New SCIENCE Curriculum

Energy
Kindergarten

November 20, 2023

Facilitators: Chris Żarski & Ted Zarowny

Alberta Regional Professional Development Consortia
Adult learning for students' sake

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

Agenda

The Big Picture - Energy through K-3

- What is *Movement*?
- How do we move?
- Why do we move?

Skills and Procedures

- Explore
- Identify
- Observe
- Compare

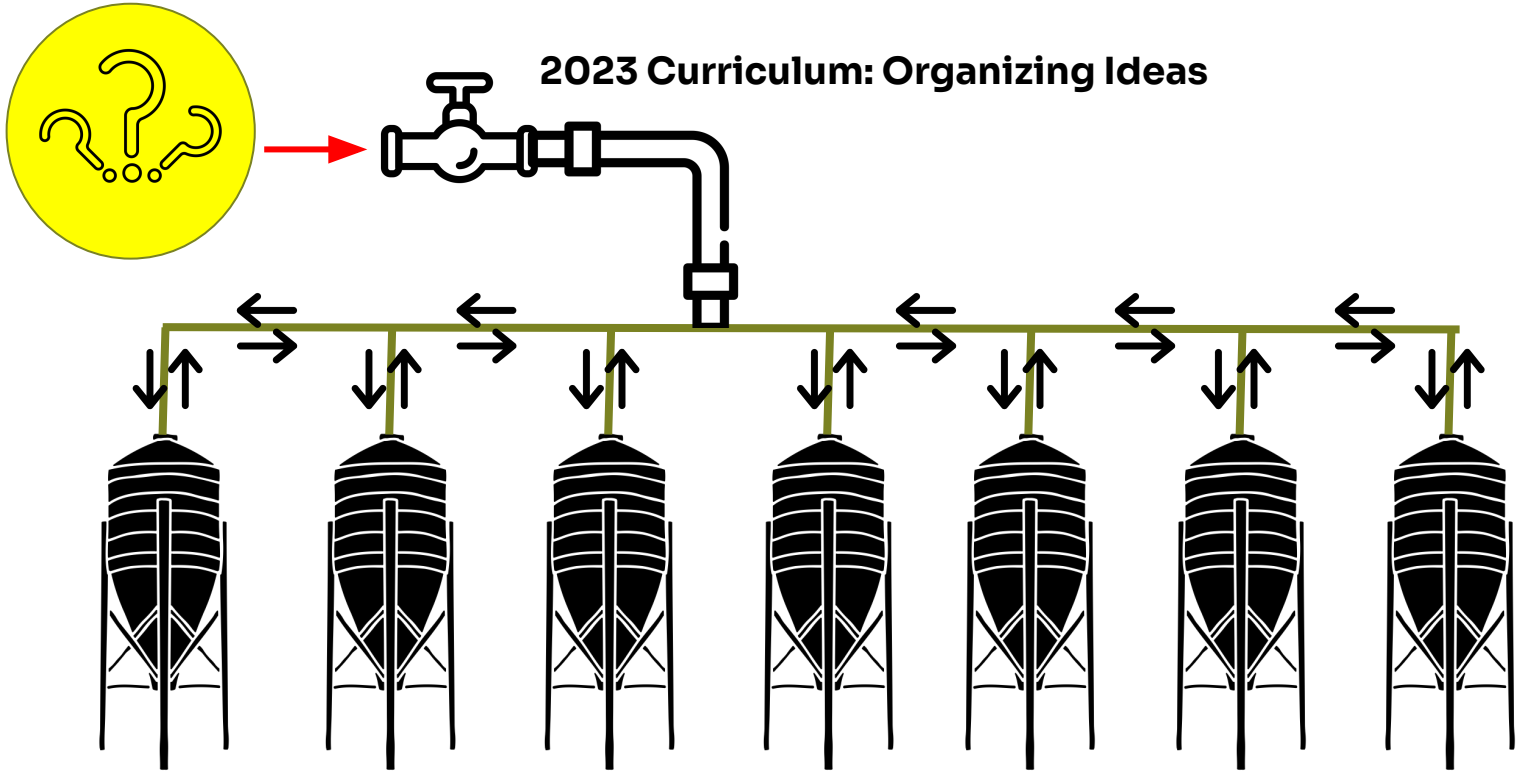
1 The Big Picture





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



Matter

Energy

Earth Systems

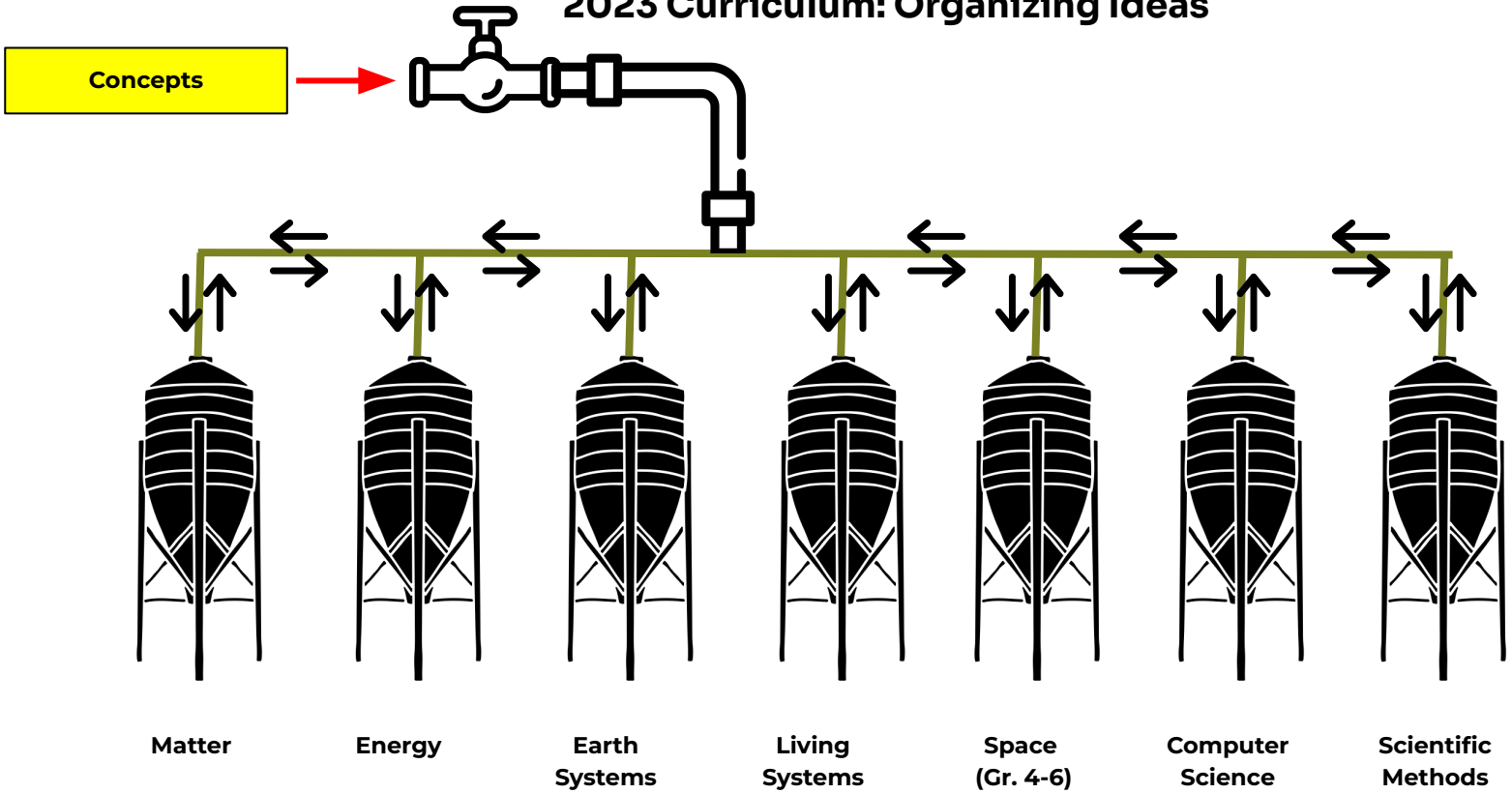
Living Systems

Space (Gr. 4-6)

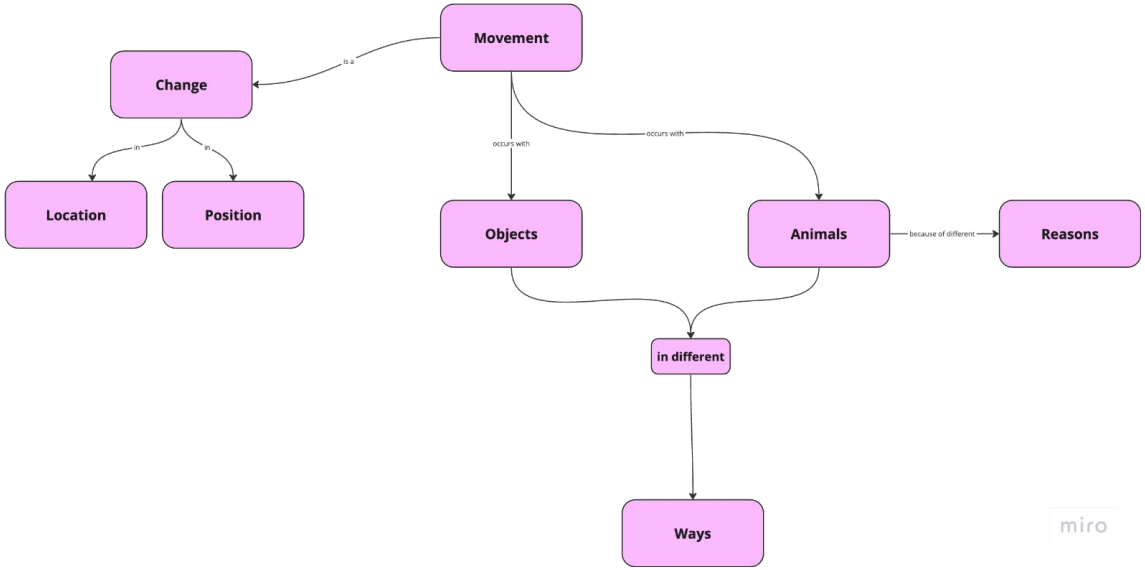
Computer Science

Scientific Methods

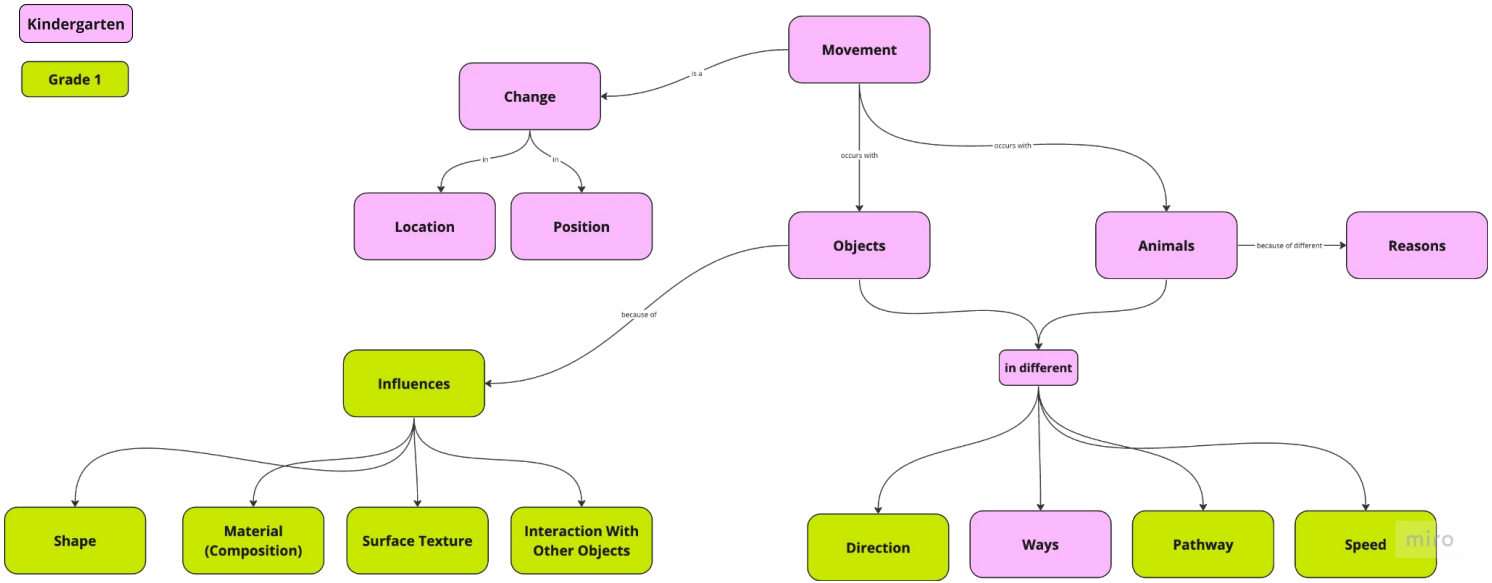
2023 Curriculum: Organizing Ideas



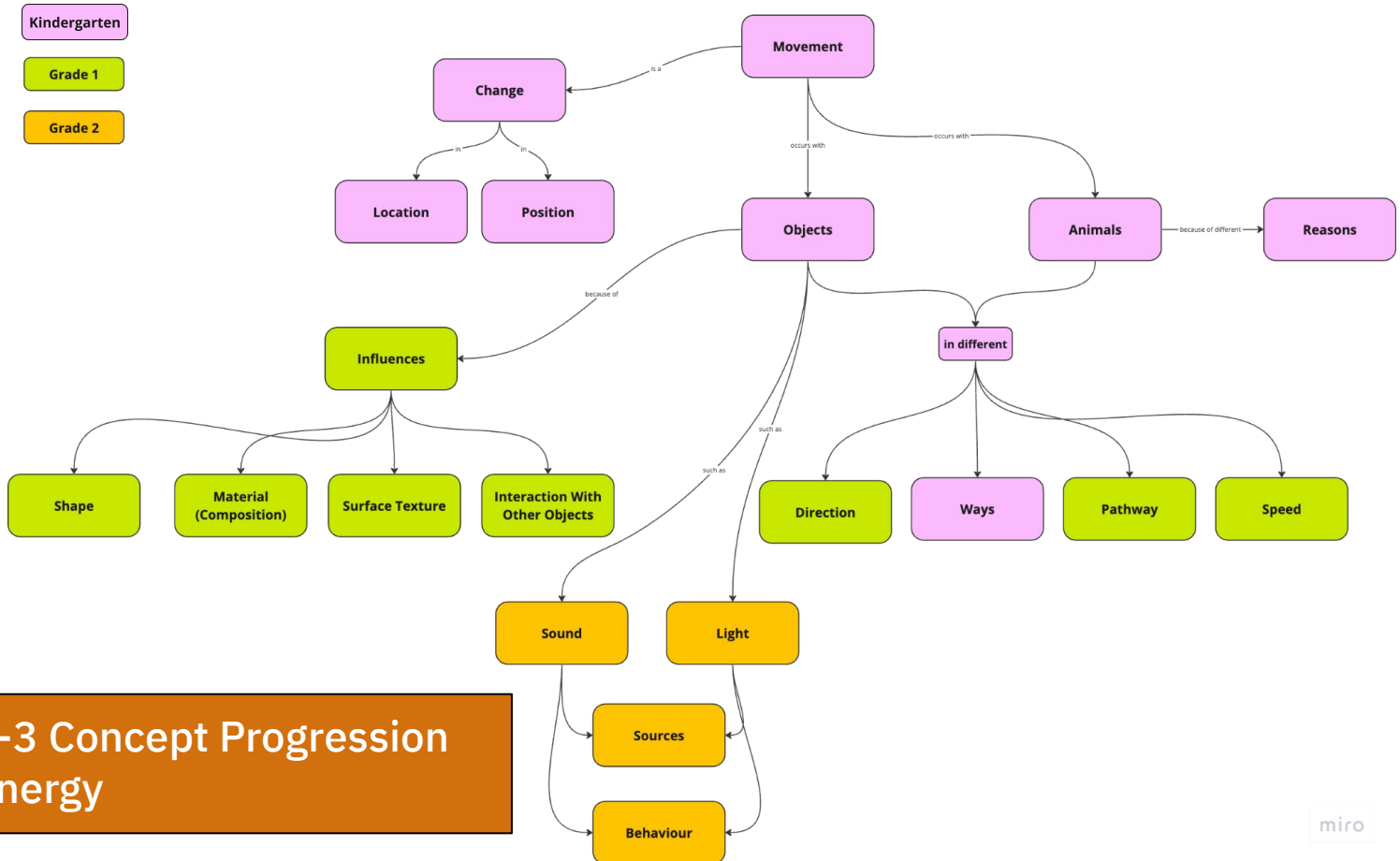
Kindergarten



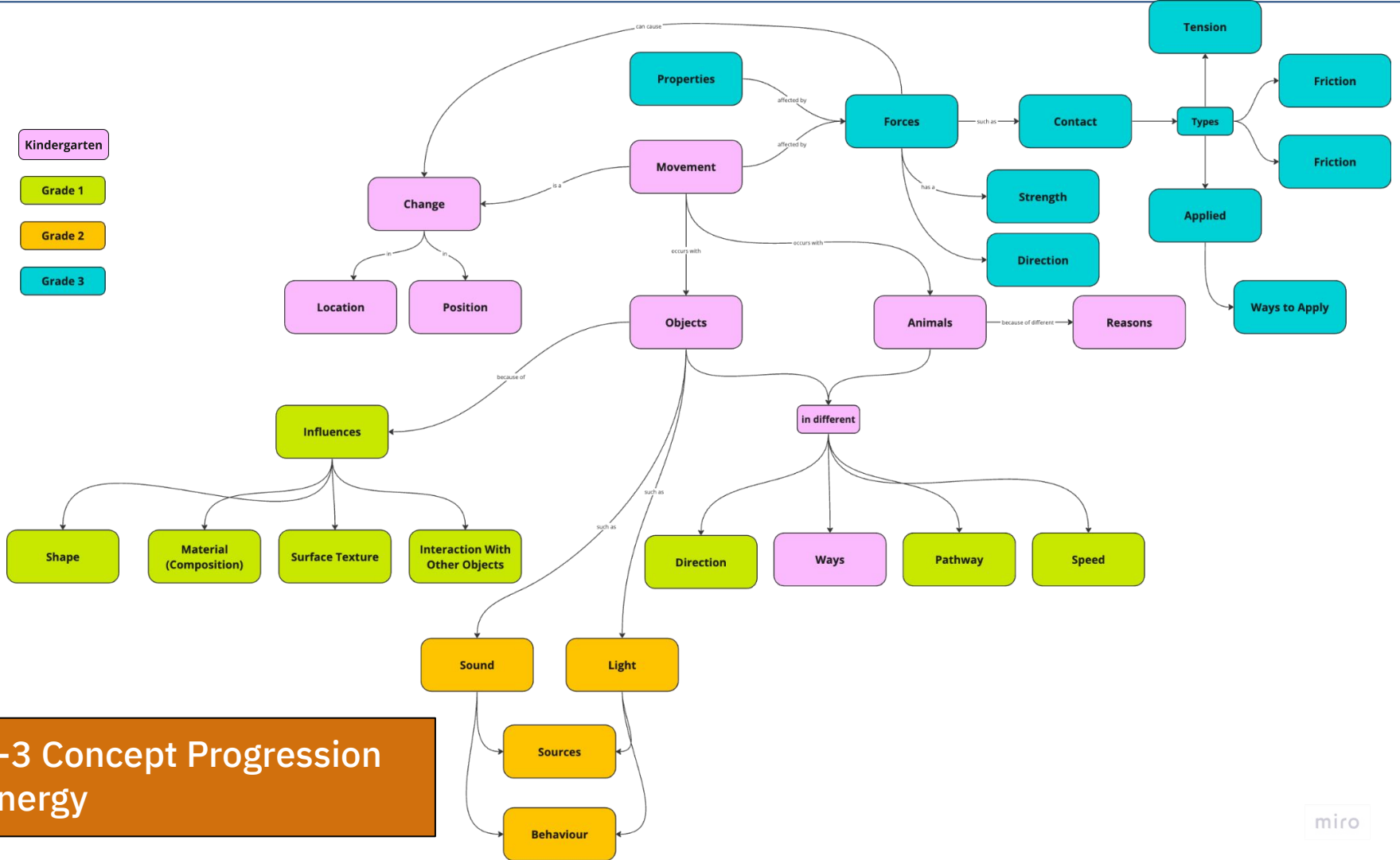
K-3 Concept Progression Energy



K-3 Concept Progression Energy



K-3 Concept Progression
Energy


Kindergarten
Grade 1
Grade 2
Grade 3
Properties
Forces
Contact
Tension
Types
Friction
Friction
Movement
Change
Strength
Direction
Applied
Ways to Apply
Location
Position
Objects
Animals
Reasons
Influences
in different
Shape
Material (Composition)
Surface Texture
Interaction With Other Objects
Direction
Ways
Pathway
Speed
Sound
Light
Sources
Behaviour
can cause
affected by
affected by
such as
has a
is a
in
in
occurs with
occurs with
because of
because of different
such as
such as
K-3 Concept Progression
Energy
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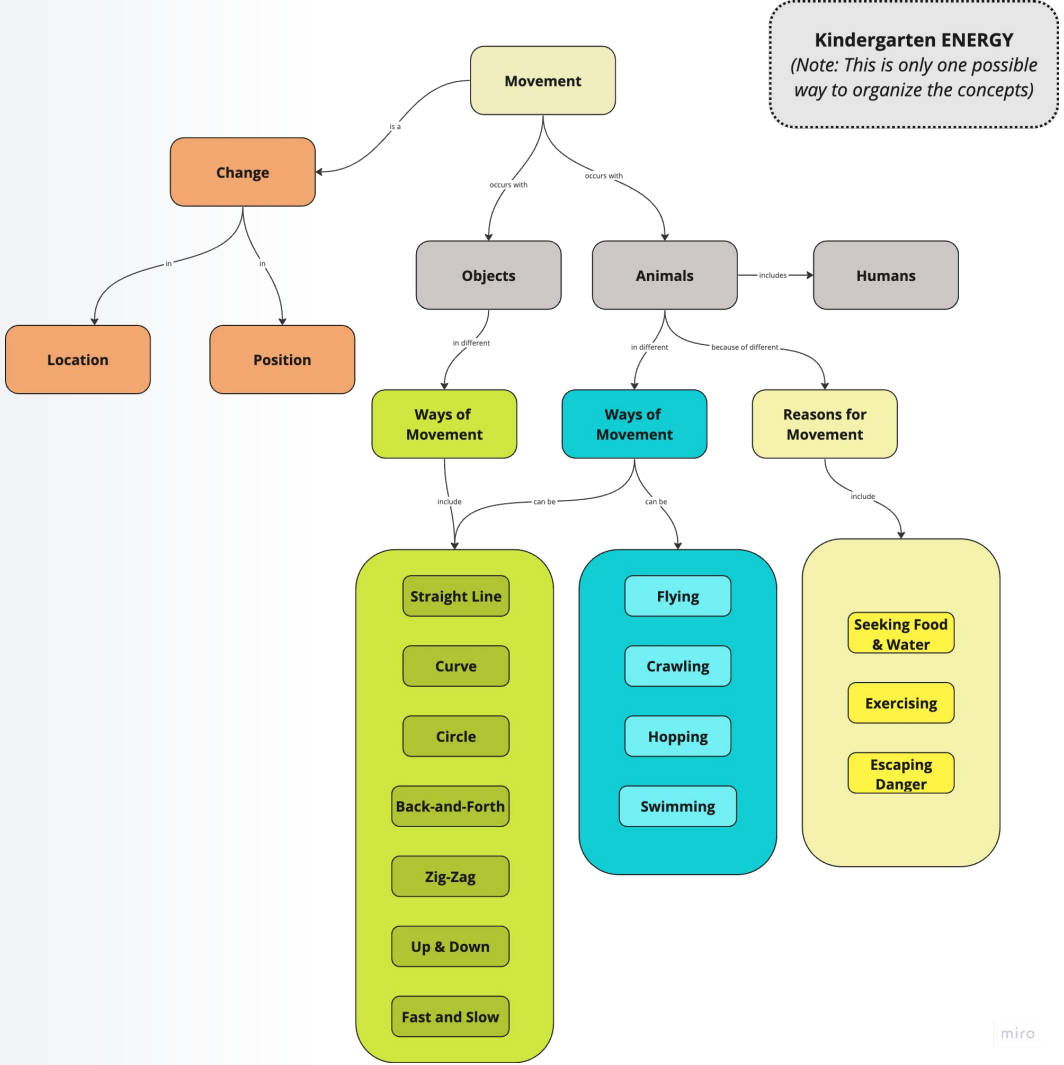
Kindergarten Energy Concept Map



[Kindergarten Science Energy Concept Map.png]

ENERGY (01)

ENERGY (02)

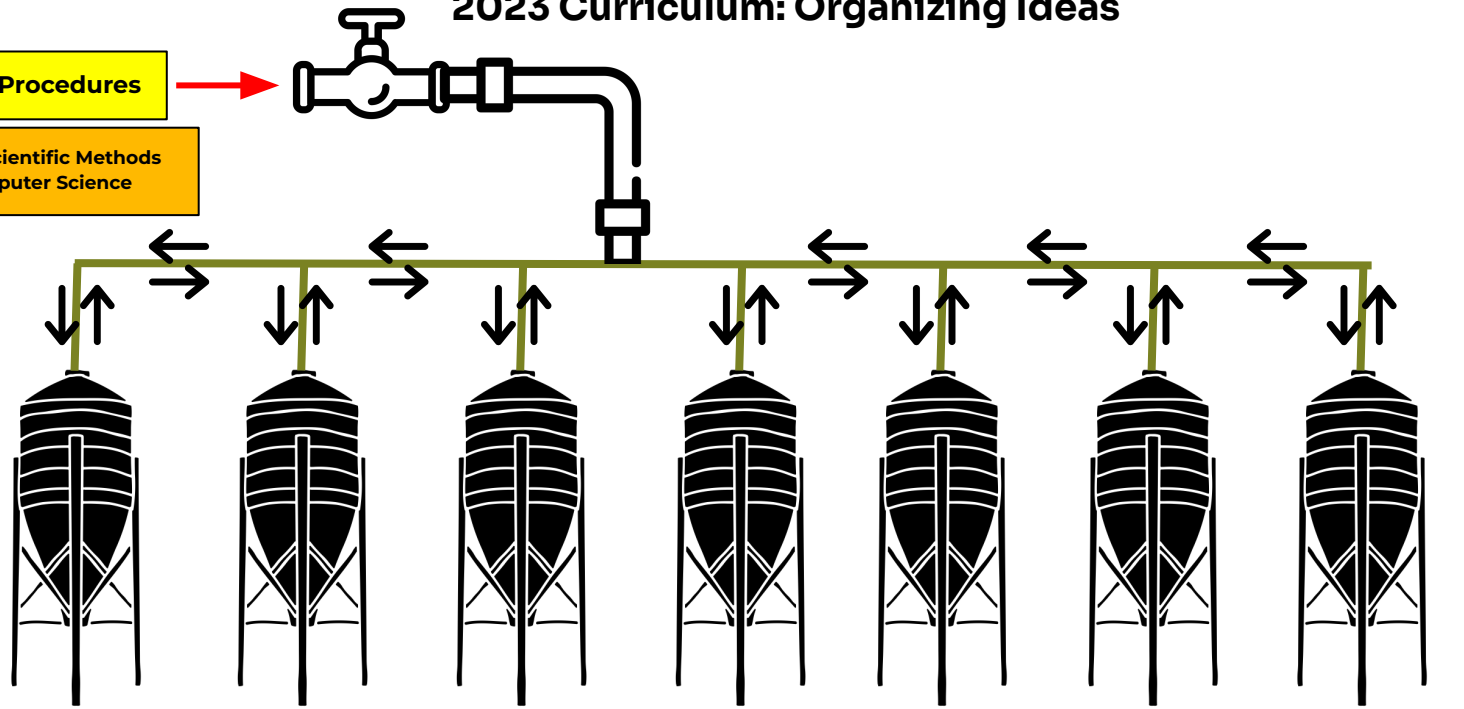
Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 5	Grade 6
Guiding Question: *How can humans, animals, and objects move?*	**Guiding Question:** *How can movement of objects be understood?*	**Guiding Question:** *Where do light and sound come from, and how do they move?*	**Guiding Question:** *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?*	**Guiding Question 02:** *What are energy resources?*	**Guiding Question 02:** *How are energy resources used?*
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.*	**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.*
KEY CONCEPTS					**KEY CONCEPTS**			
Change	Animal	Characteristics (Materials that Affect Sound)	Change: Movement	Attraction	Buoyancy	Change	Energy	Advantage
Location	Direction	Light Behaviour	Effort	Distance	Effect on Flight (speed, altitude, horizontal and vertical, straight and level)	Elasticity	Energy Needs	Daily Living
Movement	Factor	Pathway: Sound	Force: Applied (stretching, pulling squeezing pushing)	Force: Non-Contact (gravity, magnetic)	Flight	Force: Action	Energy Resource	Disadvantage
Movement: Ways	Influence	Pathway: Light	Force: Contact (applied, friction, elastic/spring)	Gravity	Flight Characteristics	Force: External (applied, friction, elastic/spring)	Resource: Renewable & Non-Renewable	Electricity
Position	Movement	Sound	Force: Direction	Interaction	Fluid	Force: Internal (tension, compression, shear, torsion)		Energy Use Management
Animals	Object	Light Source	Force: Strength	Magnetic Material	Force: Opposing (thrust, drag, weight, lift)	Force: Reaction		Energy Choice Factors
Object	Pathway	Sound Behaviour	Interaction	Magnetism		Interaction		Processed Energy & Non-Processed Energy
Human & Animal	Speed	Vibration	Movement	Poles		Object		
		Sound Source	Property	Properties		Physical Change		
		Sound Characteristics	Simple Machines	Repulsion		Plasticity		
			FNMI: Simple Machines	Strength		Property		

Link: Concept Progressions (ARPDC)

2023 Curriculum: Organizing Ideas

Skills & Procedures

Including Scientific Methods and Computer Science



Matter | **Energy** | **Earth Systems** | **Living Systems** | **Space (Gr. 4-6)** | **Computer Science** | **Scientific Methods**

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

Kindergarten ENERGY Learner Outcome

Children **explore** movement of objects, humans, and other animals. *(Ask Questions, Predict, Find Answers)*

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				

KE1 Learning Outcome: *Children **explore** movement of objects, humans, and other animals.*

KE1.1 Understanding: *Objects, humans, and other animals can move or be moved in various ways.*

6ES1.1 Skills and Procedures

- Move objects in a variety of ways.
- **Identify** objects that move.
- **Identify** objects that do not move.
- **Observe** and imitate how animals can move.
- **Identify** various ways that humans and other animals can move.

- **Compare** various ways that humans and other animals can move.

Teaching for Transfer

Phases of Learning

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

Surface

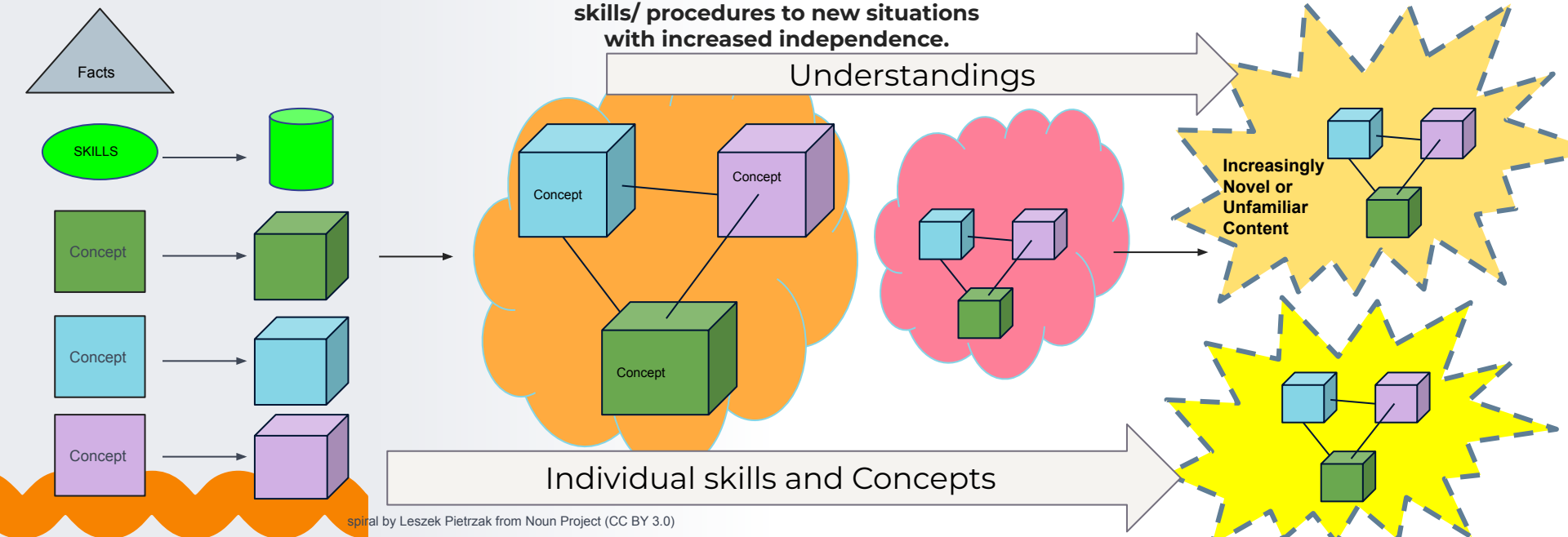
Students are first exposed to individual skills, concepts and their related knowledge.

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.



spiral by Leszek Pietrzak from Noun Project (CC BY 3.0)

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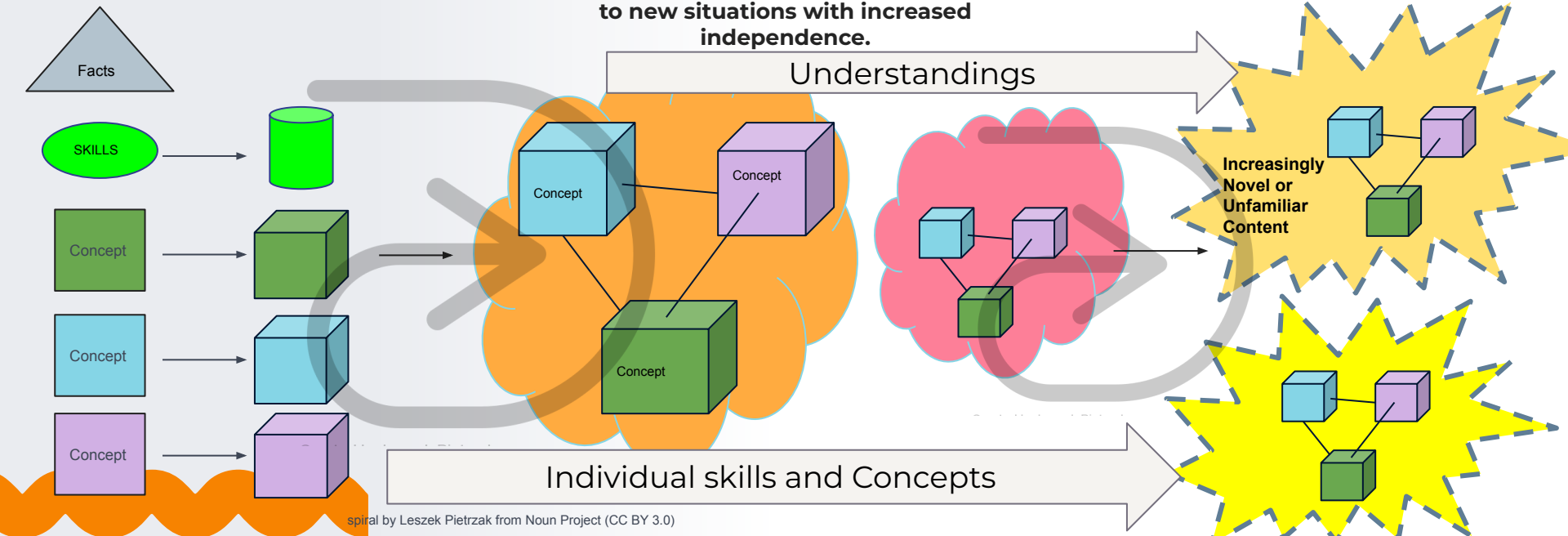


Planning

Begin With the End In Mind

Stephen R. Covey, 1989

Backward by Design

Grant Wiggins & Jay McTighe, 1998

Learning Outcome
Children explore movement of objects, humans, and other animals
Understandings
KSE.1 Objects, humans, and other animals can move or be moved in various ways.
KE1.2 Humans and other animals move for many reasons.

Sample Assessment: Provide students opportunities to move objects in certain ways and to observe and identify the type of movement an object is making. Contexts may be manipulatives, videos, or real-life observations (eg, movement of animals in a zoo, movement over rides in a carnival, movement of students at recess).

Students may be assessed in the different contexts using **this checklist.**

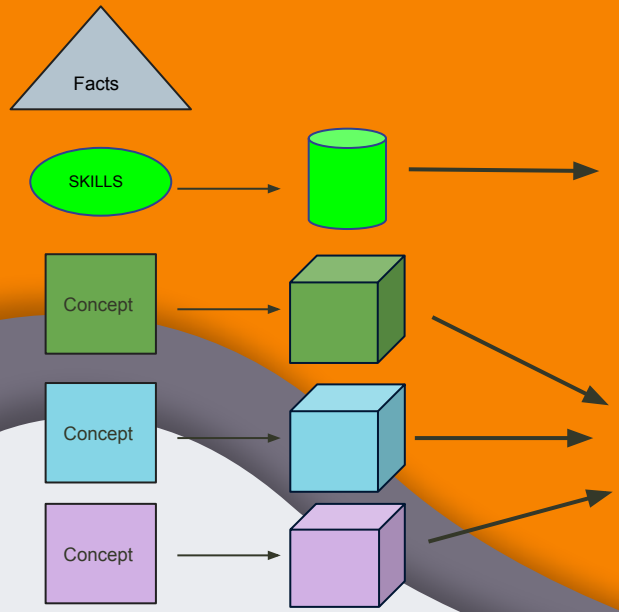
What will students need to be able to do in order to be successful?

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

Phases of Learning

Surface

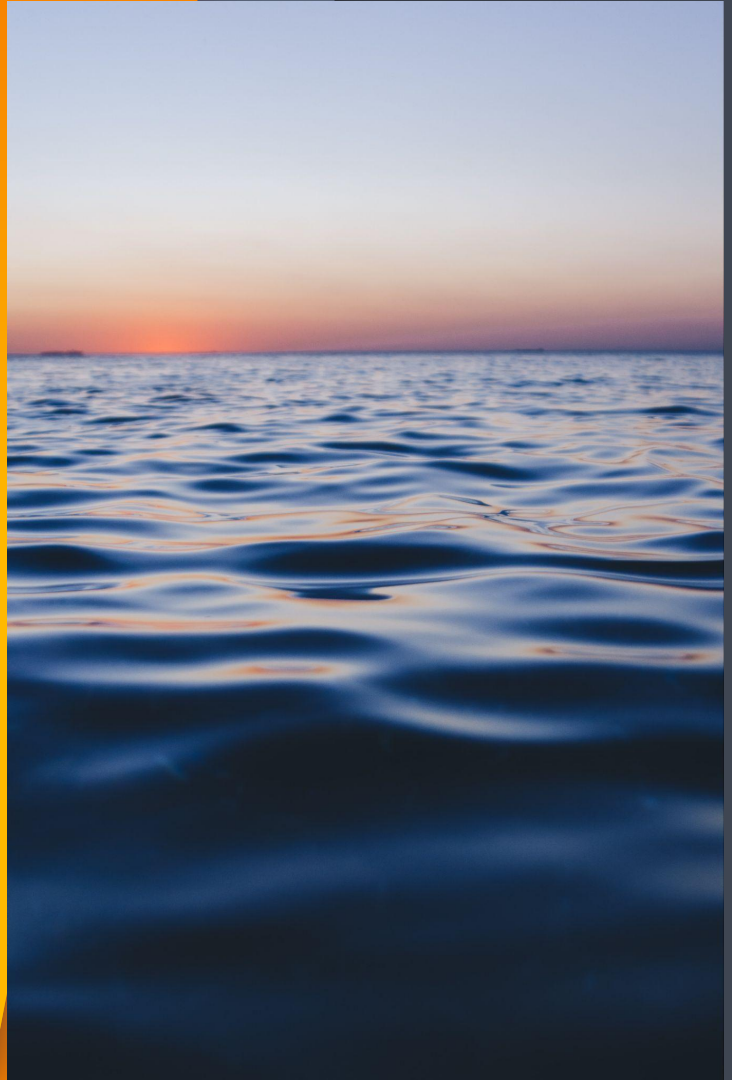
Students are first exposed to individual skills, concepts and their related knowledge.



Move objects in various ways.

Pre Assessment for Prior Learning

Concepts such as zig-zag, curve, up-dow, fast-slow, etc.



Surface Level Activities

What is Movement?

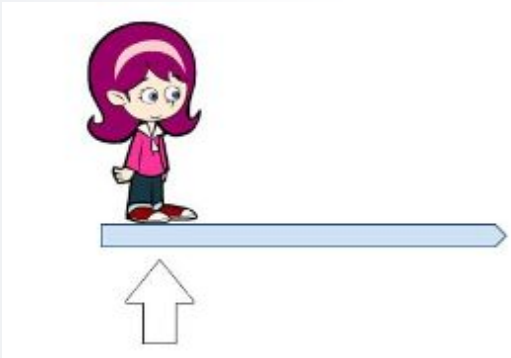
Can you show me what movement is?

Can you show me what movement is not?

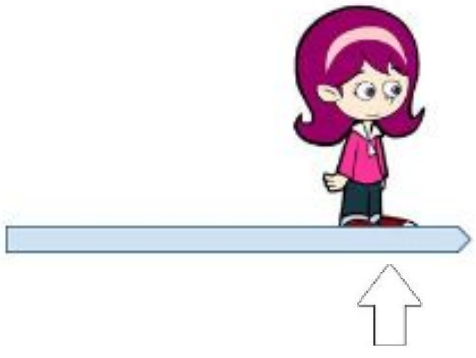
How would you explain to someone what movement is?

Movement is a change in position or location over time.

What does **location** mean?



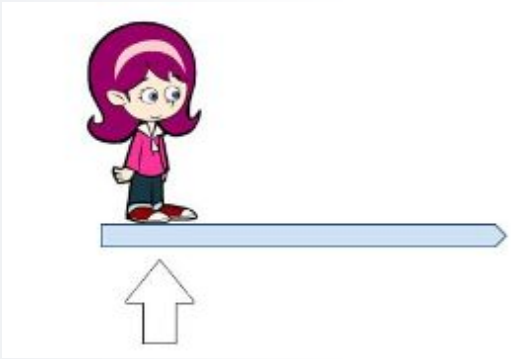
Starting point



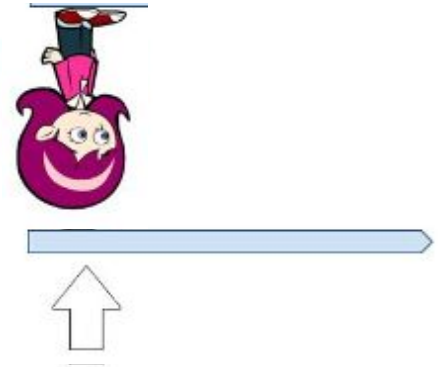
Finishing point

Movement is a change in position or location over time.

What does **position** mean?



Starting point



Starting point

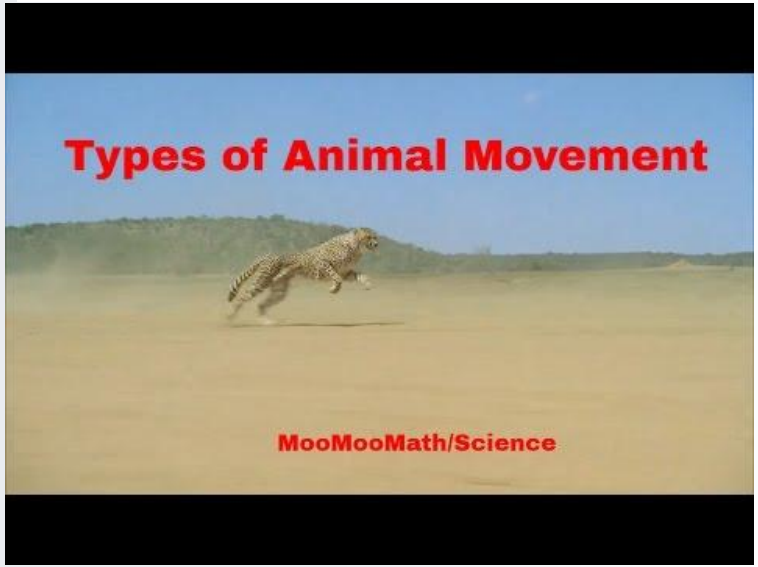
Identifying Objects that Move/Not Move and Describing the Movement

Fill a green garbage bag with pictures of animals, humans, boxes, articles from the classroom - looking to compare things that **can move without help** and those that **require** it. Have your items listed by picture on a sheet of paper that can be used to classify the objects easily. (pets in the classroom, items that are familiar to students - ski's, snowboard, glasses, fish etc.)

OR

Depending on where you are located, go for a nature walk and find examples of things that can move and not.

Let's Watch Animals Move!



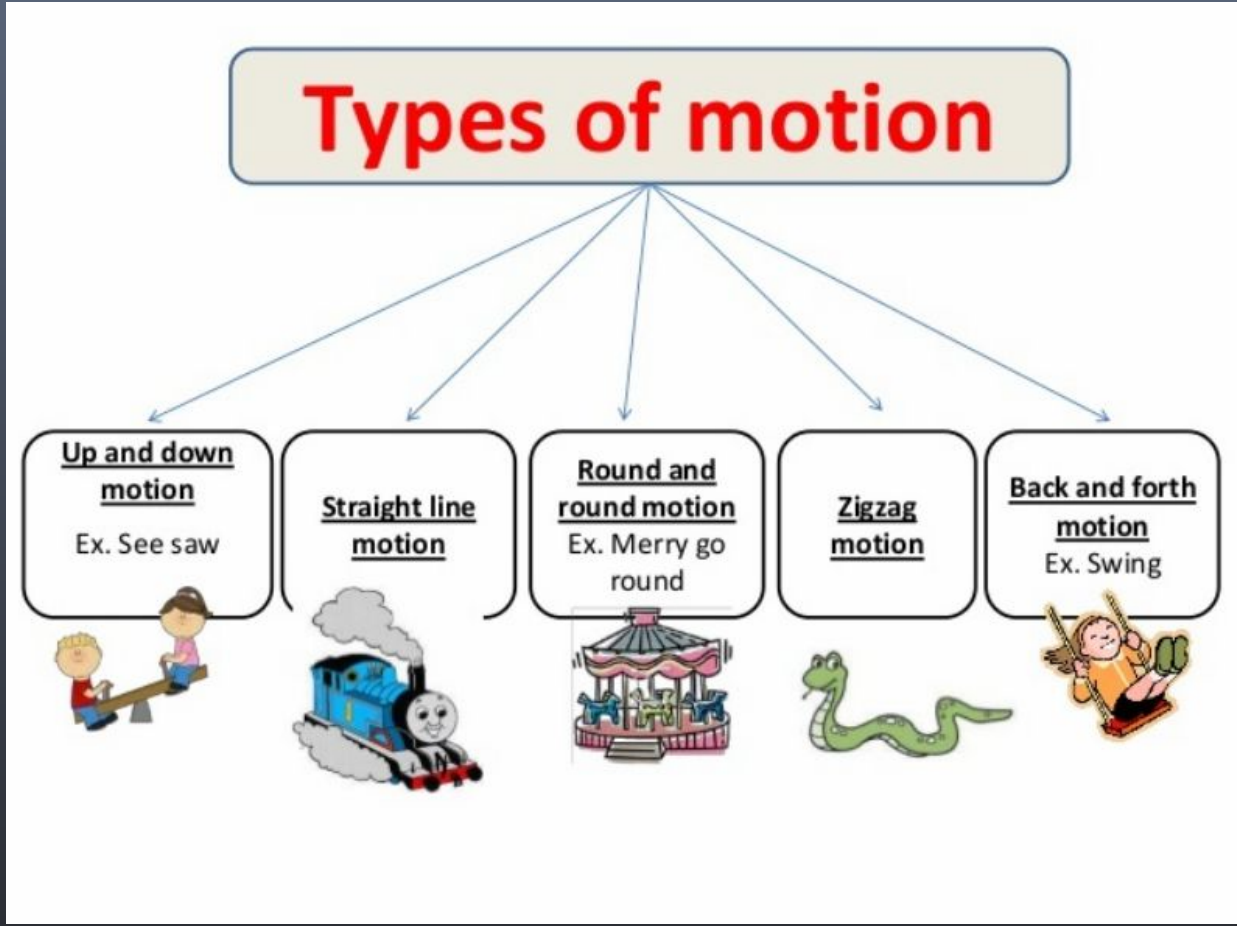
Life Science-Types of Animal - starting video Movement@MooMooMath

Movement in Animals - Macmillan Education

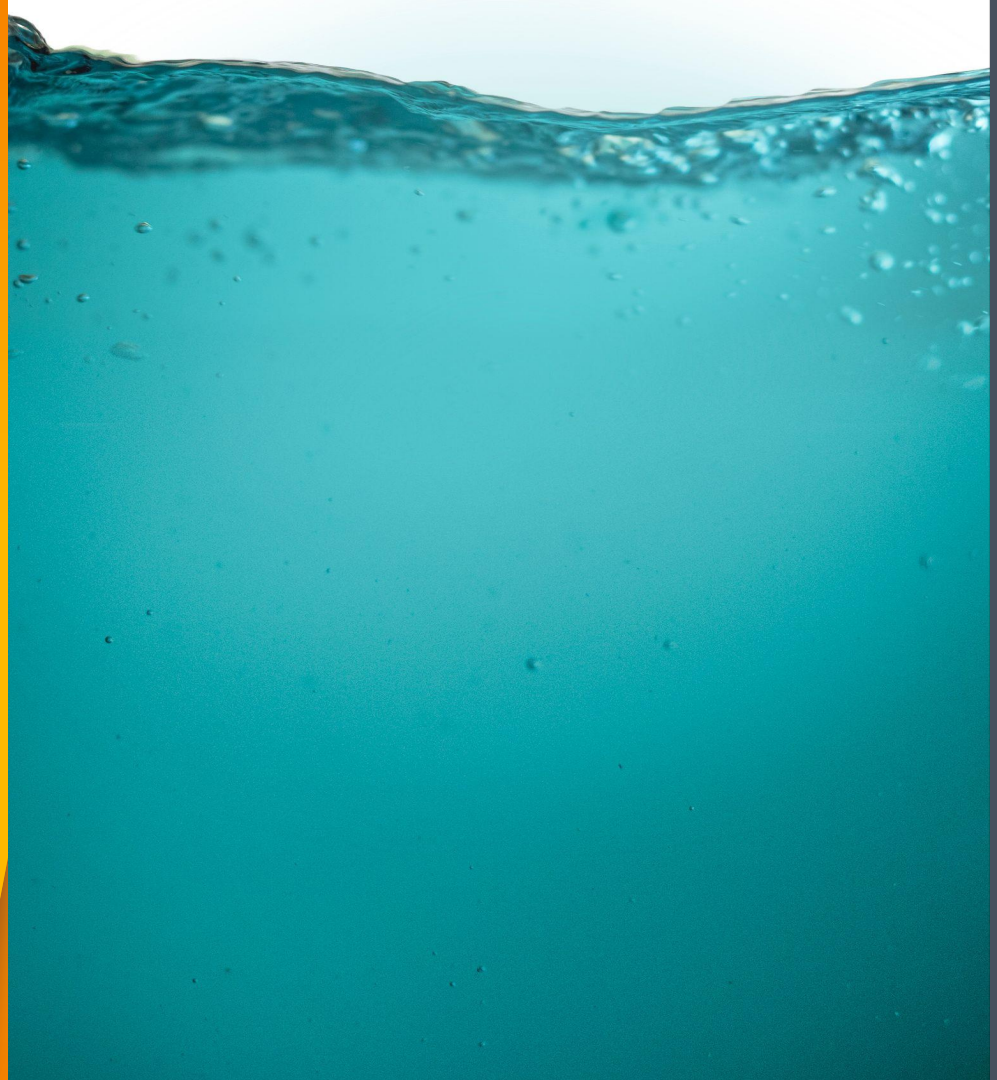
PREDICT: How do animals move? What did you notice and wonder? What did you learn?

PE or Outdoor Education Time!

Sidewalk Chalk would be a great tool!

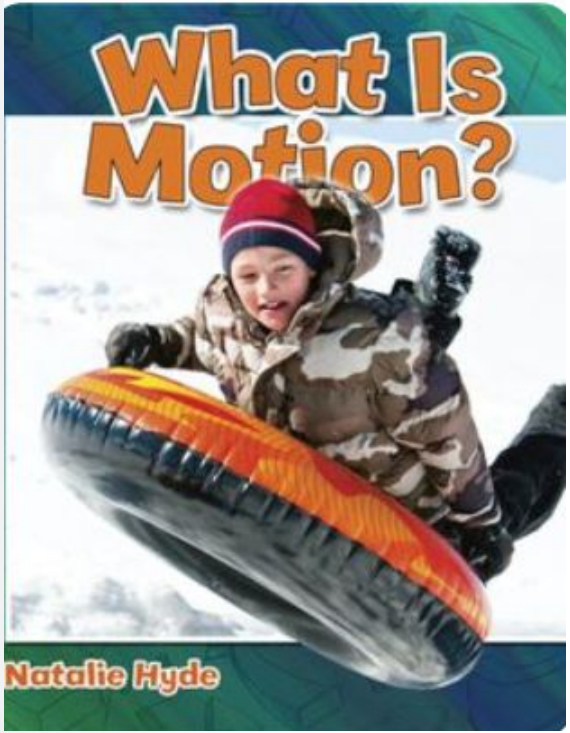


Quizizz Library. Science: Types of Motion

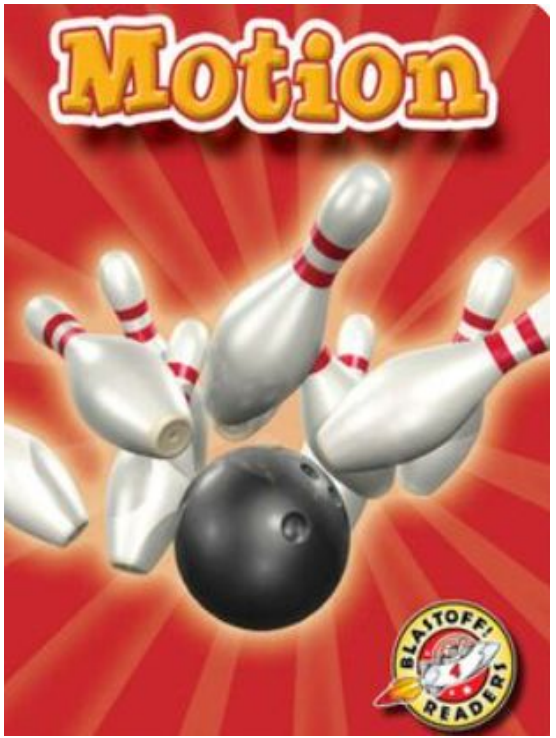


Deep Level Activities

Can I Move Objects

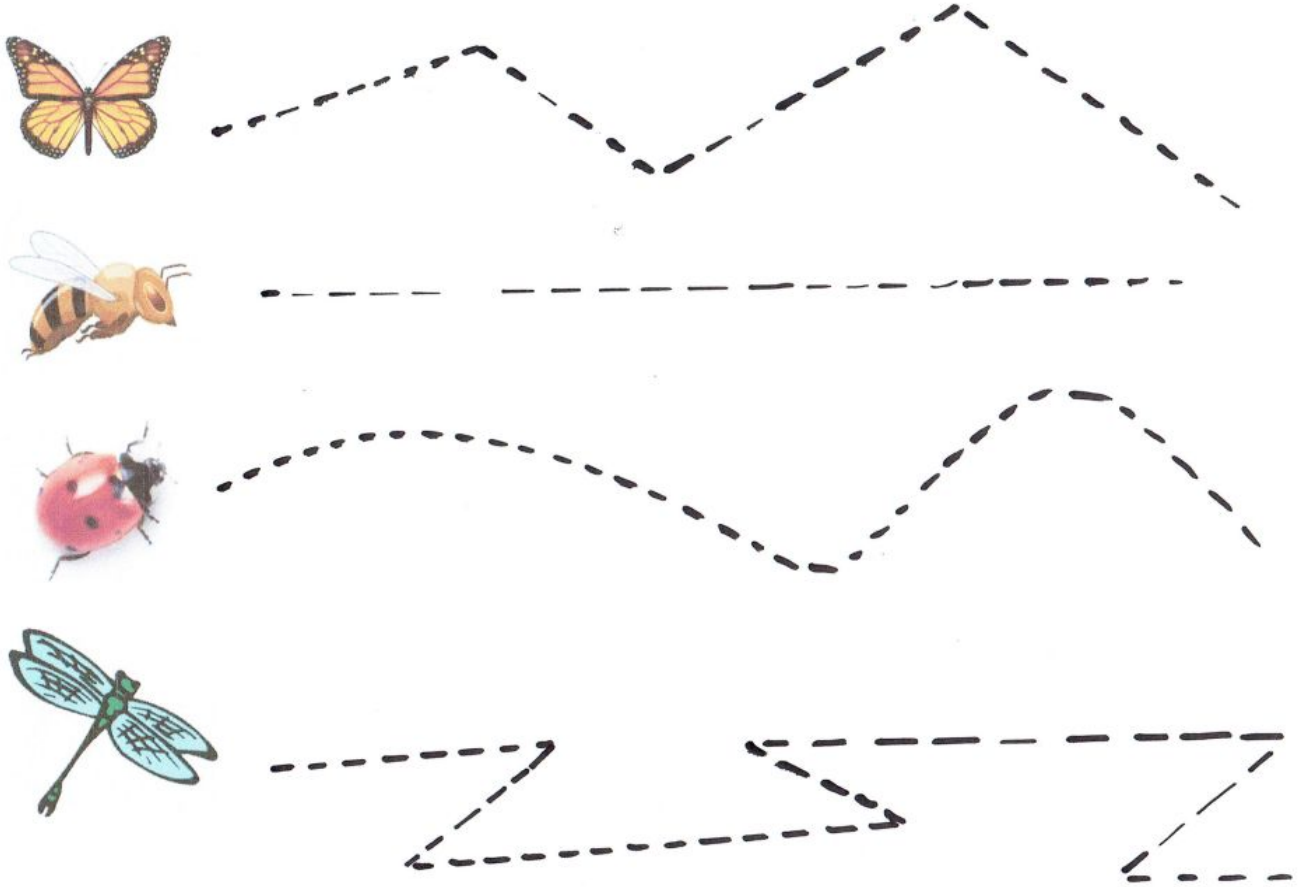


EPIC



EPIC

Practice Cutting the Path to the Insect



Can you name the ways each insect is moving?

Can you trace their path?

Can you make it go further?

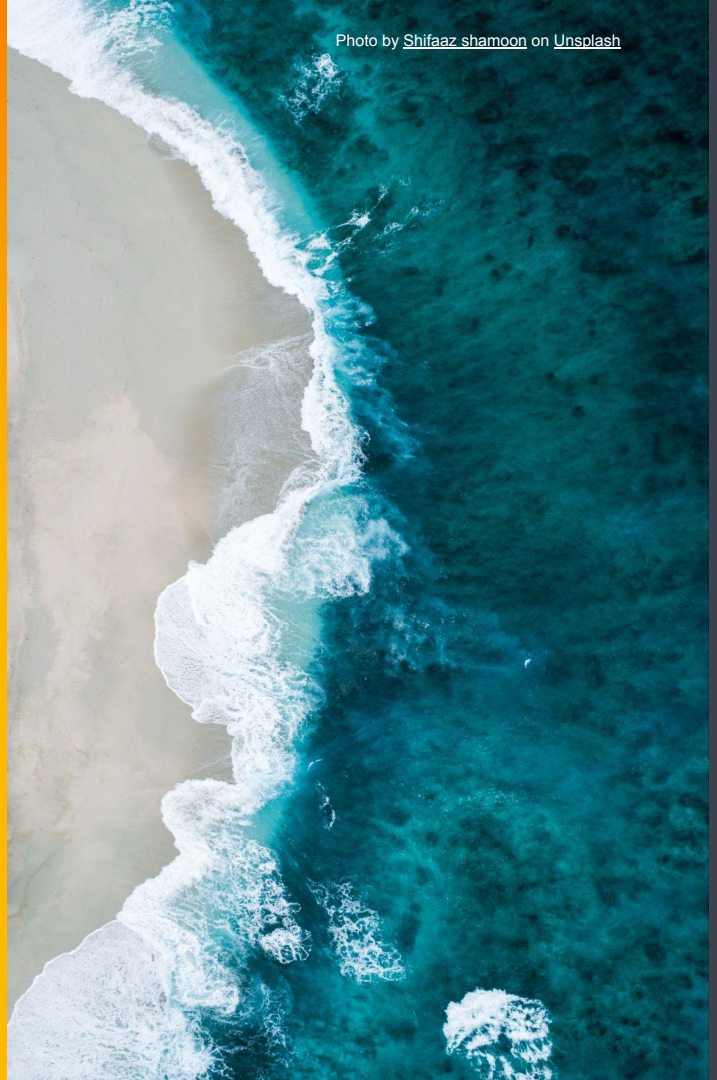
Can you imitate how each animal would move?

Photo by Tawhid Kahn on Unsplash

Photo by Ondrej Machart on Unsplash

Photo by Vincent van Zalinge on Unsplash

Photo on Freepik

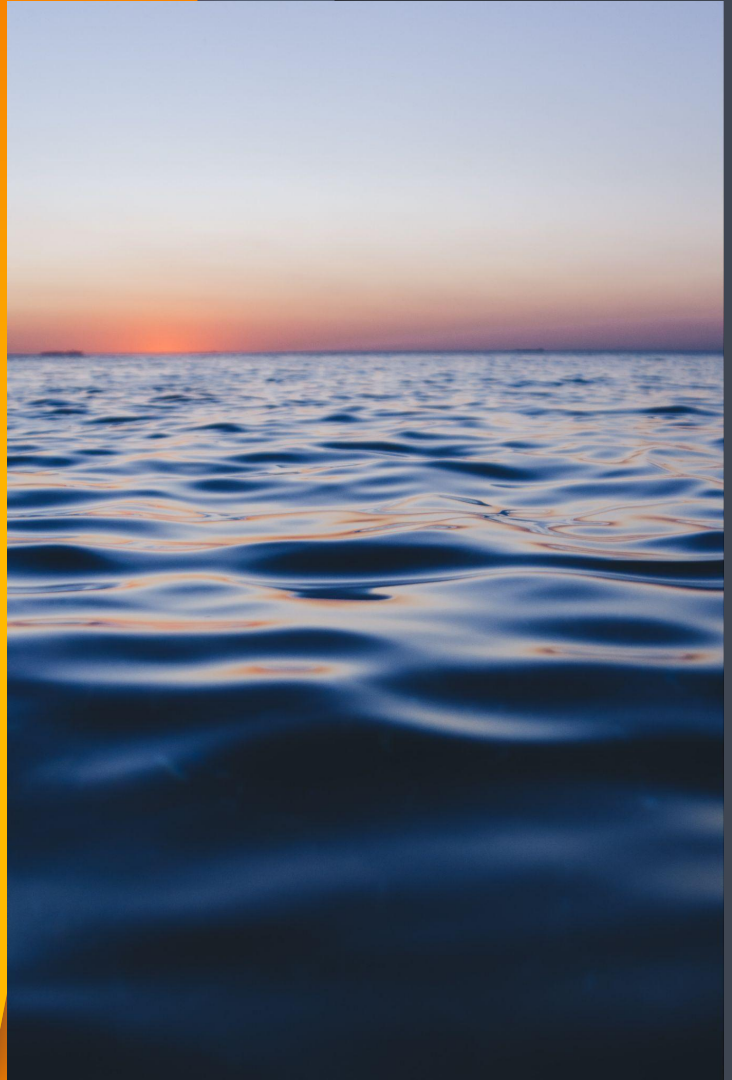


Transfer & Assessment

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



Surface Level Activities for KE1.2

What helps us Move? What do you remember?

Dreamstime.com

Pxfuel Royalty free

Shutterstock.com ID 2219652723

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FreePik

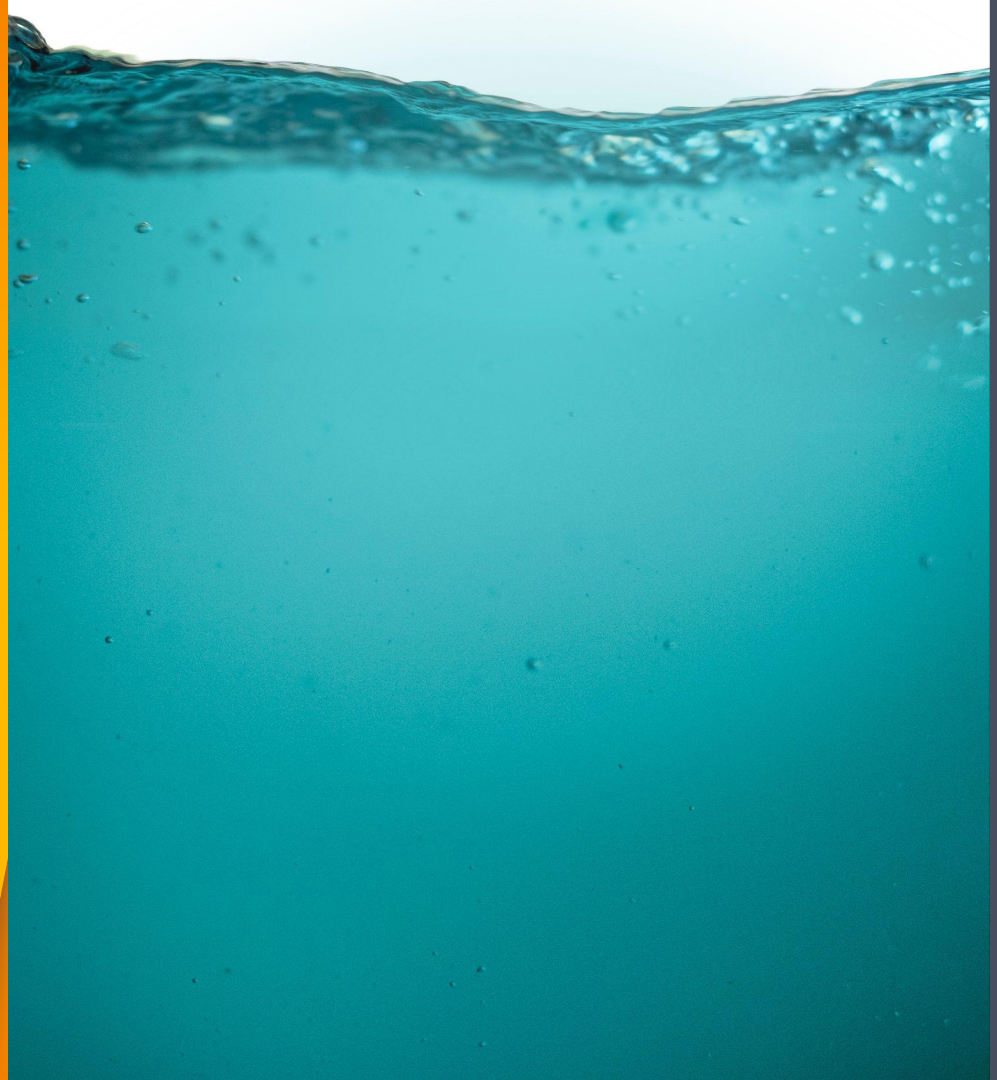
Why do you move each day?

You are a human and walk 'upright'

To get food/water
Go to the bathroom
Go to school
Go from one place to another
Keep physically and mentally fit! (Regular movement increases immunity, motivation and avoiding lifestyle diseases)

Animals might move to:

- Get food or follow food/water (migration)
- Shelter (better climate to survive)
- Avoid predators
- To have young and keep them safe



Deep Level Activities

How do seasons affect animal movement?

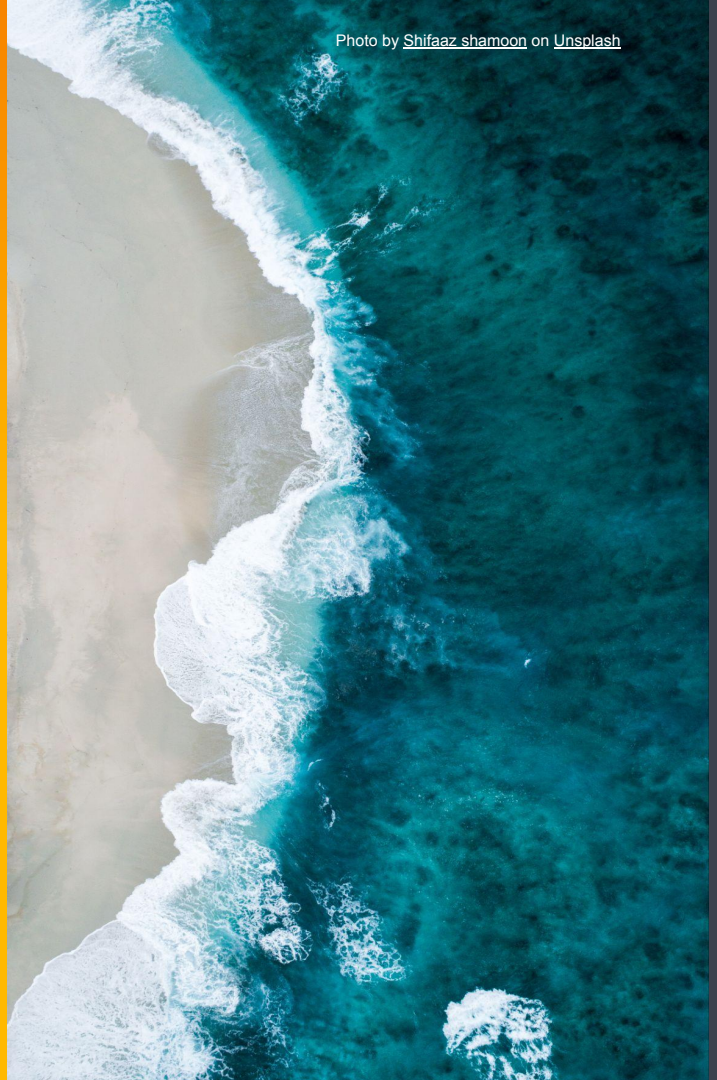
Hibernation
Migration
Food availability
‘Packs’ for survival

Sorting our animals

Using the sorting cards from the *Living Systems* Unit (Grade 1), take out any pictures of nonliving things and have students sort the remaining into groups.

How do the animals in each of your groups move?

Why do each of the different animals move the way they do? Are there some animals that you think are faster or slower than others? Why do you think this is so?



Transfer & Assessment

Transfer

My Trip to the Zoo

Sutterstock.com 2148595493

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

My Trip to the Farm

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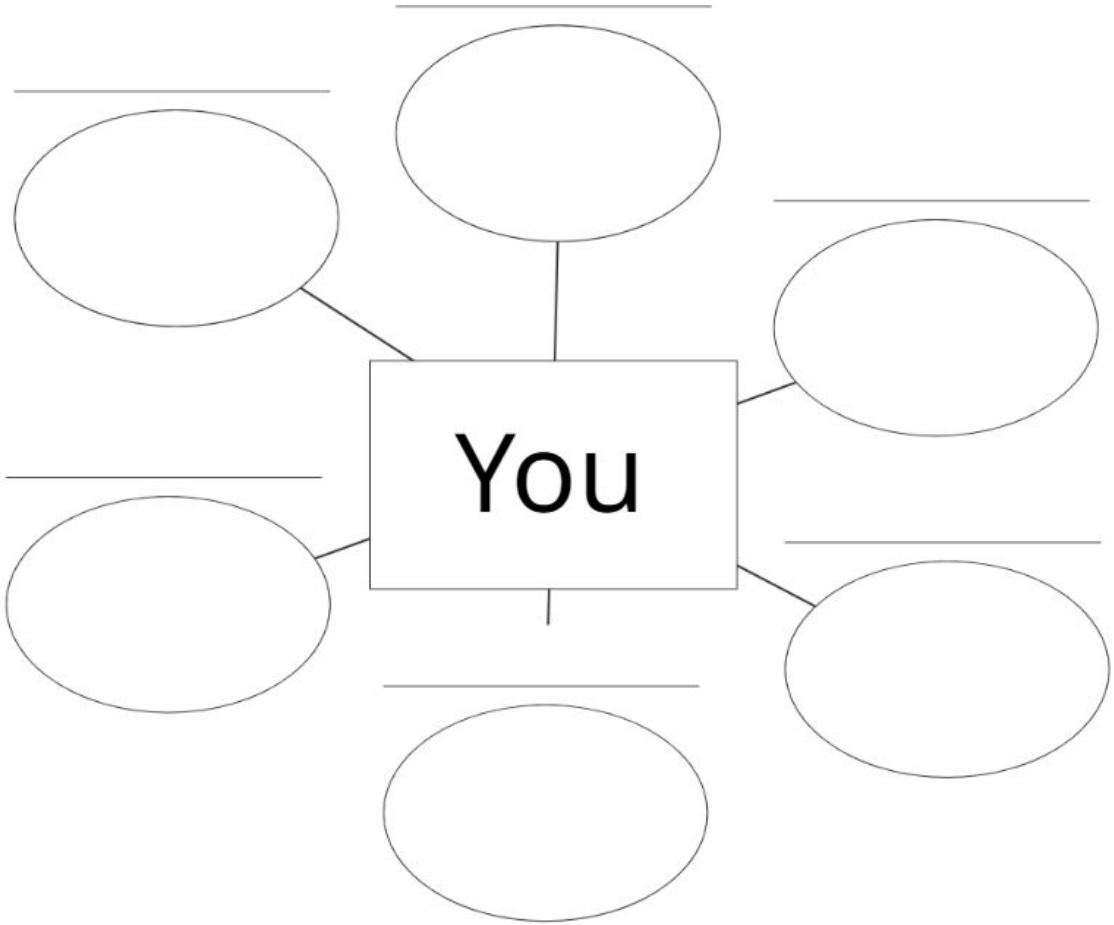
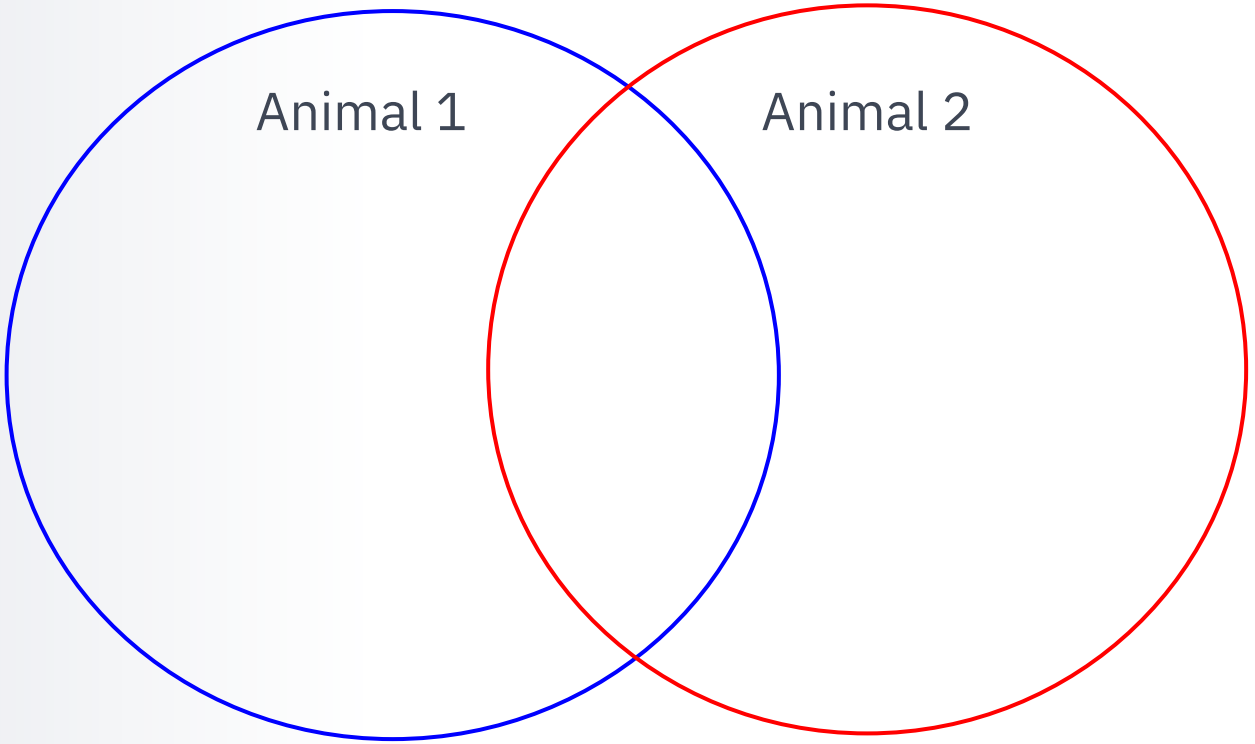
Represent Why I Move



Compare and Contrast how and why two different animals move



Hula Hoops make great Venn Diagrams

Computing Science and Energy in Kindergarten

Video with Angela Dearing

Slide Deck: Kindergarten Computer Science.pdf

Thanks!

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Photo by Lee Jeffs on Unsplash

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