New SCIENCE Curriculum

Energy
Grade 2

November 22, 2023

Facilitators: Chris Żarski & Ted Zarowny

Land Acknowledgement

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.

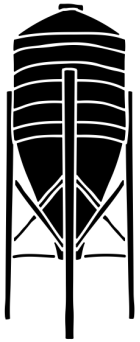
The Seven Grandfather Teachings Read by Etienna Moostoos-Lafferty

Photo by Peng Chen on Unsplash

1 The Big Picture

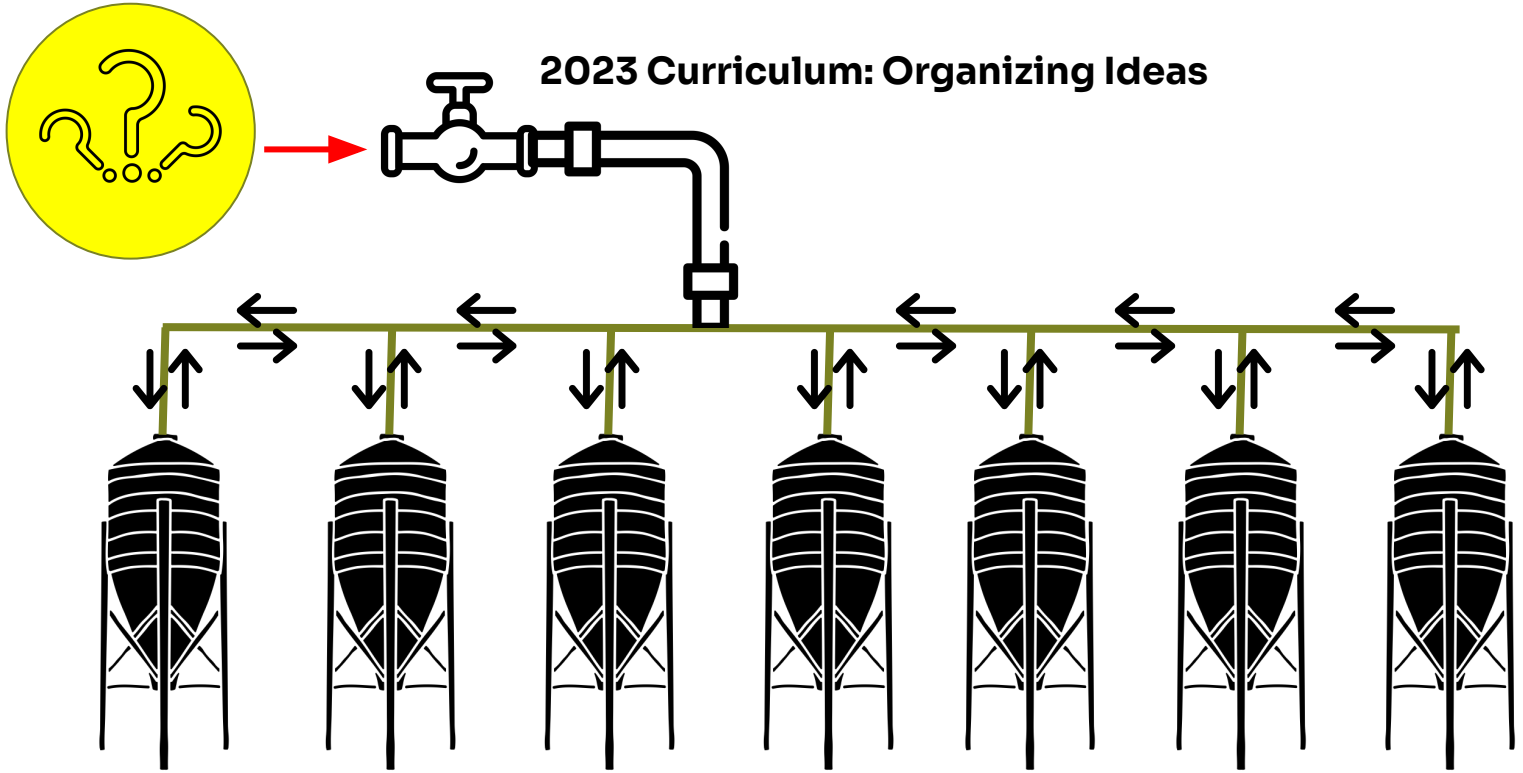




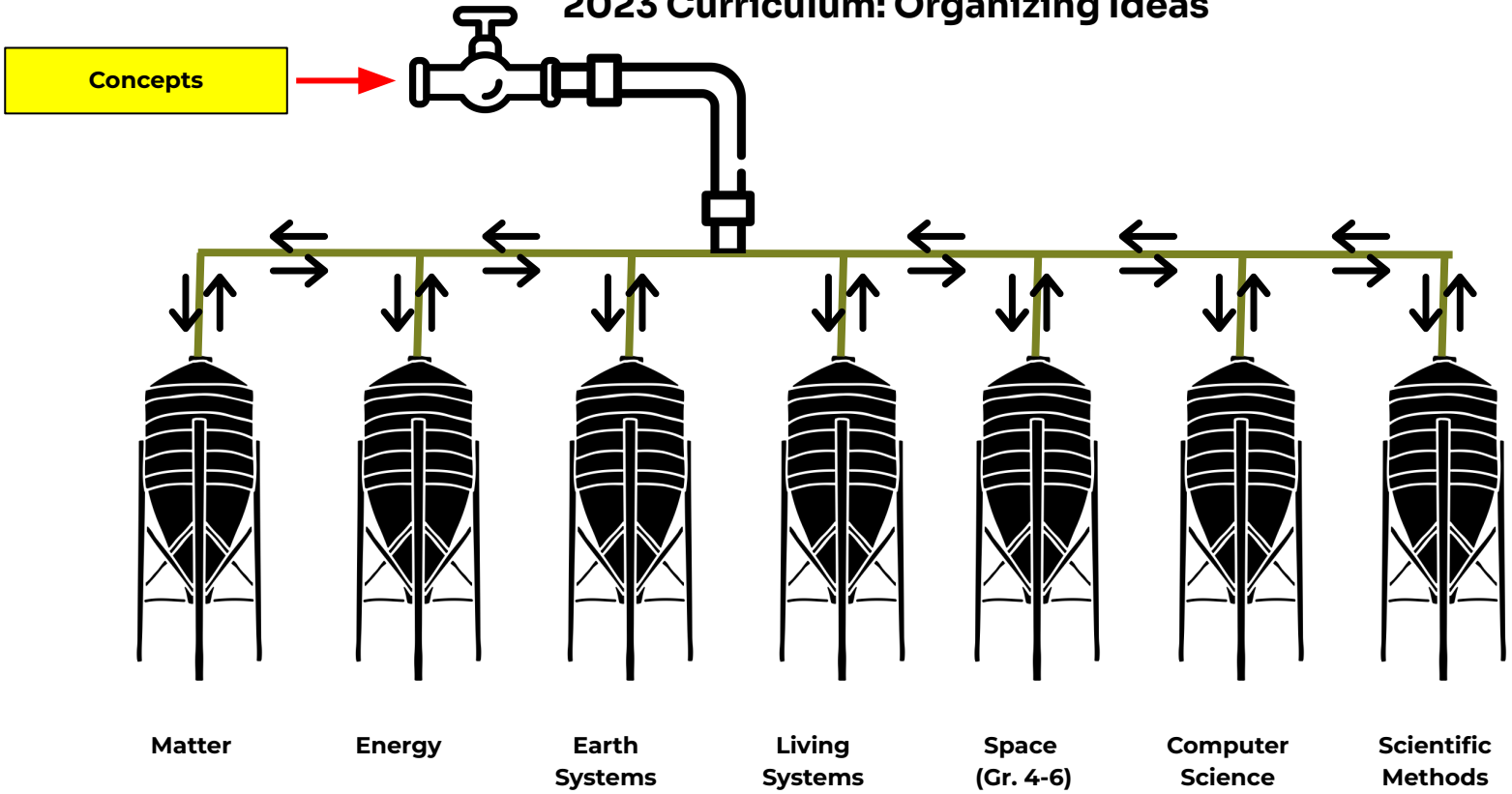


GR. 1	Seasonal Changes	Needs of Animals and Plants	Creating Colour	Building Things	Senses
GR. 2	Small Crawling and Flying Animals	Buoyancy and Boats	Magnetism	Exploring Liquids	Hot and Cold Temperature
GR. 3	Building with a Variety of Materials	Testing Materials and Designs	Rocks and Minerals	Rocks and Minerals	Animal Life Cycles
GR. 4	Building Devices and Vehicles	Light and Shadows	Plant Growth and Changes	Waste and Our World	Wheels and Levers
GR. 5	Electricity and Magnetism	Mechanisms using Electricity	Classroom Chemistry	Weather Watch	Wetlands Ecosystems
GR. 6	Air and Aerodynamics	Flight	Sky Science	Evidence and Investigation	Trees and Forests

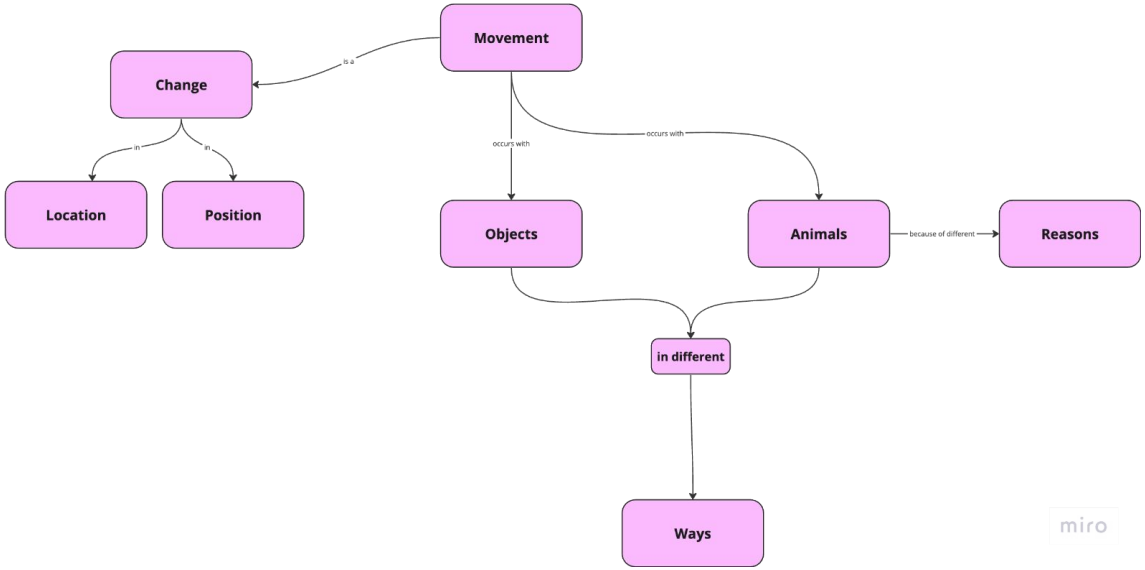
2023 Curriculum: Organizing Ideas



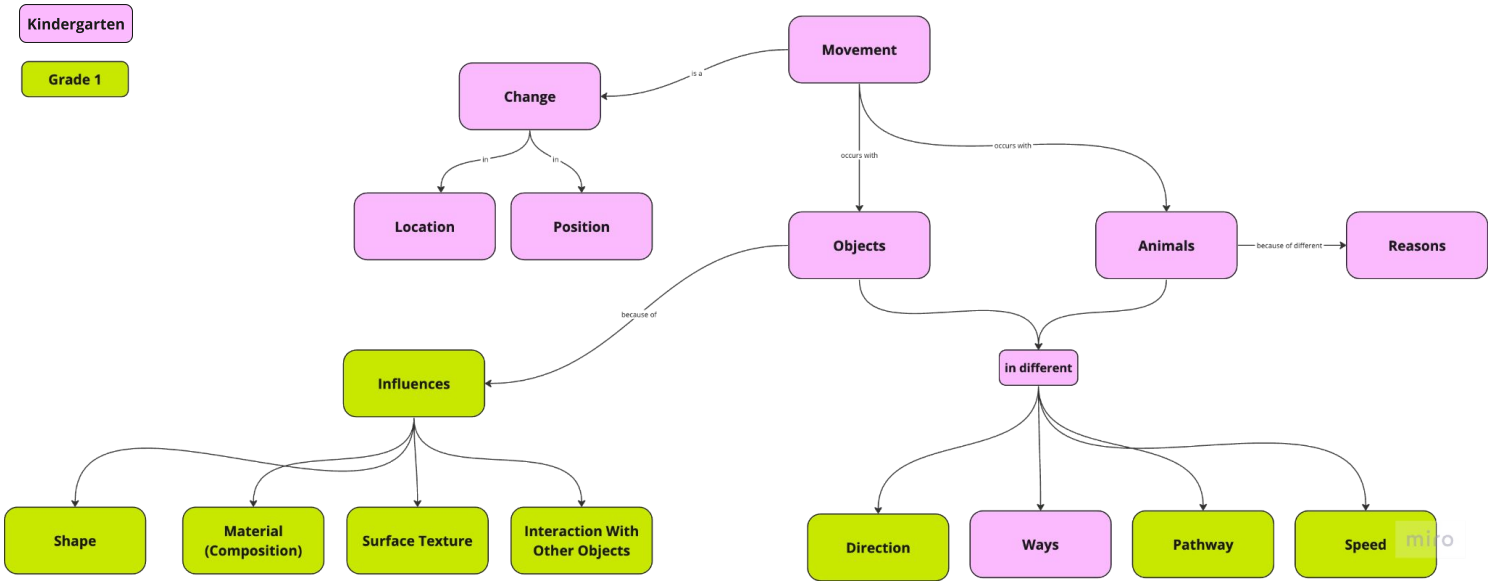
2023 Curriculum: Organizing Ideas



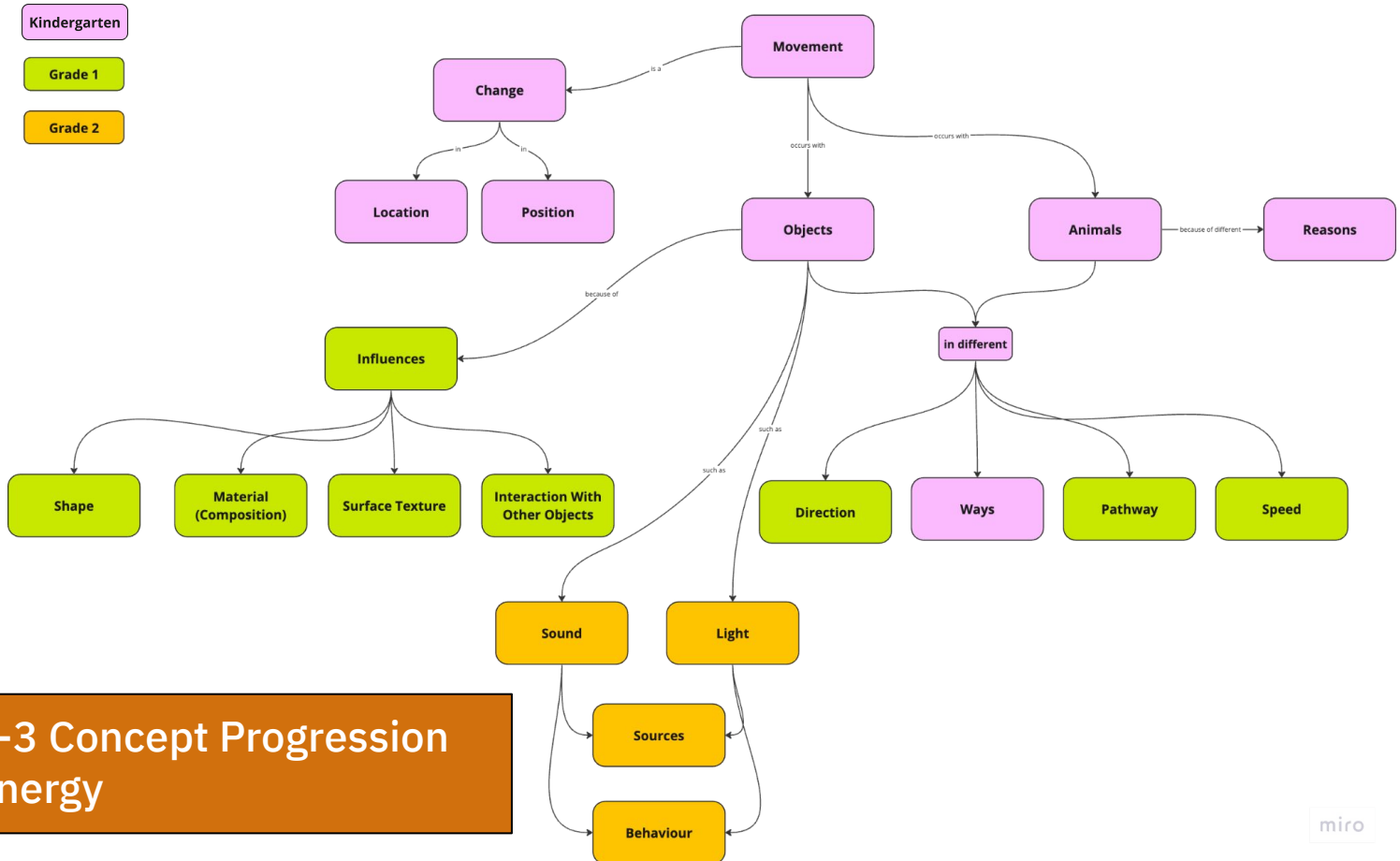
Kindergarten



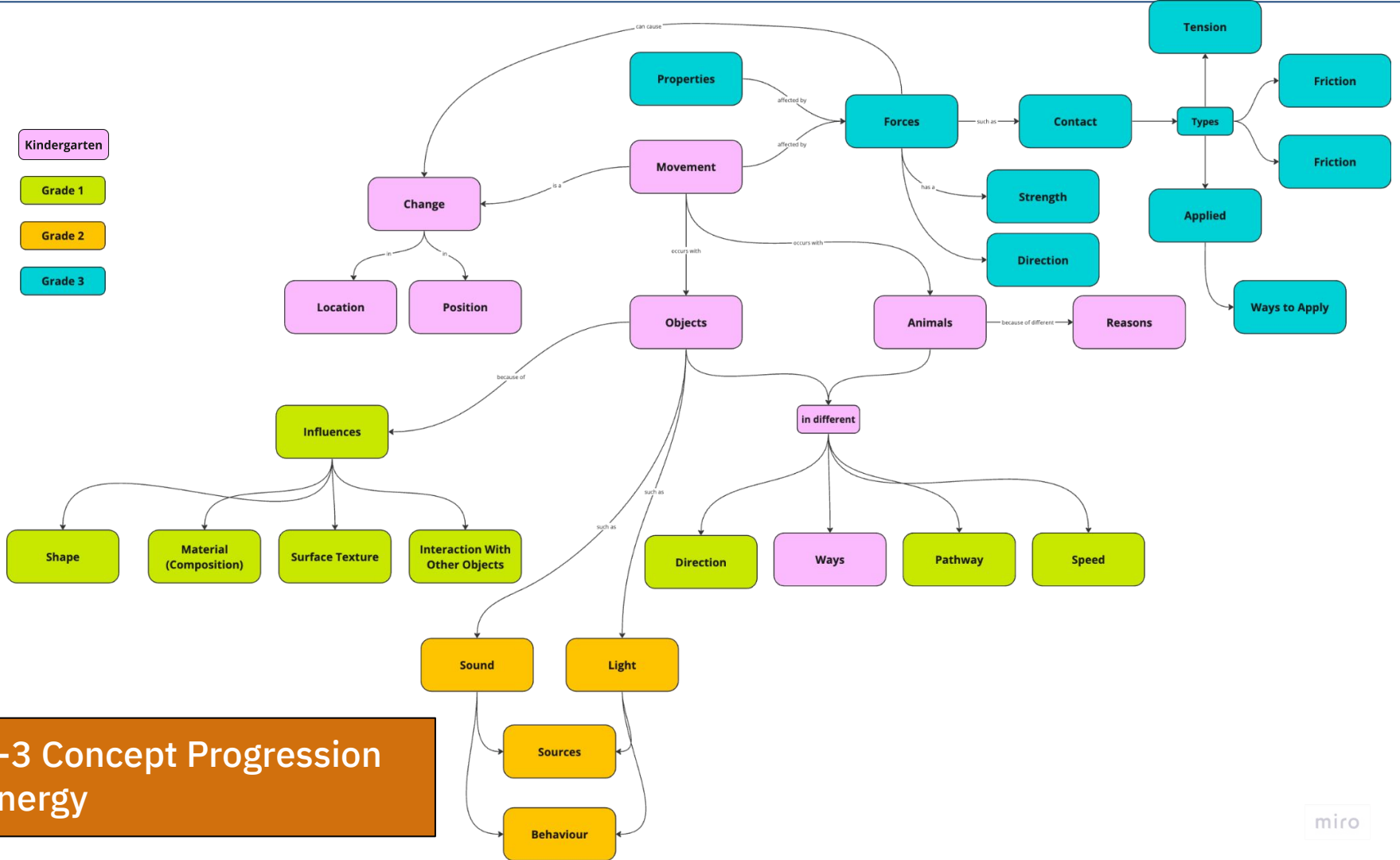
K-3 Concept Progression
Energy



K-3 Concept Progression Energy

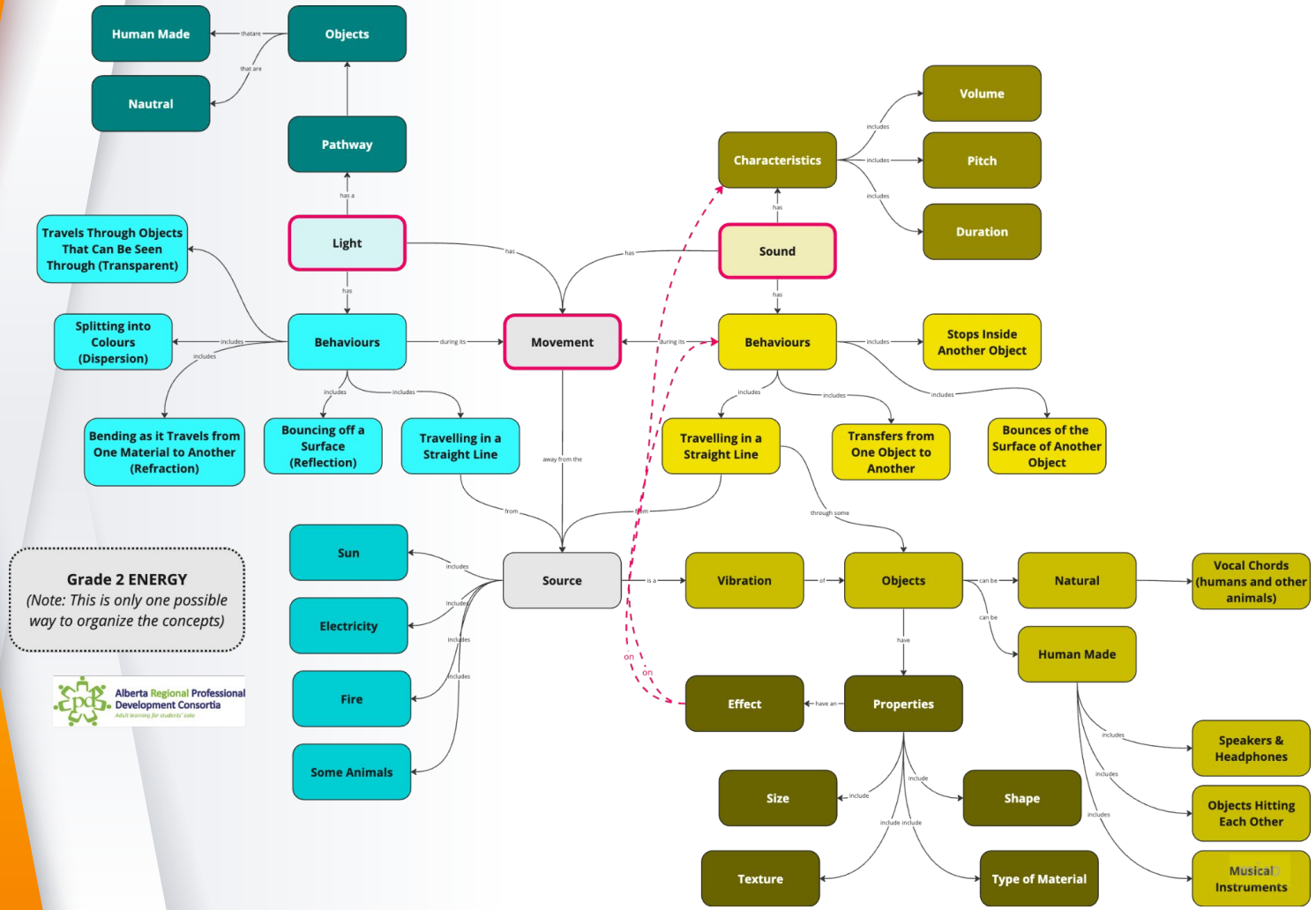


K-3 Concept Progression
Energy



K-3 Concept Progression
Energy

Grade 2 Energy Concept Map



ENERGY (01)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Guiding Question: *How can humans, animals, and objects move?*	**Guiding Question:** *How can movement of objects be understood?*	**Guiding Question:** *Where do light and sound come from, and how do they move?*	**Guiding Question:** *How can forces relate to changes in movement?*	**Guiding Question:** *How can forces affect objects from a distance?*	**Guiding Question 01:** *How are forces similar and different in water and air?*	**Guiding Question 01:** *In what ways can interactions lead to physical change?*
Learning Outcome: *Children explore movement of objects, humans, and other animals.*	**Learning Outcome:** *Students investigate the direction, pathway, and speed of moving objects and animals.*	**Learning Outcome:** *Students investigate the behaviours of light and sound.*	**Learning Outcome:** *Students investigate and explain how forces affect the movement of objects.*	**Learning Outcome:** *Students investigate how forces can act on objects without contact.*	**Learning Outcome 01:** *Students investigate and compare how forces affect living things and objects in water and air.*	**Learning Outcome 01:** *Students analyze forces and relate them to interactions between objects.*
KEY CONCEPTS					**KEY CONCEPTS**	
Change	Animal	Characteristics (Materials that Affect Sound)	Change: Movement	Attraction	Buoyancy	Change
Location	Direction	Light Behaviour	Effort	Distance	Effect on Flight (speed, altitude, horizontal and vertical, straight and level)	Elasticity
Movement	Factor	Pathway: Sound	Force: Applied (stretching, pulling squeezing pushing)	Force: Non-Contact (gravity, magnetic)	Flight	Force: Action
Movement: Ways	Influence	Pathway: Light	Force: Contact (applied, friction, elastic/spring)	Gravity	Flight Characteristics	Force: External (applied, friction, elastic/spring)
Position	Movement	Sound	Force: Direction	Interaction	Fluid	Force: Internal (tension, compression, shear, torsion)
Animals	Object	Light Source	Force: Strength	Magnetic Material	Force: Opposing (thrust, drag, weight, lift)	Force: Reaction
Object	Pathway	Sound Behaviour	Interaction	Magnetism		Interaction
Human & Animal	Speed	Vibration	Movement	Poles		Object
		Sound Source	Property	Properties		Physical Change
		Sound Characteristics	Simple Machines	Repulsion		Plasticity
			FNMI: Simple Machines	Strength		Property

ENERGY (02)

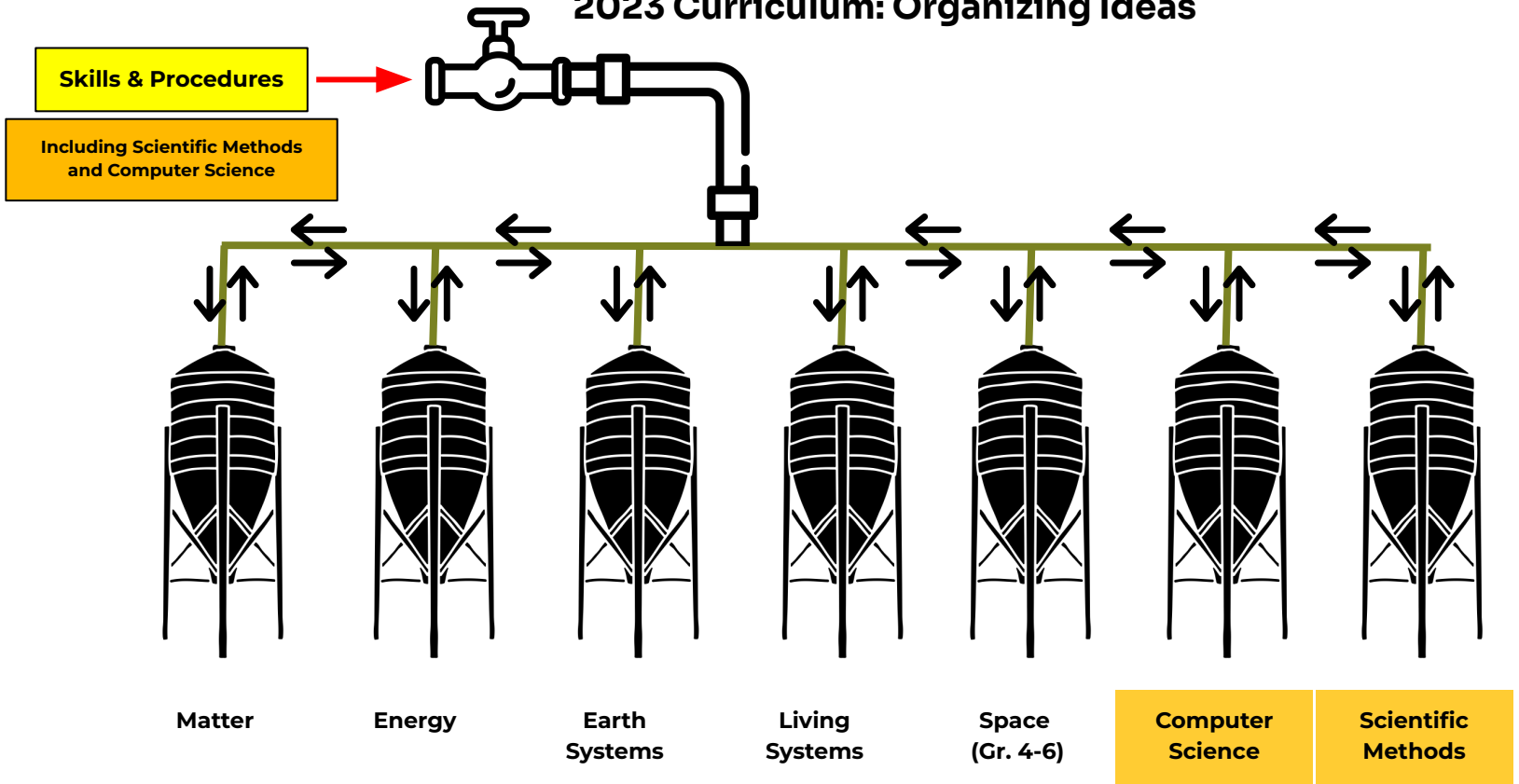
Grade 5	Grade 6
Guiding Question 02: *What are energy resources?*	**Guiding Question 02:** *How are energy resources used?*
Learning Outcome 02: *Students investigate and analyze various energy resources.*	**Learning Outcome 02:** *Students evaluate the use of energy resources and explain factors that influence choice.*
Energy	Advantage
Energy Needs	Daily Living
Energy Resource	Disadvantage
Resource: Renewable & Non-Renewable	Electricity
	Energy Use Management
	Energy Choice Factors
	Processed Energy & Non-Processed Energy

Link: Concept Progressions (ARPDC)

2023 Curriculum: Organizing Ideas

Skills & Procedures

Including Scientific Methods and Computer Science



Learner Outcome Verbs				
	Grade			
	K	1	2	3
Apply Creativity				
Analyze				
Describe				
Examine				
Explain				
Explore				
Follow Instructions				
Interpret Instructions				
Investigate				
Relate				

Learner Outcome Verbs

Verbs are the skills and procedures that students do or perform *to demonstrate knowledge and understanding.*

Learner outcome verbs are those verbs that are identified in the learner outcome

Grade 2 ENERGY Learner Outcome

*Students **investigate** the behaviours of light and sound.*

Skills & Process Verbs	Grade			
	K	1	2	3
Ask Questions				
Classify (Sort)				
Compare (find similarities and differences)				
Conclude				
Create				
Demonstrate Safety				
Describe				
Design				
Discuss				
Examine				
Explain				
Explore				
Investigate				
Observe				
Predict				
Record Data/Observations				
Relate				
Represent				

2E1 Learning Outcome: *Students **investigate** the behaviours of light and sound.*

2E1.1 Understanding: *Behaviours of sound affect its characteristics.*

2E1.1 Skills and Procedures

- **Relate** vibration to the production of sound.
- Identify sources of sound.
- Listen to sounds and **describe** their characteristics.
- Safely **explore** the production and behaviour of sound.
- Build a device to change the behaviour of sound **(investigation?)**.
- **Compare** the sounds created by various objects.

Teaching for Transfer

Phases of Learning

Hattie, Fisher & Frey: *Visible Learning for Literacy* (2016)

Surface

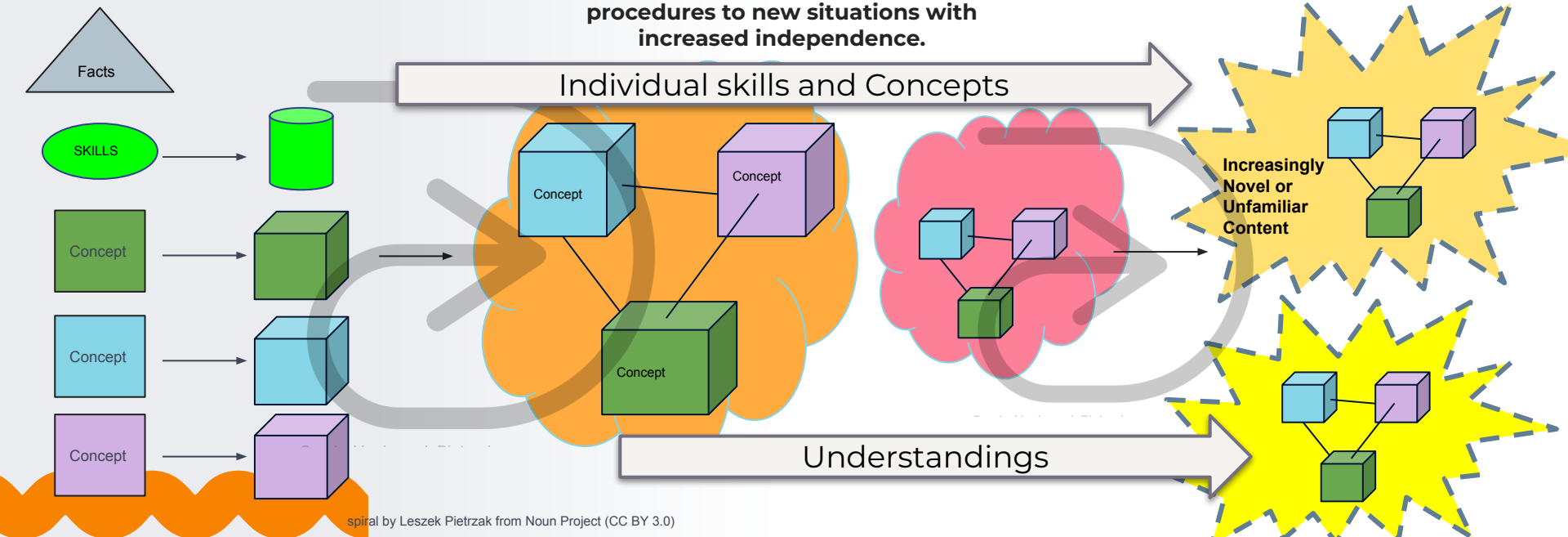
Students are first exposed to individual skills, concepts and their related knowledge.

Deep

Students make connections between concepts to create deeper understanding and appropriately apply skills/ procedures to new situations with increased independence.

Transfer

Students apply concepts, understandings and skills to a variety of novel and unfamiliar contexts.



Planning

Begin With the End In Mind

Stephen R. Covey, 1989

Backward by Design

Grant Wiggins & Jay McTighe, 1998

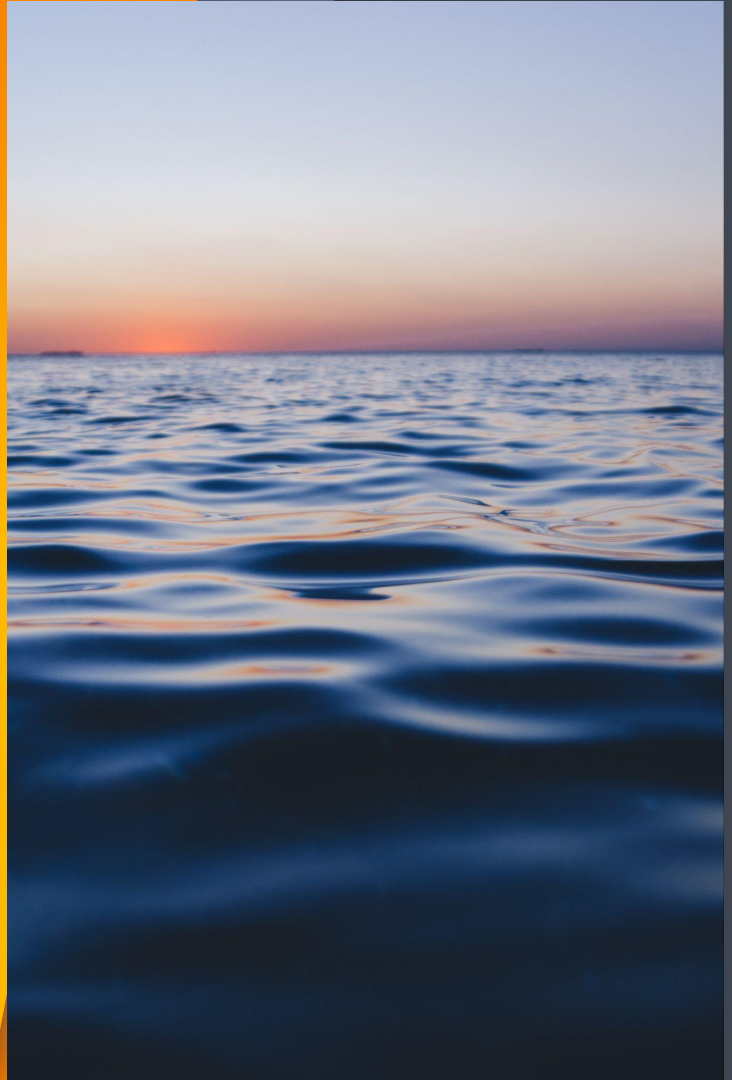
Learning Outcome
Students investigate the behaviours of light and sound.
Understandings
2E1.1 Behaviours of sound affect its characteristics.
2E1.2 Behaviours of light affect its path.

Assessment: Students conduct a variety of investigations to

1) Demonstrate their proficiency in **investigating** and in using the sub-skills in an investigation
2) Assess their knowledge and understanding.
3) Sample Assessment for Understanding 2E1.2 (light).

What will students need to know and/or understand in order to be successful?

What will students need to be able to do in order to be successful?



From Kindergarten

What is Movement?

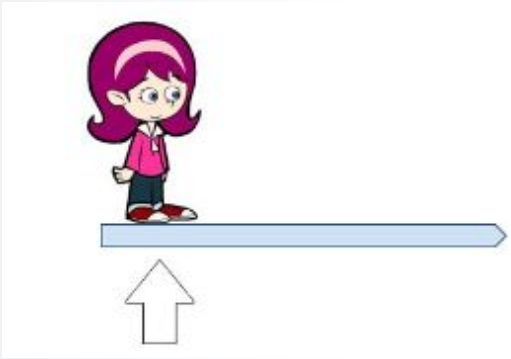
Can you show me what movement is?

Can you show me what movement is not?

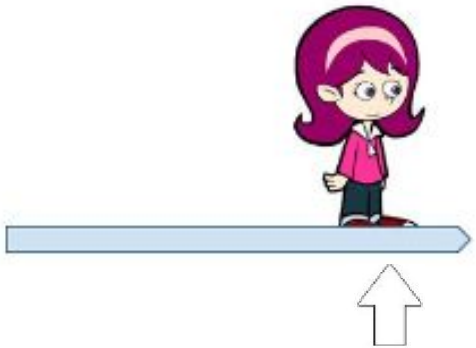
How would you explain to someone what movement is?

Movement is a change in position or location over time.

What does **location** mean?



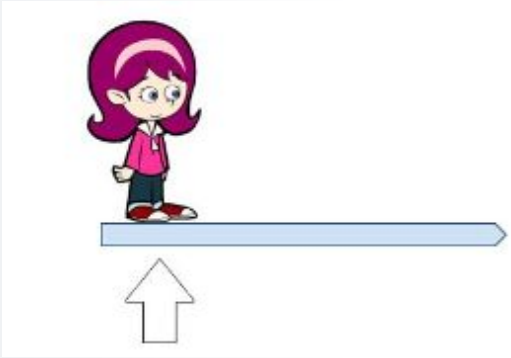
Starting point



Finishing point

Movement is a change in position or location over time.

What does **position** mean?



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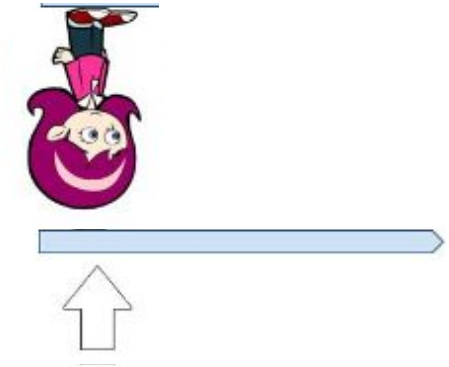
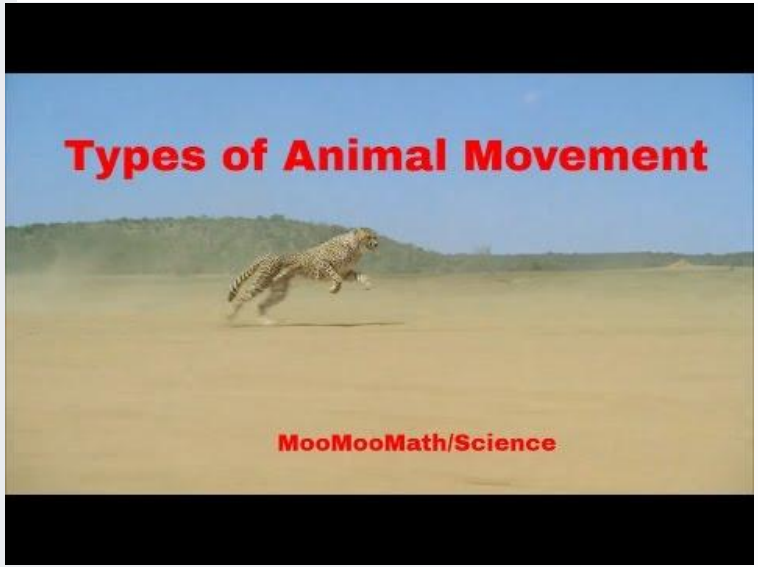


Starting point

Let’s Watch Animals Move!



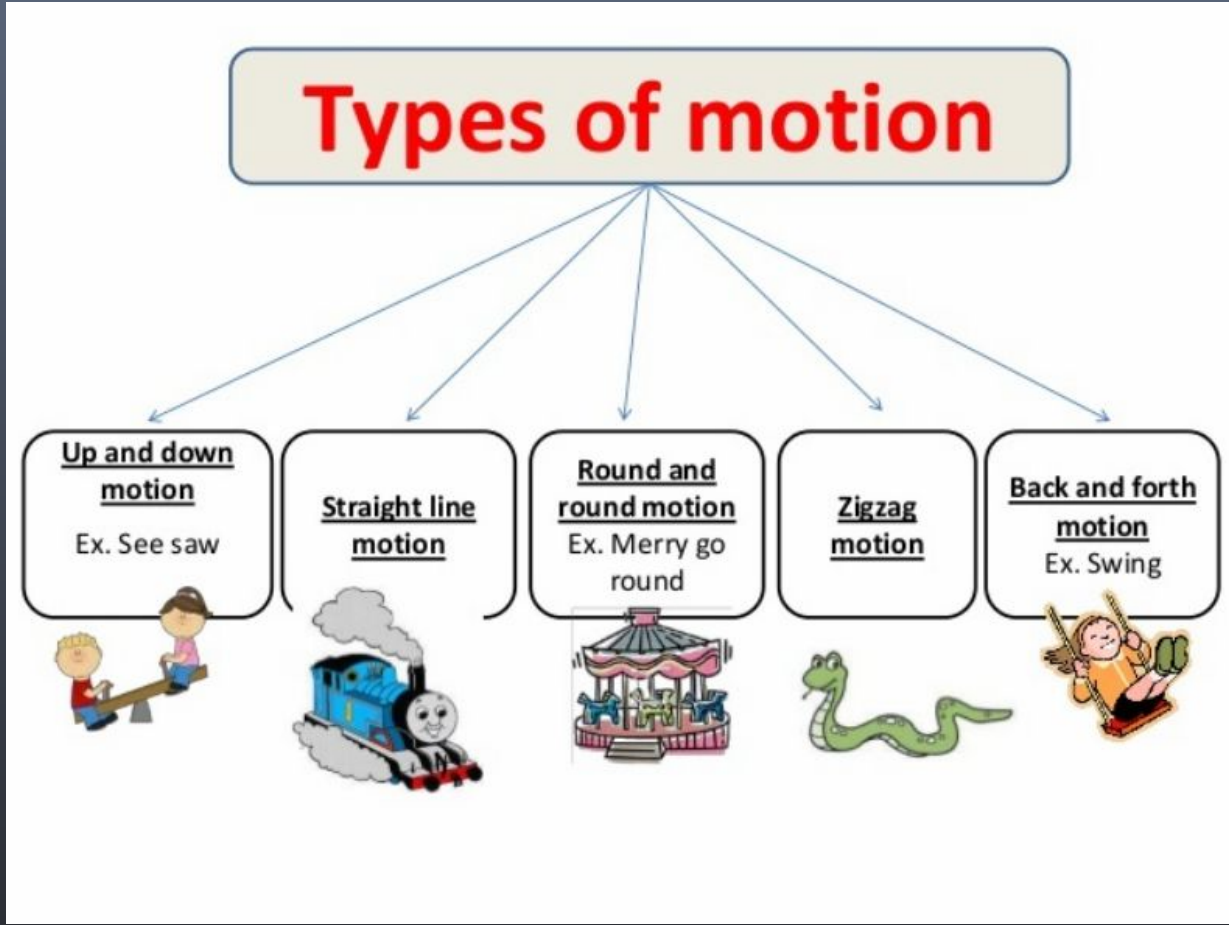
Life Science-Types of Animal - starting video
Movement@MooMooMath

Movement in Animals - Macmillan Education

How do animals move? What did you learn?

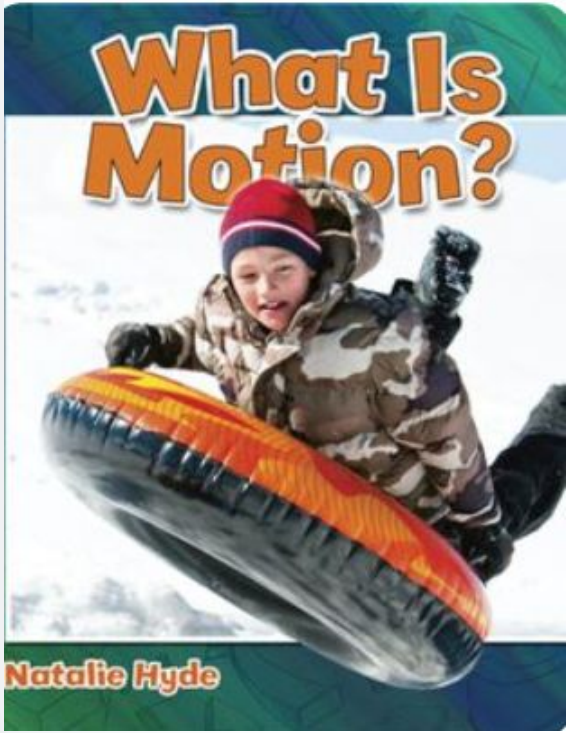
PE or Outdoor Education Time!

Sidewalk Chalk would be a great tool!

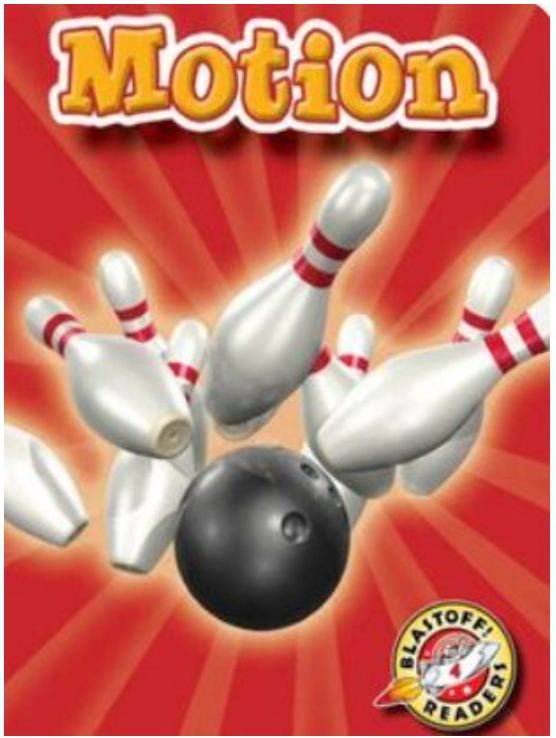


Quizizz Library. Science: Types of Motion

Can I Move Objects



EPIC



EPIC

Transferring My Knowledge

What type of movement is happening in each slide?

- What Motion Do You See_ Slide Deck A.pdf
- What Motion Do You See_ Slide Deck B.pdf

What helps us Move? What do you remember?

Dreamstime.com

Pxfuel Royalty free

Shutterstock.com ID 2219652723

Shutterstock ID 1219482937

FreePik

Transfer

My Trip to the Zoo

Sutterstock.com 2148595493

Take a Field Trip To The Zoo | KidVision Pre-K

My Trip to the Farm

Shutterstock 1673192608

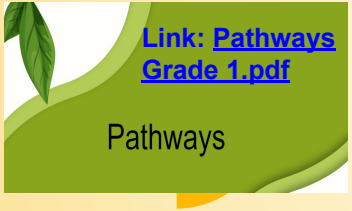
From Grade 1

Aspects of Movement: Direction, Pathway and Speed

Direction

Describing “Up, down, forward,backward, sideways, towards, away from”

Pathway



Movement pathways can be straight, curved, spiral, side-to-side

Speed

Speed - fast, slow, stay the same, change

Speed

Skiing

There are different types of skiing races where speed is important.

Ski races can be:

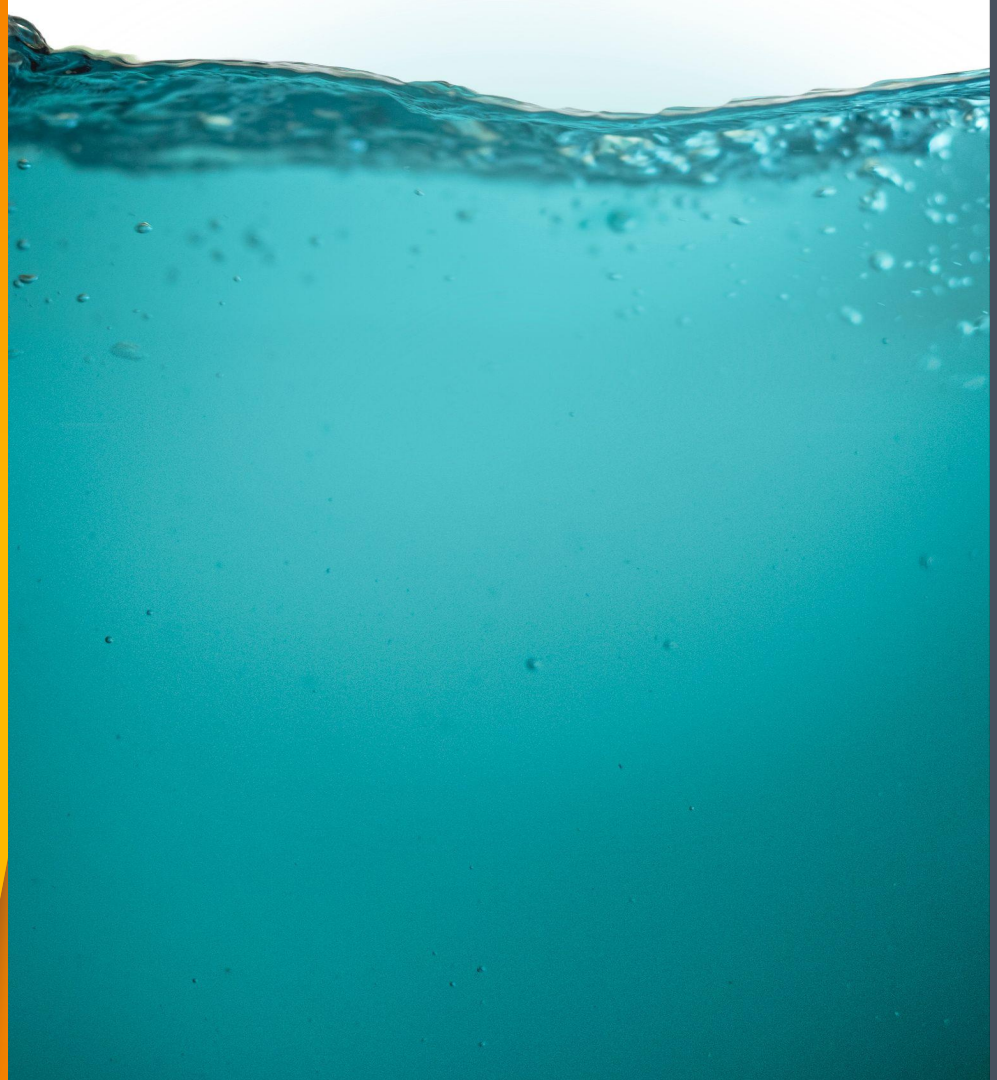
- downhill
- cross country
- racing between flags.

Faster and Faster

Today people keep trying to go faster and faster. They are always trying to break records and be the fastest in the world!

Speeds in Sports – Comparison Graph

Sails



Deep Level Activities

Transferring My Knowledge

Describe the type of movement/pathway in each of the following slides: Describing Motion

How do objects move?

What influences the way an object can move?

How does shape influence movement?

Let's explore!

How does the material influence movement?

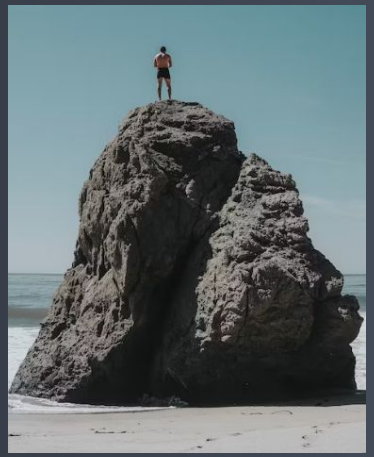


Photo by Andrew Charney on Unsplash

How does the surface texture influence movement?

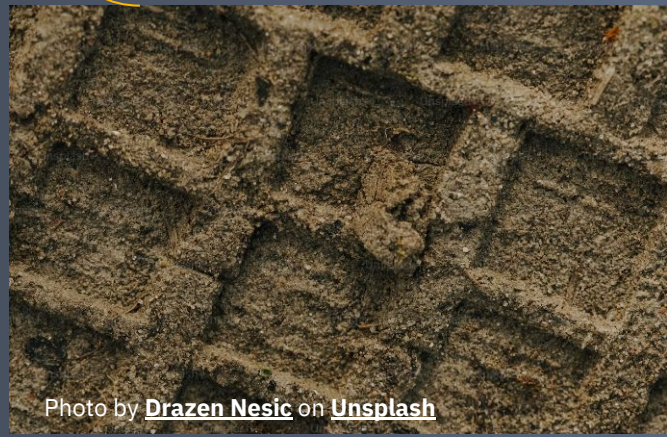
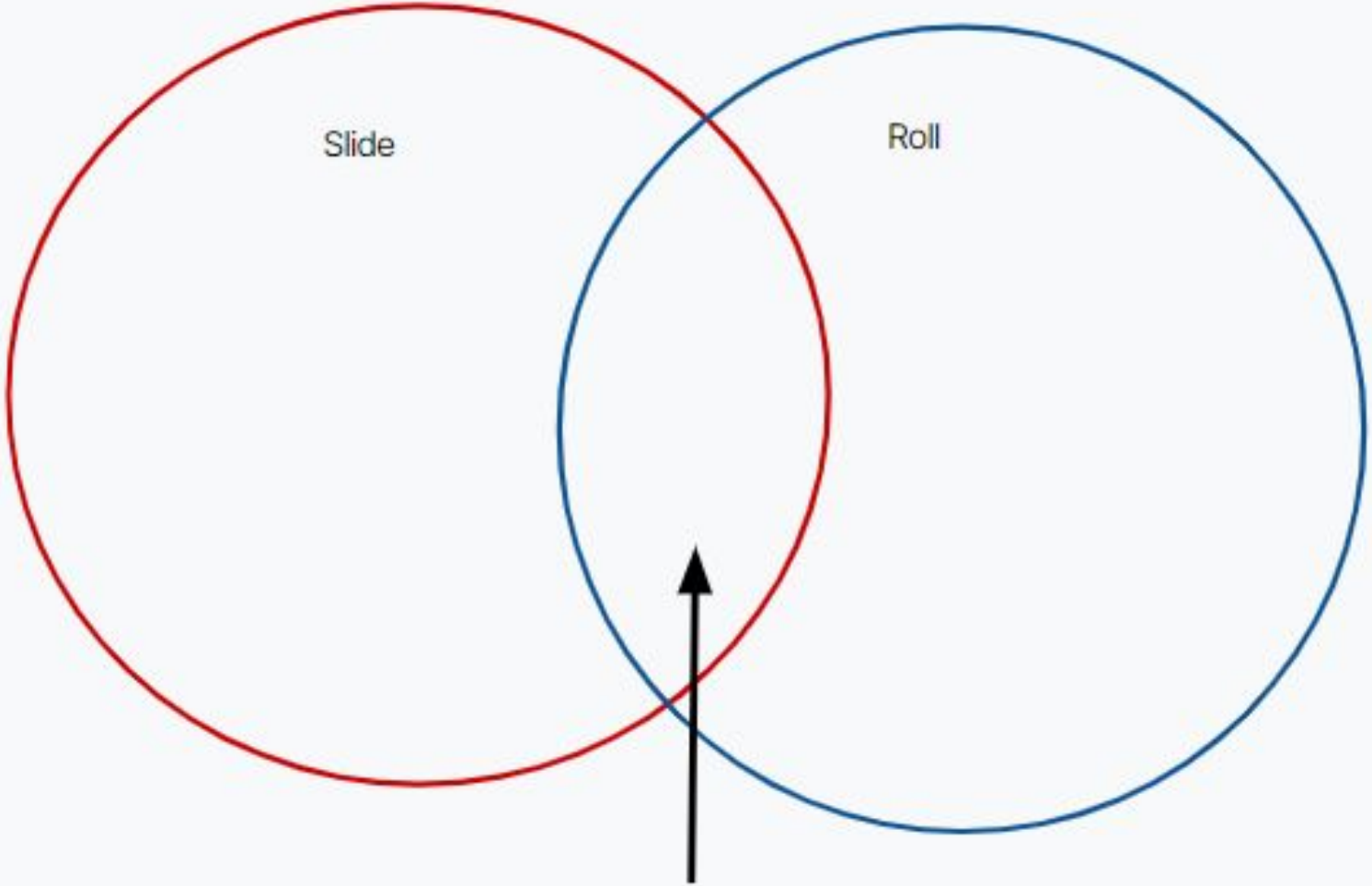


Photo by **Drazen Nesic** on **Unsplash**

Link of possible Items

Ideas for students to explore.
Descriptions of how objects move.



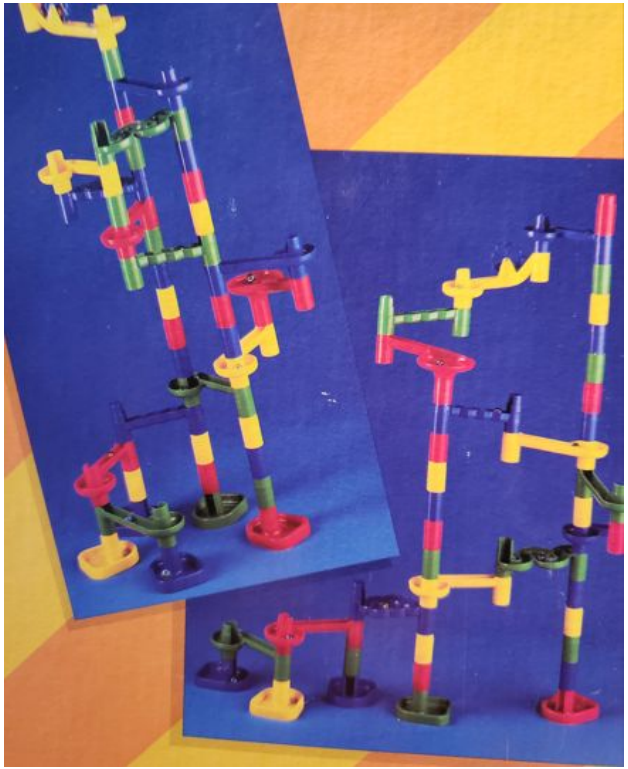
bouncing

What would go in the centre?

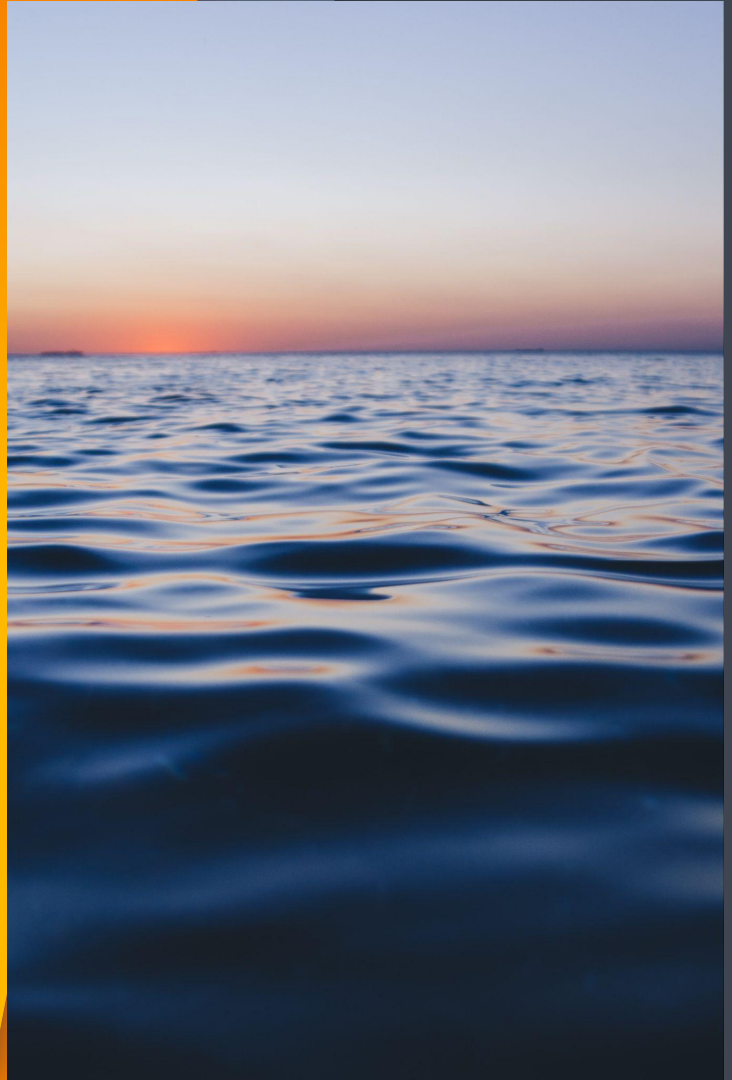
How does the surface we move things on affect how they move?

Transfer

STEM: Paper Roller Coaster



Moving to Grade 2



Surface Level

Surface Level Activities for …

Observation
Description
Investigation

What is sound?

What is Sound? SciKids Show

Shutterstock

Sound - What Makes the Sound We Hear - another listen!

Vibrations and sound by K Class Science Channel

Vibration of objects

Rapid back-and-forth-movement

Sound - What Makes the Sound We Hear

Characteristics

Volume (quiet/loud)

Pitch (high/low)

Duration (short/long)

Sources

Vibrations

Objects (musical instruments, objects hitting each other, vocal chords

Materials

Material Characteristics

Size

Texture

Shape

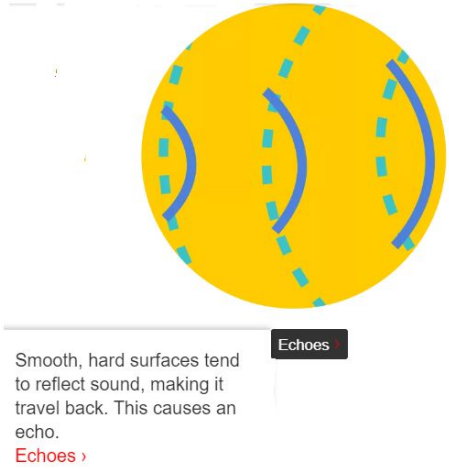
Type of Material

The Science of Sound (Unit)
Janelle Durham - music demonstrates vibrations and the movement of particles.

at pathways do sound travel in?

In a straight line

The Science of the String Phone - SciShow Kids



Bounce off surfaces

Source: DKfindout

How Sound Travels Across Different Mediums - *Knowledge Platform*

Let's play Guess the Sound!

Sources of sound can be man-made or natural. Can you guess the sounds below? Are they Man-made or natural?

Listening Game -Guess the Sound by Kreative Leadership

Guess the Sound - multiple choice

Deep/Transfer

Watch the following video which explores 4 experiments on Making Sound.

Design your own device that makes sound with different characteristics.

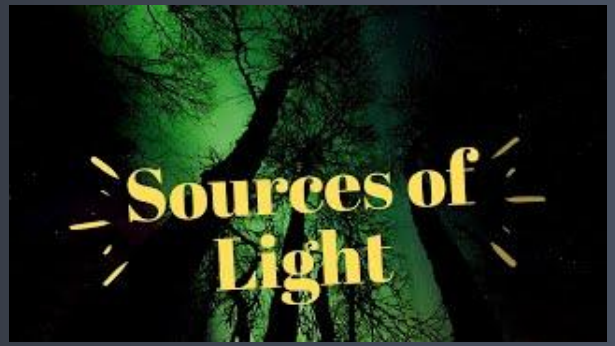
Explain why you might hear an echo in a cave and not in your backyard.

Demonstrate how you can change the sound on a string instrument. Why does the sound change?

What is *Light?*

- *Light is a form of energy*
- *Light sources emit light*

What is Light? - Twig Science Reporter (Tigtag)



Sources of Light - Ramy Melhem (good foundational/surface level knowledge)

Examples of Natural and Artificial Light - a musical portrayal of natural and artificial examples of light sources.(K8 School Lessons)

Photo by Selvan B on Unsplash

Light

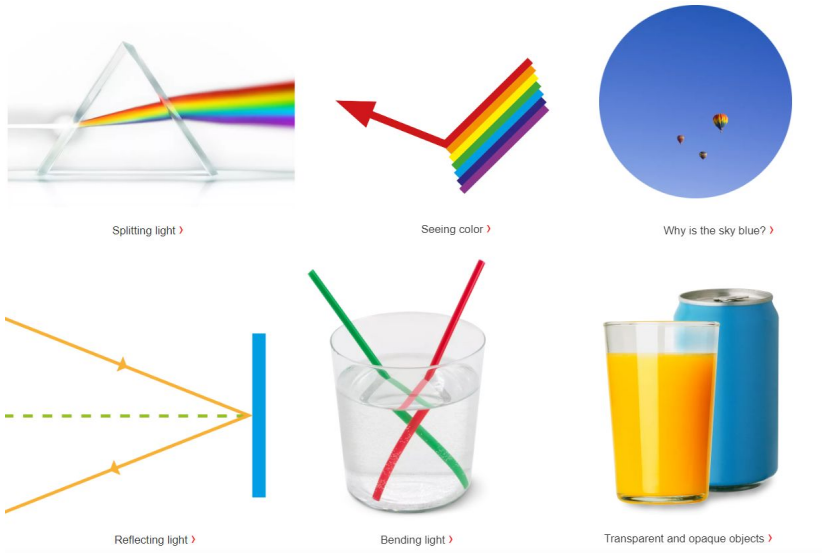
Introduction to Electricity- video for kids (Stop at 0:51)

learning junction@learningjunction

Does light travel through all materials the same way? What do reflection, absorption and mean and look like?

How Light Travels...Everything You Need to Know.*Fun Science*

This video covers the terminology and exemplars for the terms and light characteristics covering 2E1.2 It would serve as a 3 day lesson. The examples are excellent surface level exemplars for students.



DKfindout! - Light

Deepening Understanding

Examine light and sound through the lens of "relationships," "interaction," and "cause and effect."

- ***Skills and Procedure 2E1.1:*** *Relate vibration to the production of sound. (ie. What is the relationship between vibration and sound production?)*
-
- **What is the relationship between pathway, object, and light?**
- **What causes sound?**
- **What is the effect when light interacts with an object that has smooth surface?**
- **What is the relationship between properties, objects, and pitch?**
- **Describe the interaction of light passing through a glass of water.**

Transfer

Design your own musical instrument that makes at least two sounds. Make good notes to describe how you made it, the materials you used.

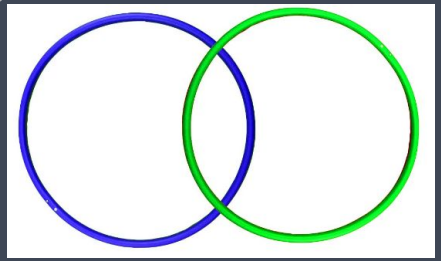
Let's Talk Science

Rubric

Investigate what materials make the best shadow puppets?

What is a Rainbow? Is there really a "pot-of-Gold" at the end!!!!??? (Extension)

Select two different light sources and describe how they would behave on a smooth table top, your bedroom window and a glass of apple juice.



How are Sound and Light the same? Different?

Computing Science and Energy in Grade 2

Video with Angela Dearing

Slide Deck:

- Energy Grade 2
- Slide Deck

Resources

This video explains what sound is. It goes into a higher explanation of sound production and travel. It would be appropriate for enrichment for students needed a higher level challenge.

Read Aloud - *Sounds All Around* - book by Wendy Pfeffer

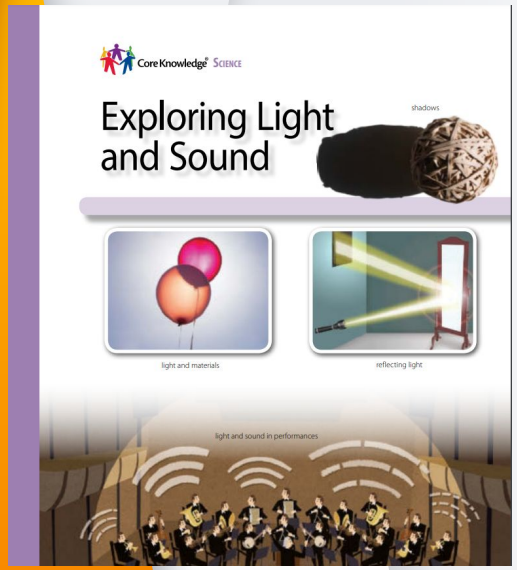
***Let's Talk Science*:**
Exploring Sound
This self contained unit covers all of the Grade 2 expectations and more. Some sections may be more "technical" than is needed for Grade 2 however, the activities and hands on investigations can easily be adapted to fit the grade 2 outcomes.

Resources

Exploring Light and Sound by CoreKnowledge

Student Resource: The *Exploring Light and Sound* Student Books offer engagingly written and richly illustrated text on the topics specified for the unit. Each volume includes color photographs and illustrations and is intended to be read aloud with students across the instructional sequence of lessons.

Teachers Guide: The *Exploring Light and Sound* Teacher Guide provides detailed lesson plans for each Student Book chapter, as well as activity page masters, assessments, and additional activities to reinforce the lesson content.



Resources

Discovery of *Sound in the Sea* - has a wealth of information which could serve as background knowledge for the teacher.

Modelling a Sound Wave - Science World

Light - an introduction

Source: Science A-Z
K-2: Light
Subscription for the Resources Identified
Link: Science A-Z

Resources

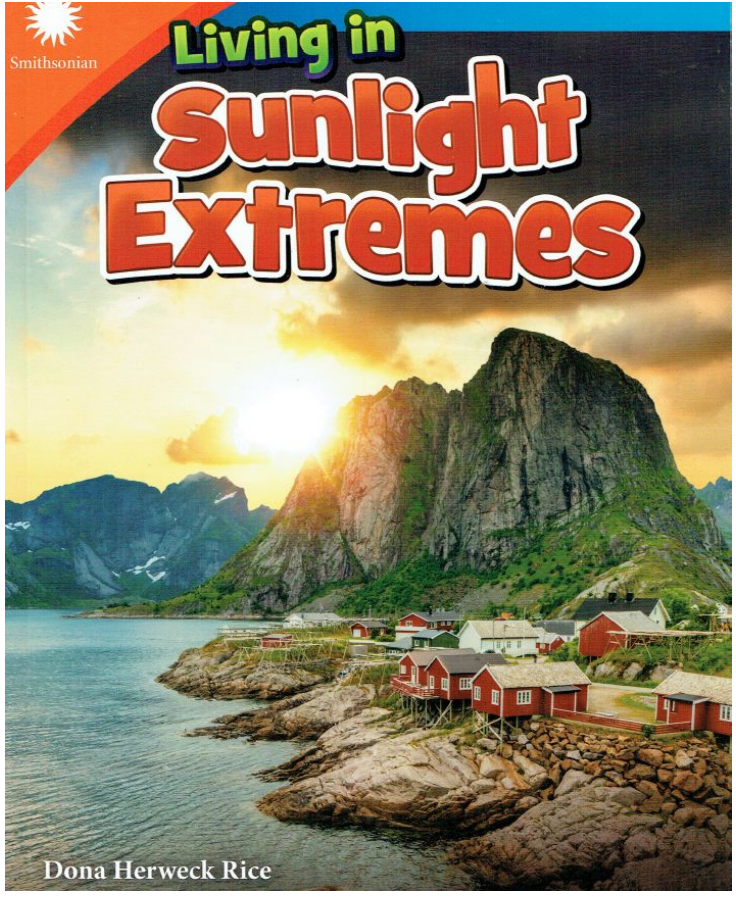
Inventors of Tomorrow

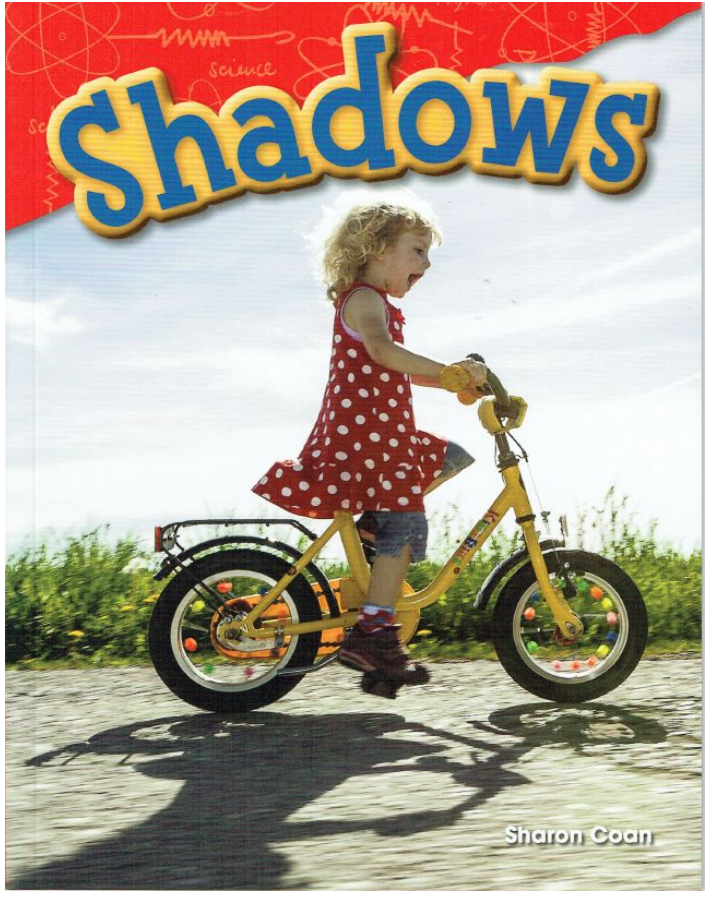
Hands On Science and Engineering Source Site developed by Janelle Durham
www.JanelleDurham.com

How Light Travels...Everything You Need To Know! *FUN* Science for Kids!

- ➔ Watch video ahead of showing;break up for instruction

Book Resources - all available through Pearson Canada





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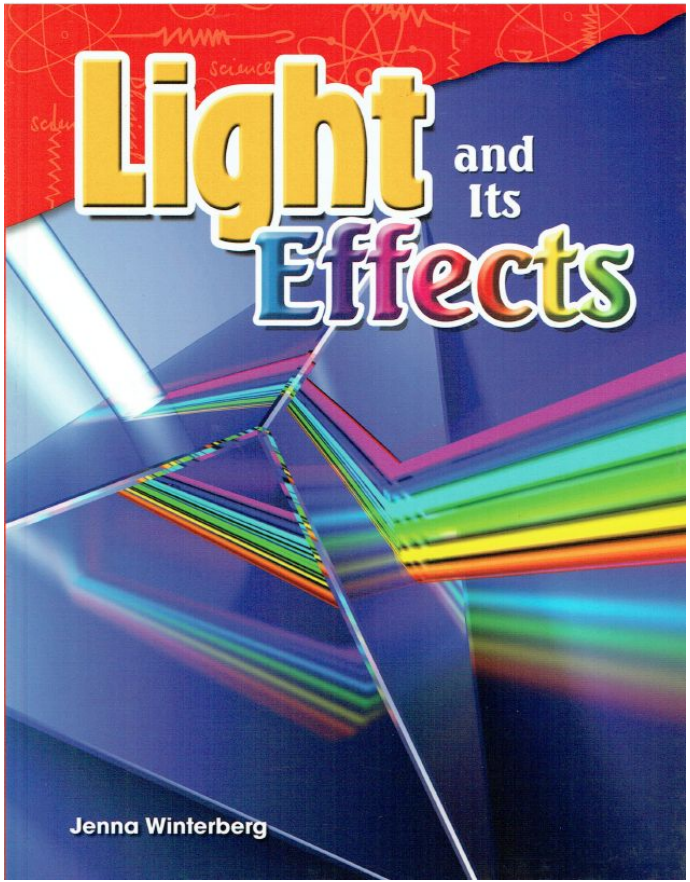

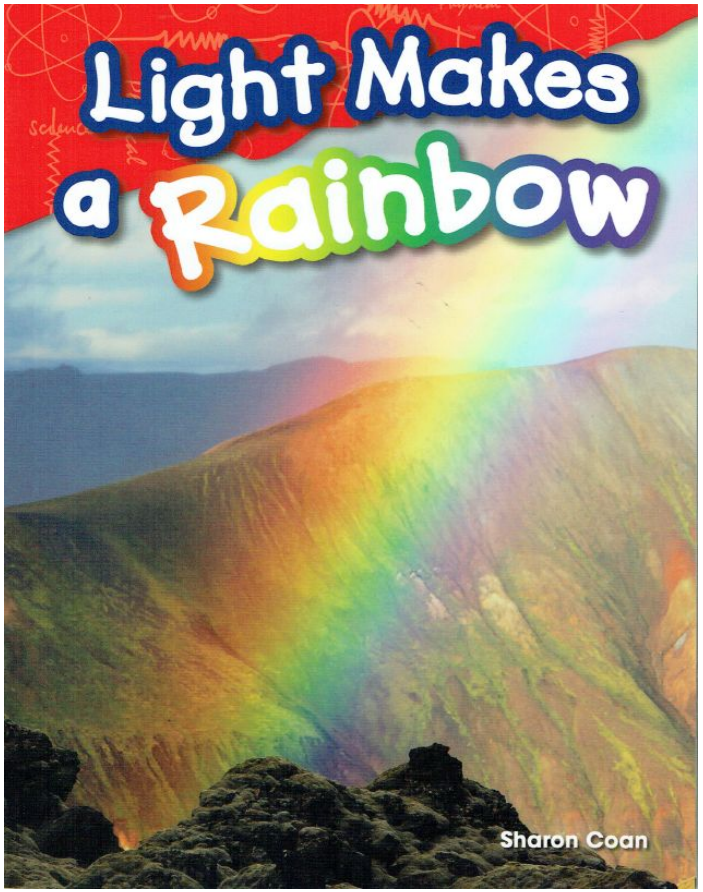

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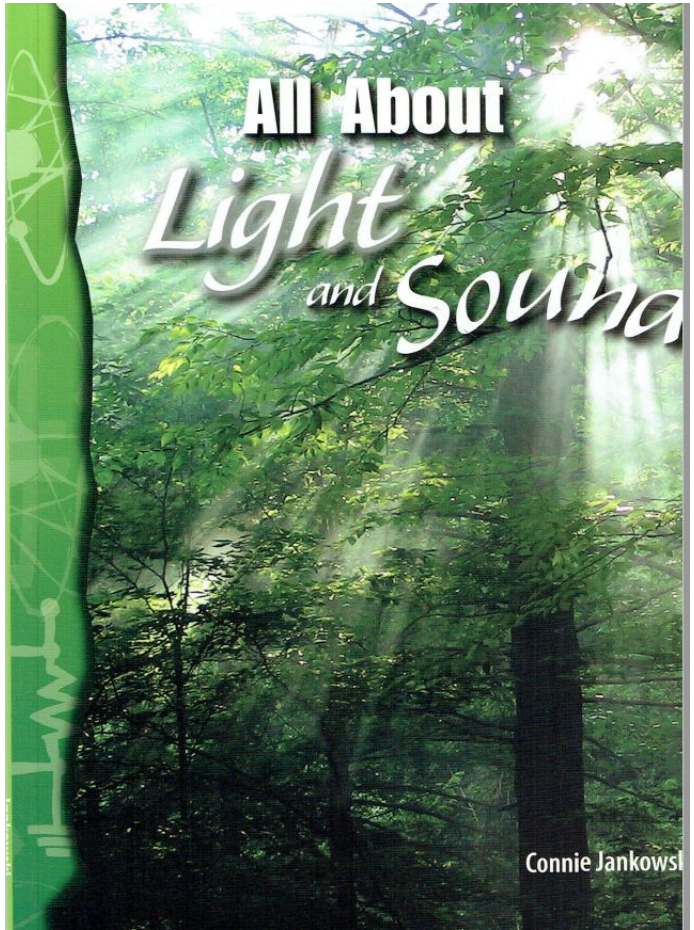

Table of Contents

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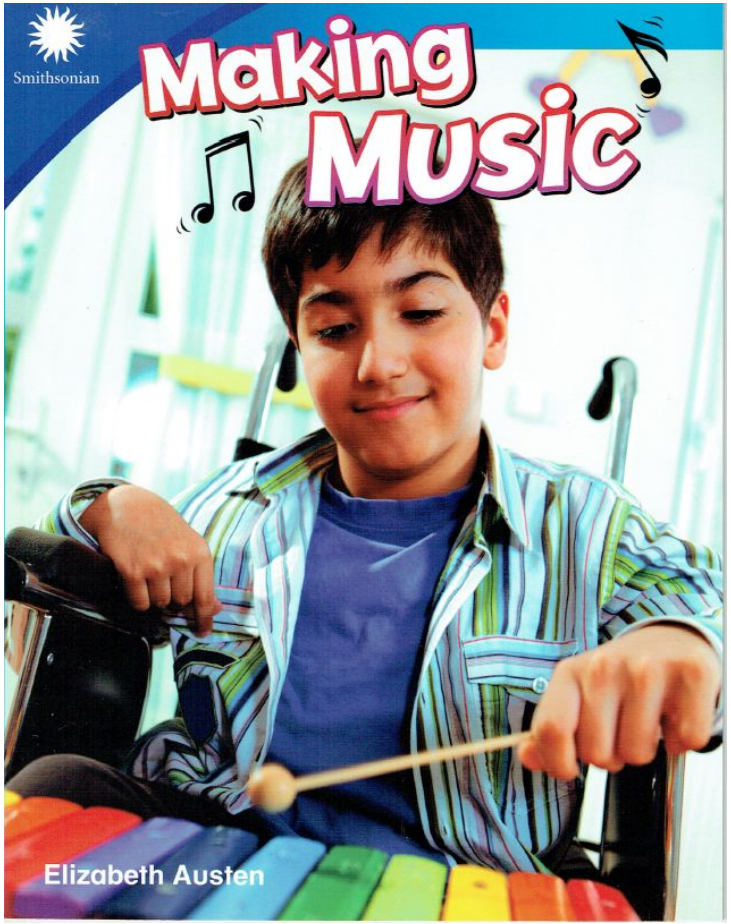

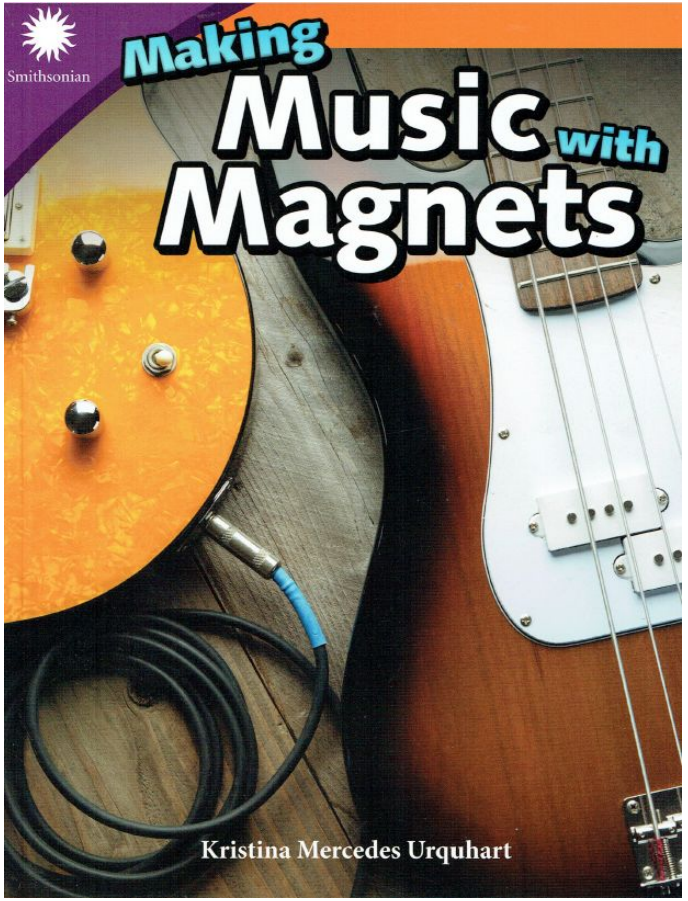

Book Resources - based on old Science Curriculum - see Topic D

On The Mark Press

Thanks!

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