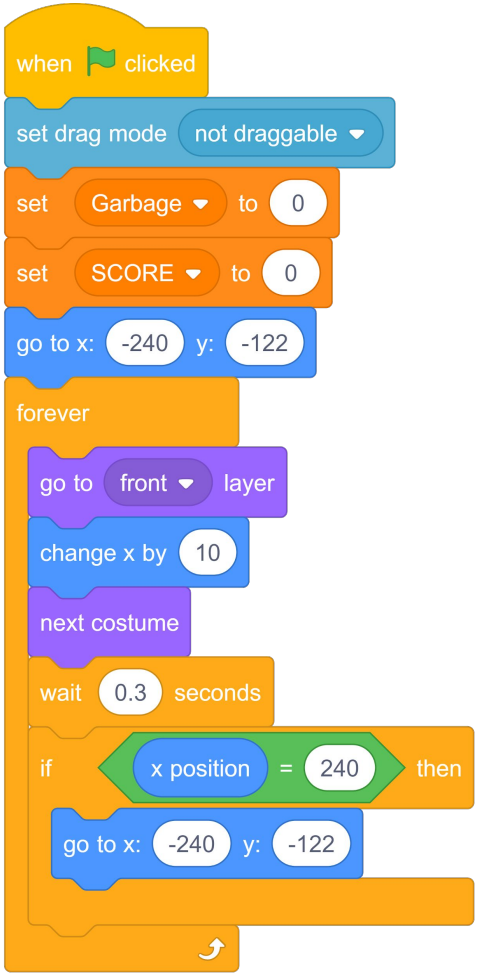
http://bit.ly/MrsDWaterStateCards





CHOICE!
Delete the cat sprite and choose a different garbage dropping sprite from the gallery.

Add this code to the cat sprite.



The cat will walk across the stage and change costumes creating a walking animation as it goes.

When the cat reaches the far right side of the stage it will restart at the far left making it continually move across the screen over and over.

Organizing Idea	**Matter: Understandings of the physical world are deepened by investigating matter and energy.**
Guiding Question	**How can states of matter and other physical properties be explained using the particle model of matter?**
Learning Outcome	**Students investigate the particle model of matter in relation to the physical properties of solids, liquids, and gases.**

Skills & Procedures

Measure the mass of solids and liquids using a balance scale and SI units.

Measure the volume of liquids using appropriate instruments and SI units.

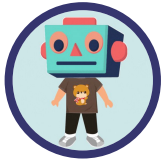
Directly compare the density of solid objects that have the same volume.

Directly compare the density of liquids.

Relate densities of solids, liquids, and gases using the particle model of matter.

Compare the compressibility of air and water.

Practise safe and appropriate use of materials, tools, and equipment.



Bridging: Div 1 CS focuses on instruction. Having students repeat or determine instructions will help bridge those gaps!