Photo by Aaron Burden on Unsplash

New SCIENCE Curriculum

Earth Systems Grade 3

October 16, 2023

Facilitator: Chris Zarski & Ted Zarowny

Alberta Regional Professional Development Consortia
Adult learning for students' sake

Acknowledgment of Land and People

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 Honorable Harvest - Robin Kimmerer

Photo by Chris Lawton on Unsplash

Agenda

1. Spiraling Curriculum - Concepts
2. Spiraling Curriculum - Skills and Procedures
3. Spiraling Curriculum - Understanding
4. Spiraling Curriculum - Transfer
5. Teaching for Transfer
6. Surface Level Activities
7. Deep Level Activities
8. Transfer and Assessment
9. Resources

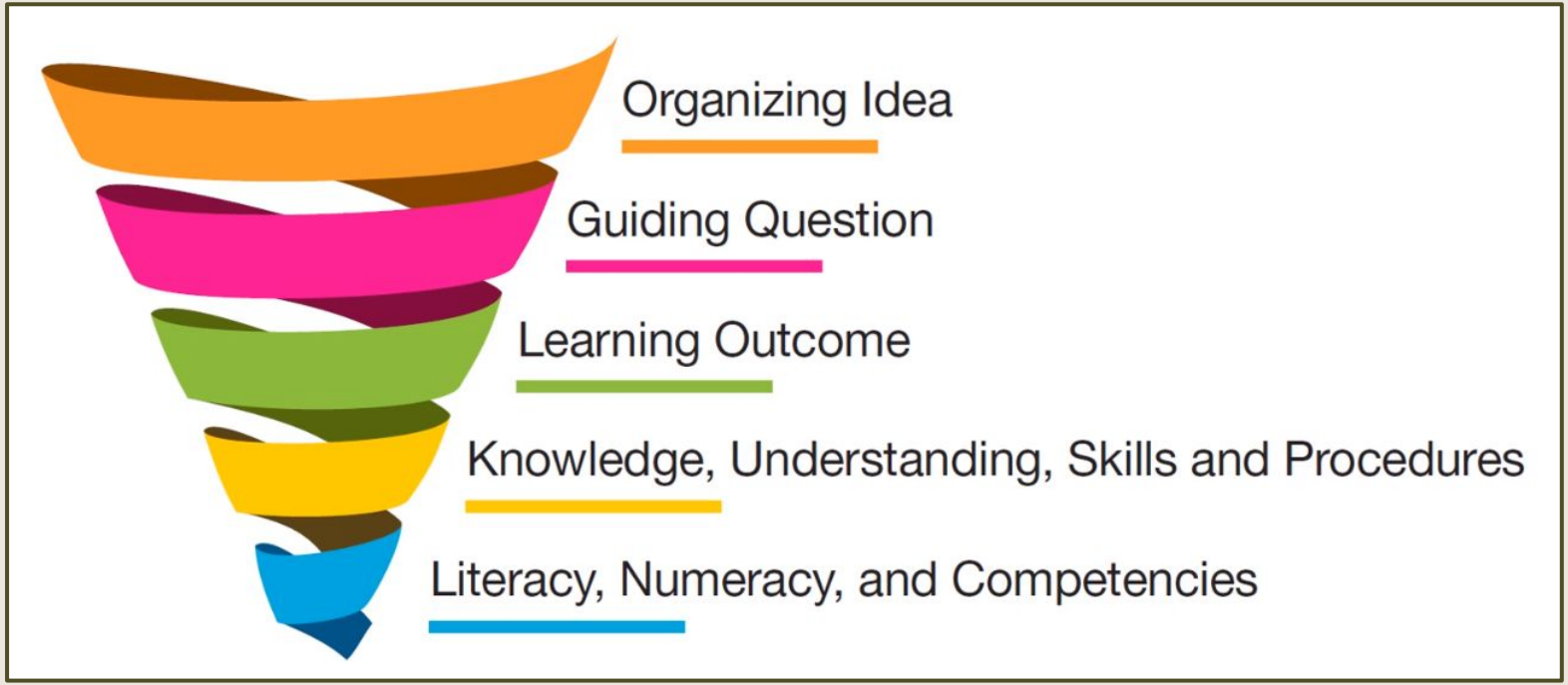
01

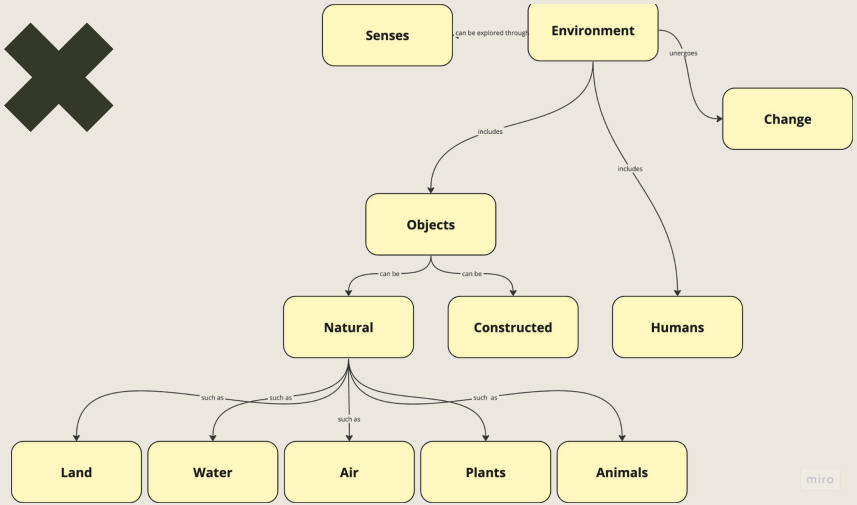
Spiraling Curriculum Concepts

Spiraling Curriculum

Guiding Framework Document

New LearnAlberta



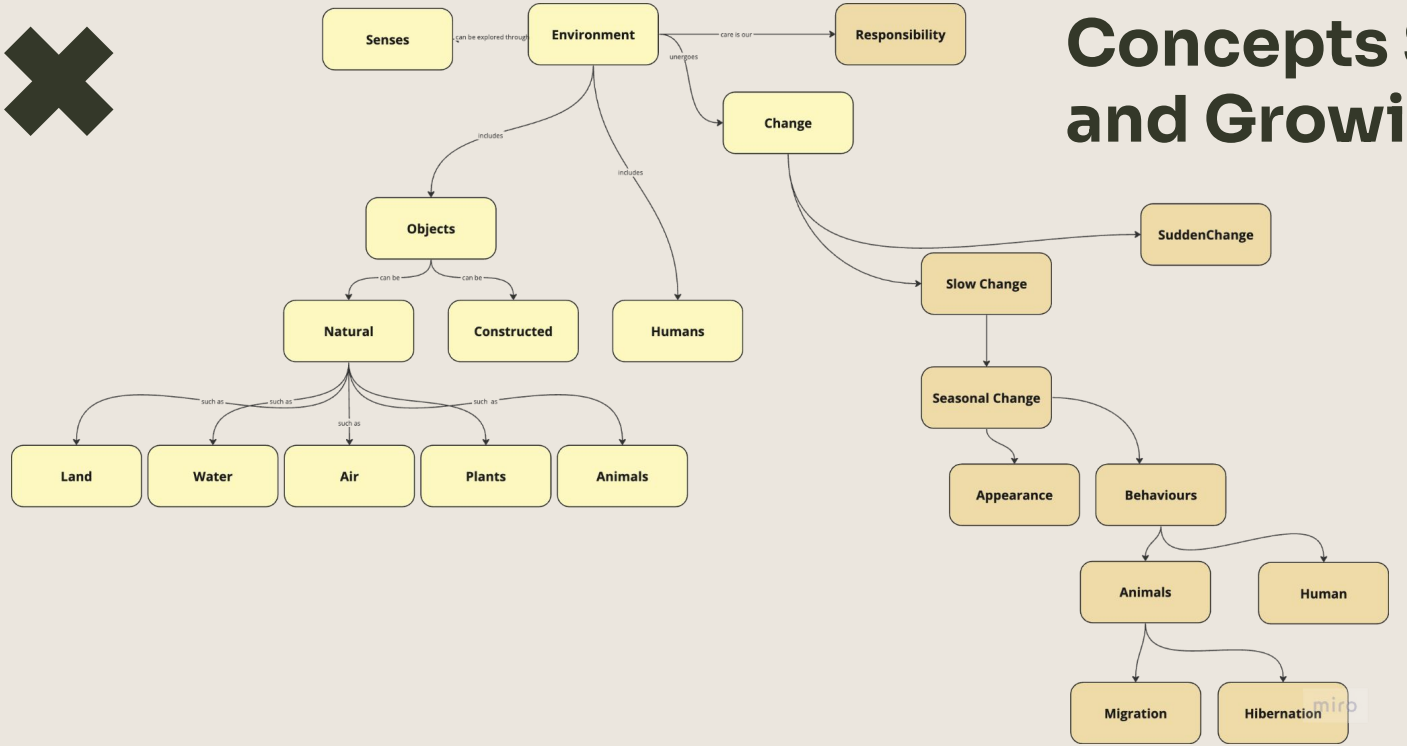


Concepts Sprialing and Growing

Kindergarten

K-3
Earth Systems

Concepts Sprialing and Growing

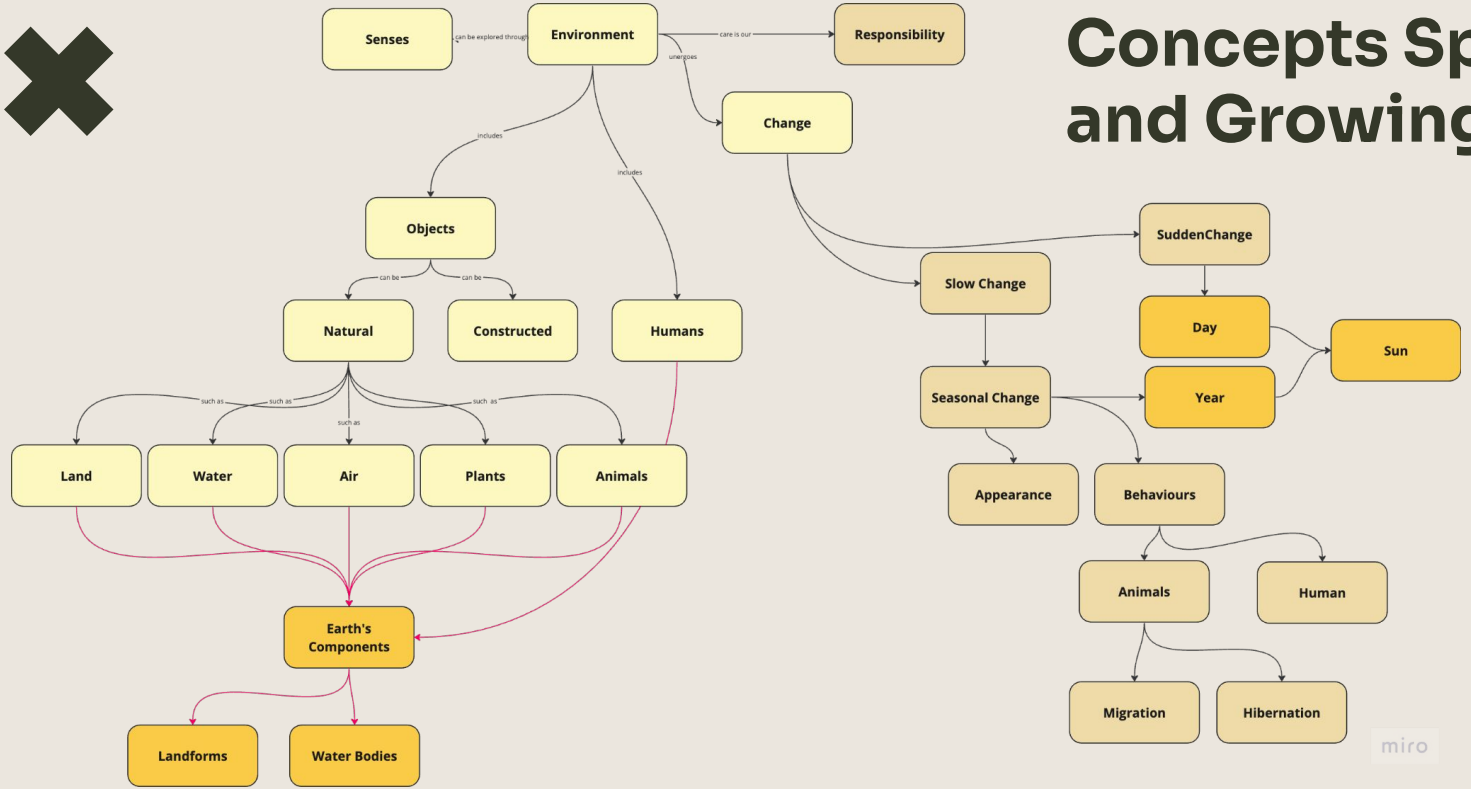


Kindergarten

Grade 1

K-3
Earth Systems

Concepts Sprialing and Growing



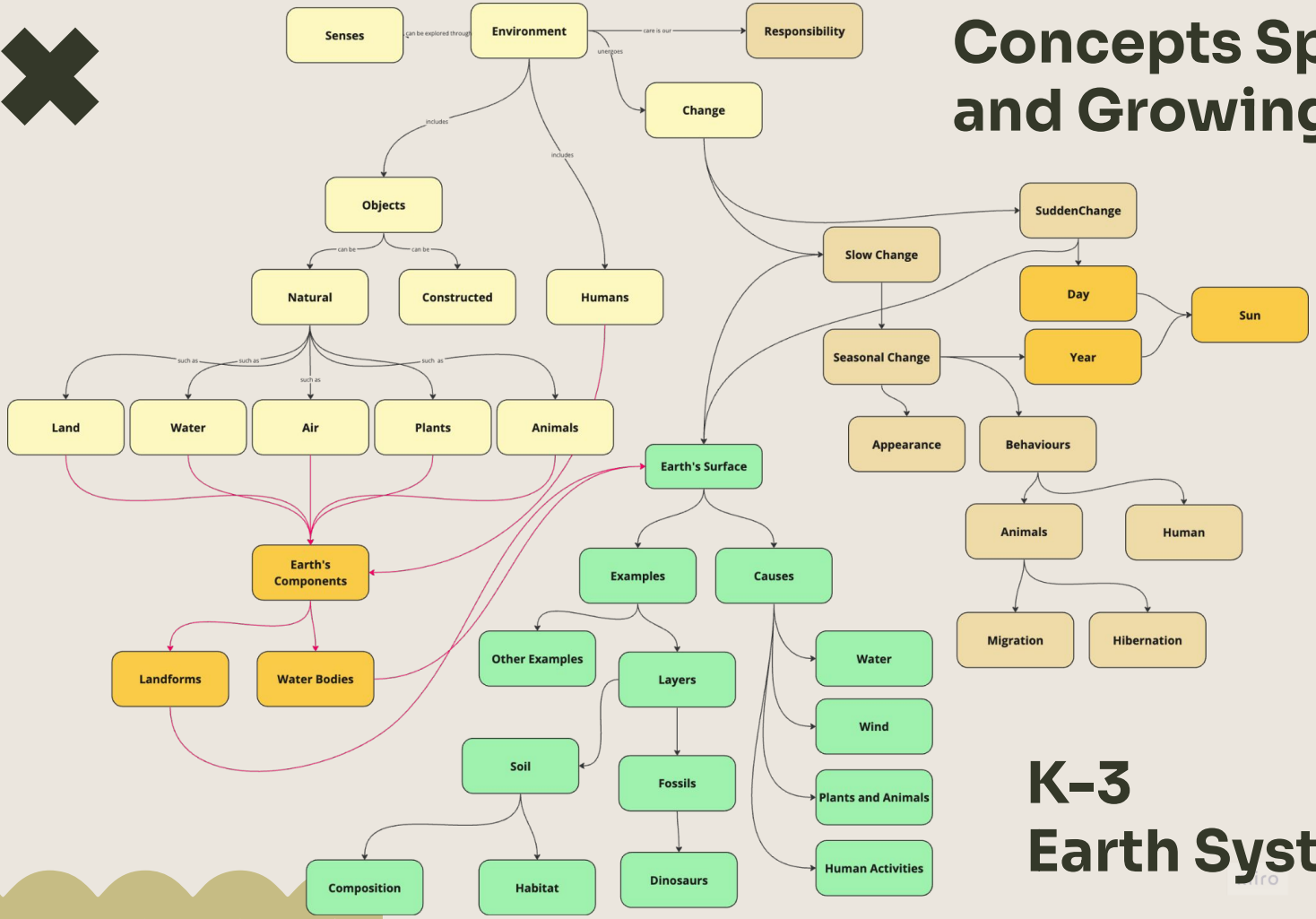
Kindergarten

Grade 1

Grade 2

K-3
Earth Systems

Concepts Sprialing and Growing



Kindergarten

Grade 1

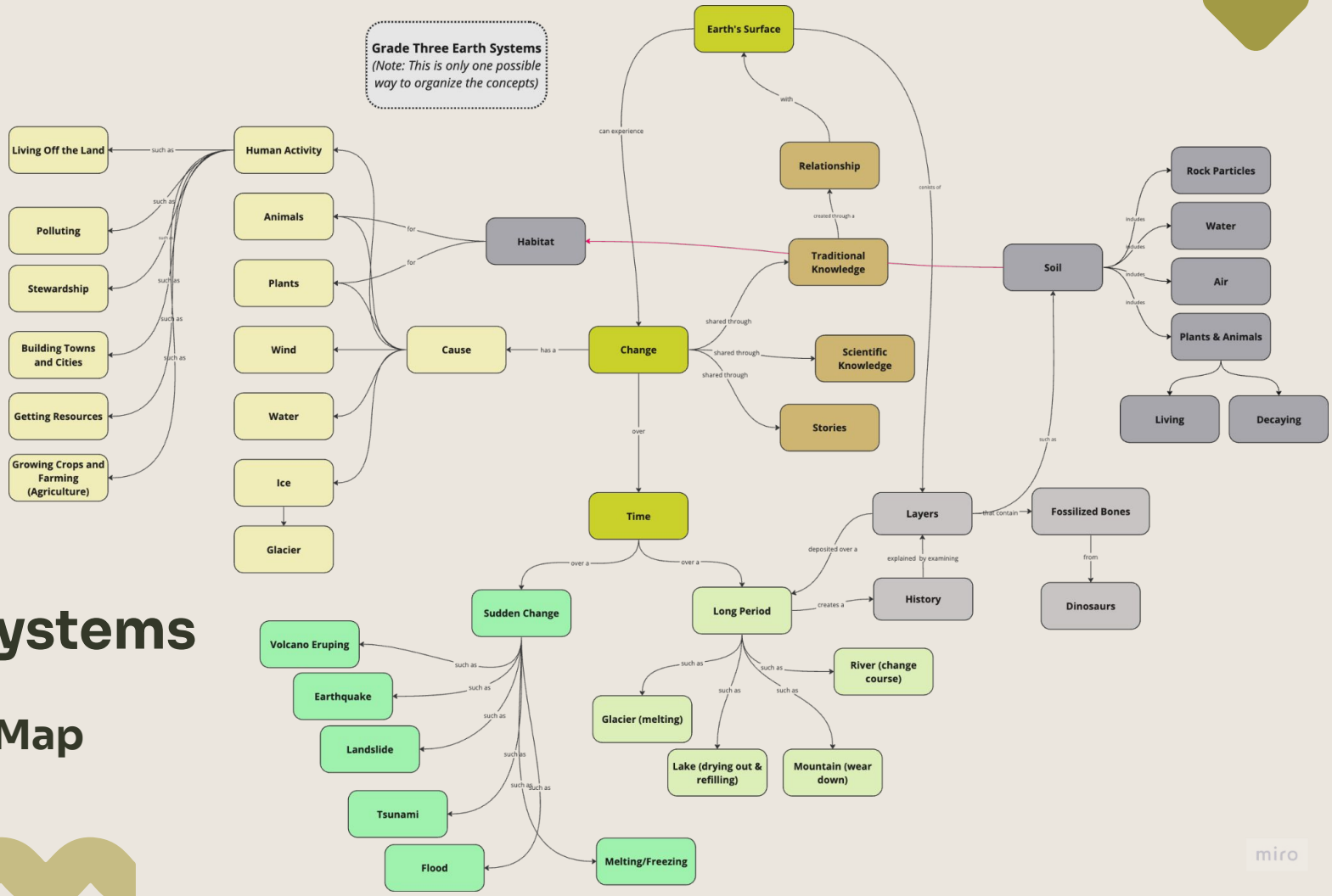
Grade 2

Grade 3

K-3
Earth Systems

Earth Systems

Grade 3
Concept Map



EARTH SYSTEMS

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Guiding Question: *How can environments be explored?*	**Guiding Question:** *In what ways can environments change?*	**Guiding Question:** *How can Earth's components and relationship to the Sun be understood?*	**Guiding Question:** *What visible changes can be identified through examination of Earth's surface?*	**Guiding Question:** *How does Earth sustain life?*	**Guiding Question:** *How can climate and its effects be understood?*	**Guiding Question:** *What factors affect climate?*
Learning Outcome: *Children examine and describe surrounding environments.*	**Learning Outcome:** *Students analyze environments and investigate interactions and changes..*	**Learning Outcome:** *Students investigate Earth & its landforms, & its bodies of water & and its relationship to the Sun.*	**Learning Outcome:** *Students analyze changes in Earth's surface and explain how layers of the landscape hold stories of the past.*	**Learning Outcome:** *Students investigate the systems of Earth and reflect on how interconnections sustain life.*	**Learning Outcome:** *Students analyze climate and connect it to weather conditions and agricultural practices.*	**Learning Outcome:** *Students investigate climate, changes in climate, and the impact of climate change on Earth.*
	KEY CONCEPTS				**KEY CONCEPTS**	
Animal	Change	Axis	Bodies of Water	Care	Weather	Climate Change
Environment	Change: Seasonal	Bodies of Water (wetland, river, lake, glacier, ocean)	Cause	Action	Climate	Interaction
Exploration: Senses	Change: Seasonal: Environment	Components of Earth: land,water, air, plants, human, animals.	Change	Change	Climate Zones	Climate Change Causes
Human	Change: Seasonal: Human Activities	Day	Earth's Surface	Conservation	Patterns	Climate Change: Effects
Objects Natural	Change: Sudden	Earth's Surface	History	Environment	Climate Characteristics	Climate Factors (Location)
Objects: Human-Made	Change: Seasonal: Plants and Animals	Landforms	Human Activities	Interaction	Climate Factors	Personal Actions
Plant	Environment: Responsibility: Care	Life	Intergenerational Knowledge	Interconnection	Weather: Tools: Measuring	Climate Change Observations
Shared Space	Environment	Revolution	Landscape	Life	Weather: Prediction	Extreme Weather
Wonder	Hibernation	Rotation	Landscape Layers	Lithosphere | Hydrosphere | Biosphere | Atmosphere	Climate & Human Activity	Traditional Knowledge
FNMI: Ways of Living Connected to Land	Migration	Saltwater & Freshwater Bodies	Natural Events	Natural Resources	Climate & Animal Activity	FNMI: Impact of climate change on way of living
	Observation: Senses	Water Flow	Plant & Animal Activity	Responsibility	Climate and Agriculture	
	Seasons	Year	Soil	Spheres	Agriculture: Sustainable Practices	
	FNMI: Sense of responsibility and care with nature.		Time	Sunlight	Agriculture: Conservation Practices	
	FNMI: Products made from plants and animals.		Wind | Water | Ice	Systems	Agriculture: Sustainable Harvesting	
			FNMI: Knowledge of Earth's Surface	Water Resources	Intergenerational Observation	
				FNMI: Interconnectedness of Earth Systems	FNMI: Long-term climate observations	
				FNMI: Laws of Nature and Sacredness of Water	FNMI: Observations and weather predictions	
				FNMI: Conservation		

[Link: Concept Progressions (ARPDC)]

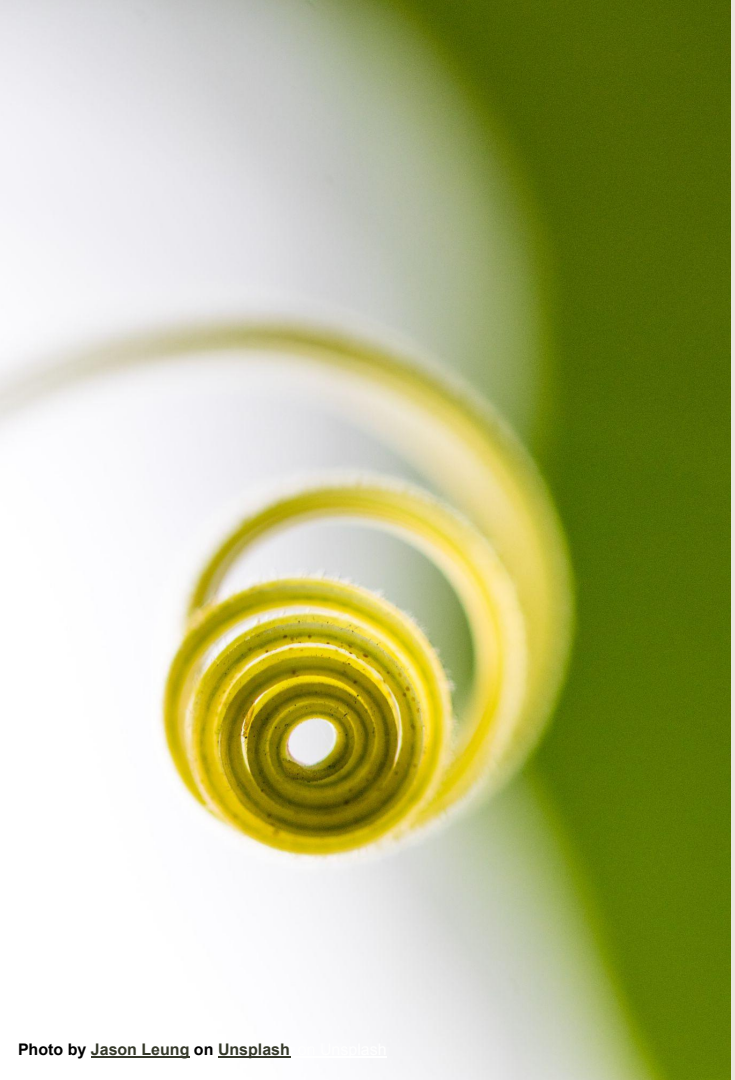


Photo by Jason Leung on Unsplash

02

Spiraling Curriculum

Skills & Procedures

“Skills and procedures **are what students do to demonstrate their knowledge and understanding.** They are specific skills, methods, tools, strategies, and processes that students will develop as they achieve the learning outcome.”

Guiding Framework

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.

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

Skills and Procedures K-3 Progressions

Students **analyze** changes in Earth's surface and **explain** how its layers hold stories of the past.

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				

3ES1.3 Understanding: *Plant, human, and other animal activities can cause changes to Earth's surface.*

3ES1.3 Skills and Procedures

- Relate human activities to changes in Earth's surface.
- Relate activities of plants and animals to changes in Earth's surface.

- **Compare** activities of plants and animals to changes in Earth's surface to activities of humans.

Photo by zero take on Unsplash

03

Spiraling Curriculum Understanding

“Understanding is about putting pieces of knowledge into **logical and meaningful order** with other knowledge.”

Guiding Framework

Knowledge	Understanding
● **Human Activities** ● **Change** ● **Earth's Surface**	 How can these three concepts can be put into a **logical and meaningful order?** ● **Change** of the **Earth's Surface** can cause **changes** to **human activities.** **OR** ● **Human activities** can cause **changes** to **Earth's surface**

Image Credit: **Question** by Francisco Garcia Gallegos from Noun Project (CC BY 3.0)

Knowledge	Understanding 3ES1.3
Human activities that can change Earth's surface include ● living on the land ● building towns and cities getting and using resources growing crops and farming (agriculture) ● polluting ● stewardship	Plant, **human,** and other animal **activities** can cause **changes** to **Earth's surface.**

Photo by Rohan Makhecha on Unsplash

04

Transfer

Concepts Transfer (Different Contexts)

Knowledge
Change Human Activity

Concepts Transfer (Different Contexts)

Understanding
Plant, human, and other animal activities can cause changes to Earth's surface.

Photo by Rohit Tandon on Unsplash

Concepts Transfer (Different Contexts)

Understanding
Plant, human, and other animal activities can cause changes to Earth's surface.

Photo by Silver Ringvee on Unsplash

Photo by Maryna Yanul on Unsplash

Photo by Erik Gazi on Unsplash

05

Teaching for Transfer

Phases of Learning

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

Surface

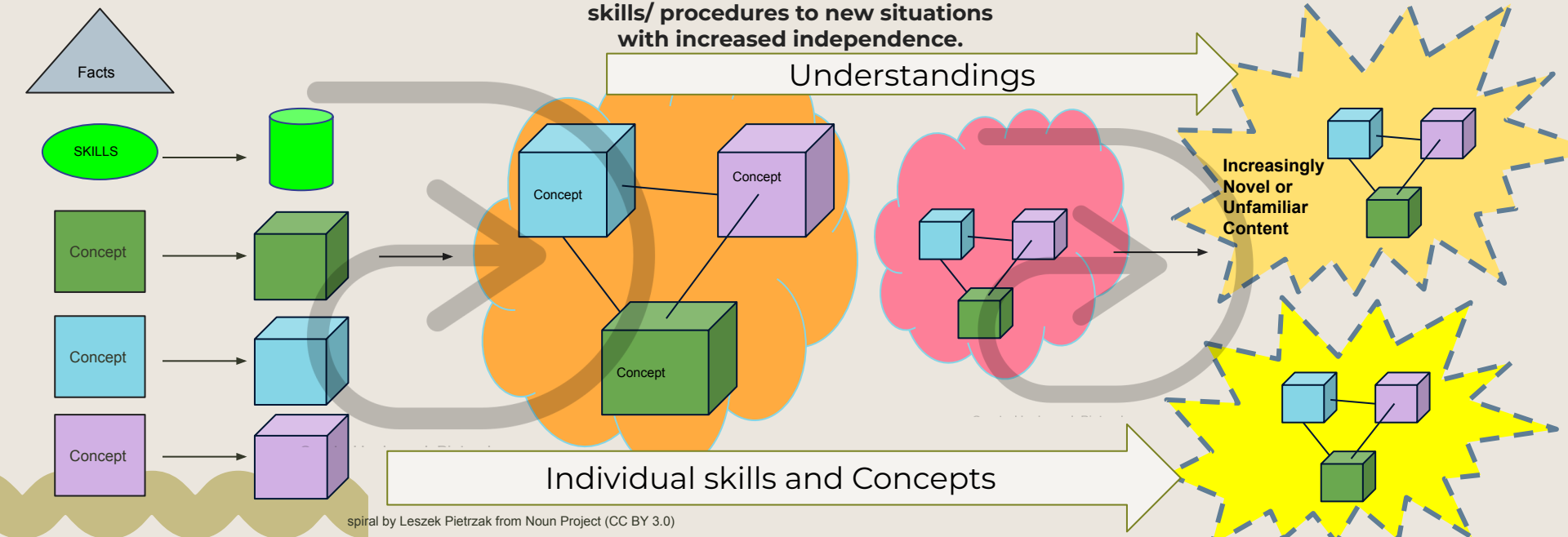
Students are first exposed to individual skills, concepts and their related knowledge.

Deep

Students make connections between concepts to create deeper understanding and appropriately 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)

Planning

Begin With the End In Mind

Stephen R. Covey, 1989

Backward by Design

Grant Wiggins & Jay McTighe, 1998

Learning Outcome
Students analyze changes in Earth’s surface and explain how its layers hold stories of the past.
Understandings
3ES1.1a Earth’s surface changes over time.
3ES1.1b Relationships with land provide intergenerational knowledge of Earth’s surface for many First Nations, Métis, and Inuit.
3ES1.2 Water and wind can shape Earth’s surface.
3ES1.3 Plant, human, and other animal activities can cause changes to Earth’s surface.
3ES1.4 The history of Earth’s surface can be explained by examining its layers.
3ES1.5 Soil is a continually changing upper layer of Earth’s surface.

Learning Outcome

3ES1: Plant, **human**, and other animal **activities can cause changes to Earth's surface.**

What will students do to demonstrate their learning?

Sample Assessment:
Investigate how human activities cause changes to the Earth's surface.

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?

?

Learning Outcome

3ES1: Students analyze changes in Earth's surface and explain how its layers hold stories of the past.

What will students do to demonstrate their learning?

Sample Assessment:
Investigate how human activities cause changes to the Earth's surface.

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

Earth's Surface (Land, Water, Air, Plants & Animals) | Human Activities | Change | Slow Change | Sudden Change | Positive/Negative | Criteria

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

Investigate | Research Skills including how to search for images and download images

Understanding	Formative Assessment
2ES1.1: Earth consists of many components that support life.	**EXAMPLE Formative Assessment:** **SKILLS & PROCEDURE : Discuss how the various components of Earth interact to support life.** **What will students need to be able to do in order to be successful?**

	Understanding	Formative Assessment
Components of Earth include • land • water • air • plants, humans, and other animals	1ES1.3: Seasonal or sudden changes can affect the behaviour of animals.	**EXAMPLE Formative Assessment:** **SKILLS & PROCEDURE** **Discuss how the various components of Earth interact to support life.**

Interaction

Discussion

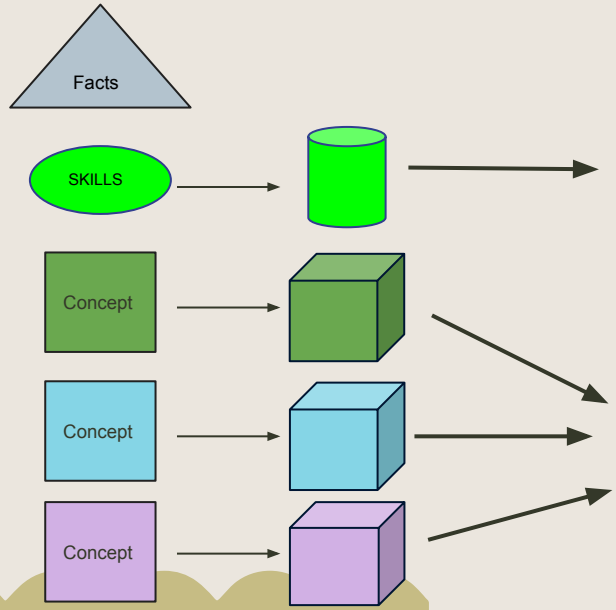
What will students need to be able to do in order to be successful?

Phases of Learning

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

Surface

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



Skills such as Investigating; Researching; Comparing; Concept Mapping

Pre Assessment for Prior Learning

Concepts such as landform (and the various types) and water bodies (and the various types).

Prior Learning

What *concepts* from previous grades are important?

Environments

To the Teacher: Ask if anyone has heard the word...what do they think it means. You could start a list of words (explanations) on chart paper or the board that could be used to create a definition of what it means and what it includes.

The following 3 slides, focus on what they see and not on differentiating between natural and man-made. After discussing their notices and wonders, ask again what they think am environment is.

What is an environment?

How would you describe it in your own words?

Man-Made or **Natural**?

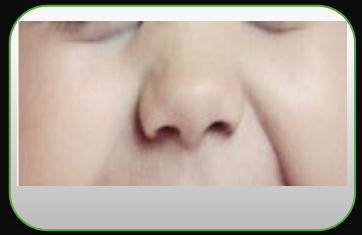
What do these mean?

Coman, Mirela & Cioruța, Bogdan-Vasile. (2019). 2019 (57) - From Human-Environment Interaction to Environmental Informatics (III): the Social-Ecological Systems dynamics in Knowledge-based Society.

Exploring Environments

How do we ‘explore’ our environments?

Teacher note: this is an opportunity to review work done/initiate work on senses and how they can assist us in learning about and experiencing our environments.



Review of Senses

Can you name our 5 senses?

Let's Do A *Card Sort*!

With your partner, place the card on the sense you would use to identify it.

source: www.kindergartenkindergarten.com

Seasons in Earth - video for kids

Sesame Street: Learn About the Four Seasons | Elmo's World (includes what clothes to wear in each season)

What is a Season?
What are the names of the seasons?

The Earth System

https://epod.usra.edu/blog/2001/01/the-earth-system.html

Landforms of Alberta

Plateaus
Head Smashed In Buffalo Jump

UNESCO

Hills
Cypress Hills

Mountains
Mount Edith Cavell

Prairies
Drumheller Prairies

Valleys
Dinosaur Provincial Park

UNESCO

Landforms on Earth have varying characteristics.

Slopes

Zhang Yu @ Dreamtime

Size

Terrain

Peyto Lake @Pixabay20

Landforms - What are they?

Write down the terms in the picture. Listen for what they are in the presentation.

Water, Water Everywhere!

Earth's surface is covered mostly by bodies of water.

Do you have any water near where you live or go to school? What type of water is it?

Water

Water on Earth's Surface

- oceans
- glaciers
- lakes
- wetlands
- rivers

Water in Alberta

- glaciers
- lakes
- wetlands
- rivers

What are the characteristics of the different ‘waters’ in Alberta?

Glaciers

Glaciers are huge, thick masses of ice. They form when lots of snow falls in one location for many years. Over time–decades or centuries–the snow on the bottom gets squished down by the weight of falling new snow. This compressed snow becomes ice, forming a glacier.
Can a glacier move? Explain.
National Parks Service

Lakes

Source: Lily Uits Learning - How are lakes formed?

Rivers

Important characteristics of a river.
Source: Study ‘n’ Learn

Wetlands

Wetlands are areas where the land does not drain well. The ground in a wetland is saturated, or full of water. Often the ground is covered with shallow water. Wetlands are usually classified as swamps, marshes, or bogs.
Source: Britannica for Kids

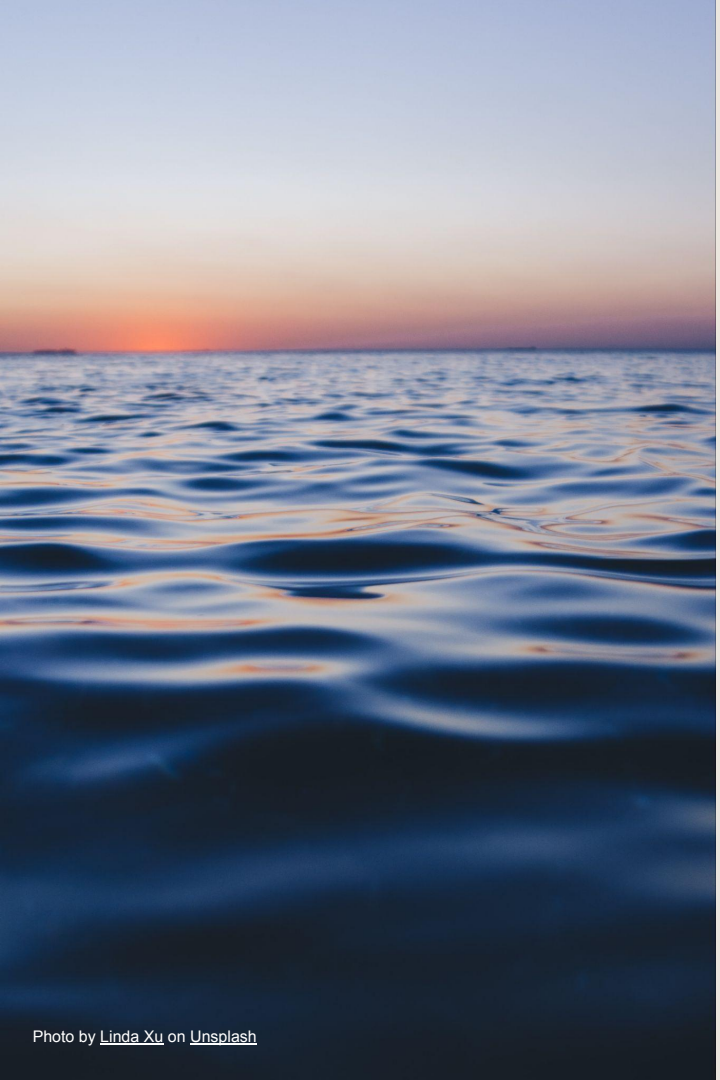


Photo by Linda Xu on Unsplash

06

Surface Level Activities – How is Change Occuring?

Surface Level Instructional Approaches

INTENT: Introduce and begin developing Individual Concepts (Knowledge) and Skills and Procedures

- Concept Attainment Strategy
- Frayer Model
- SEEI (State - Explain - Exemplify - Illustrate)
- Card Sorts/Classify
- Students Making/Finding examples & non-examples.
- Show a photo. Ask students how the concept you are studying is evident in the photo (eg. symmetry, empathy, authority, conflict, etc.)
- Diamond Ranking.
- Making Analogies("diversity" is like …, "motivation" is like …," our senses are like …")
- Case Studies

Sample Activities (Surface)

While planning surface activities, consider these ideas.

- Change (Introduction)
  - Change and Time
  - Criteria
  - Significant Change
  - Positive/Negative Statements
- Human Activity
- Investigation (From Grade 2 Scientific Methods)
  - Asking Questions (Notice and Wonder)
  - Observing (Using senses)
  - Analyzing
  - Prediction and Predicting
  - Conclusion
  - Sample Introduction to Research as an Investigation
- Relationship
  - Concept Map
  - Cause and Effect
  - Dependence
  - Affect/Effect
  - Interaction
- Representation
- Change on the Earth's Surface

Forces of Nature/ Change Over time

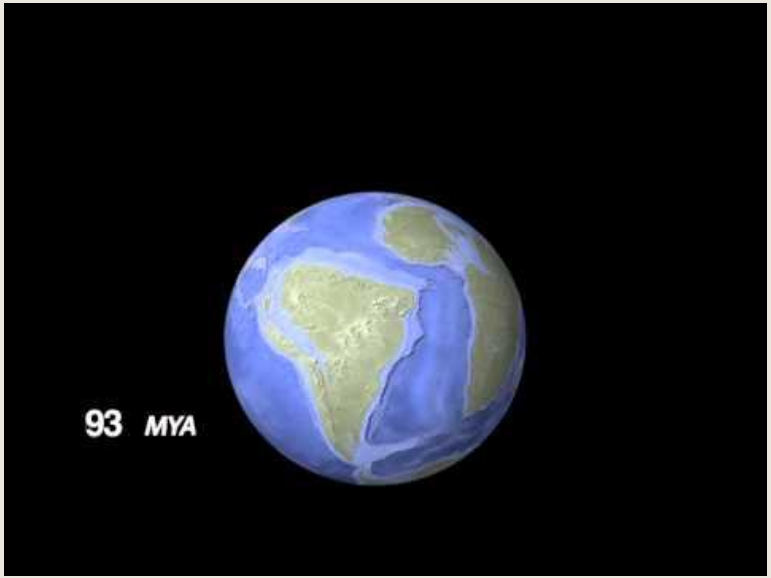
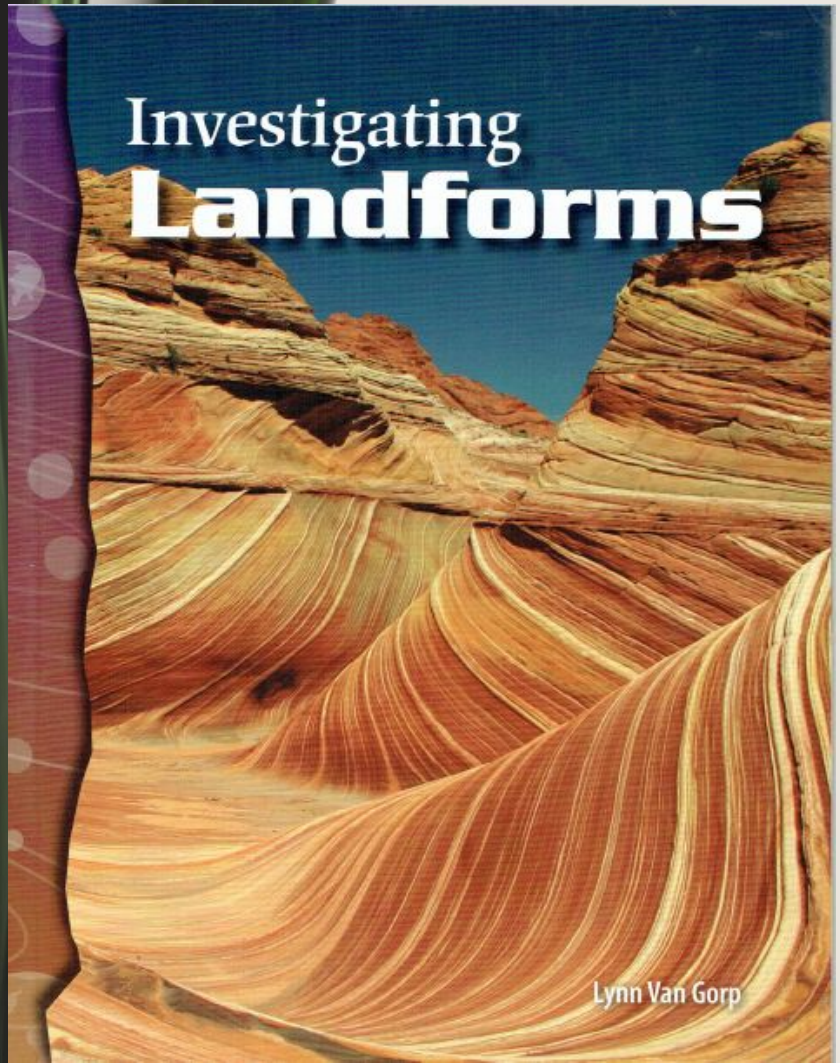


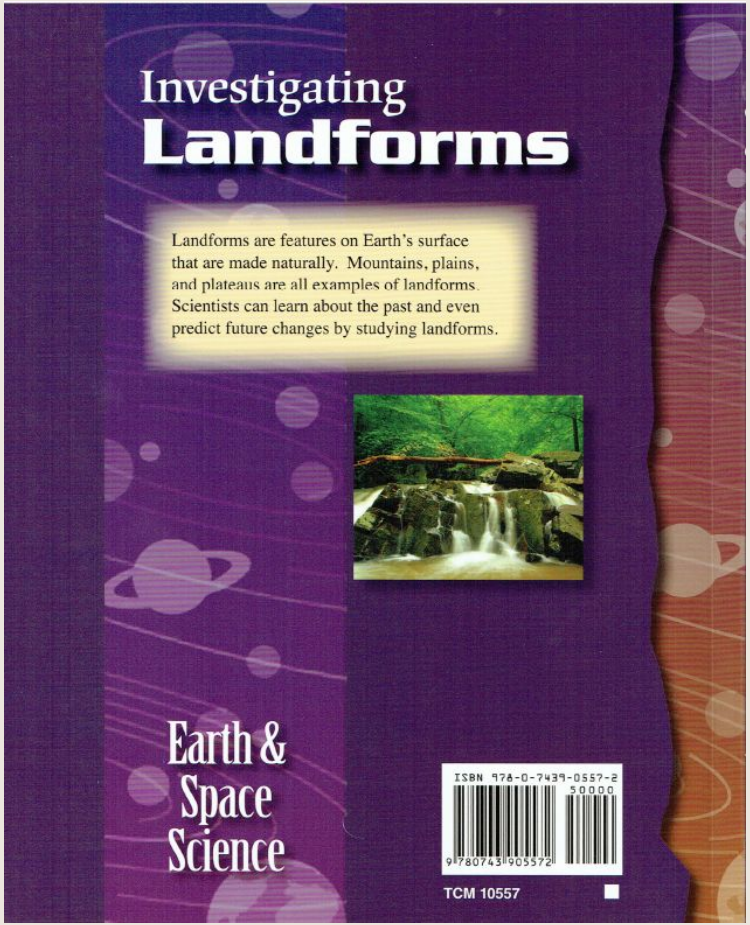
Plate Movement over the last 200 Million Years Ago to Today

How do you think it will look in the next 200 Million Years? Why can’t we feel the movement?

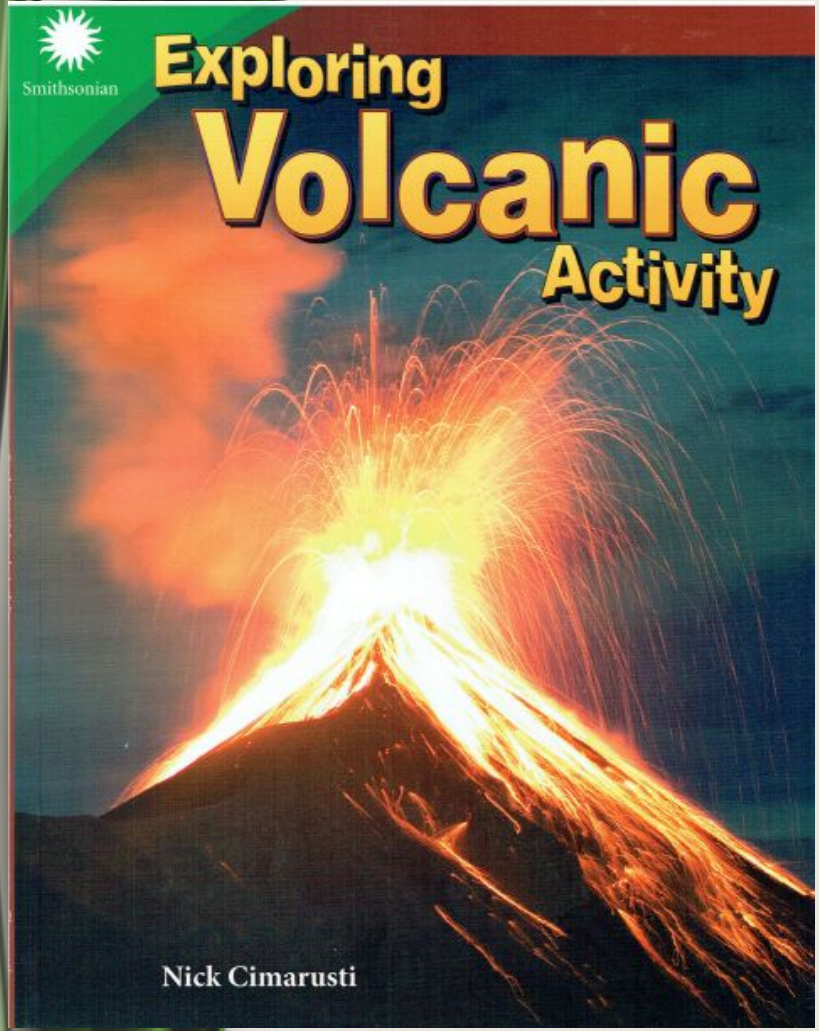
How does human activity change the face of the earth?

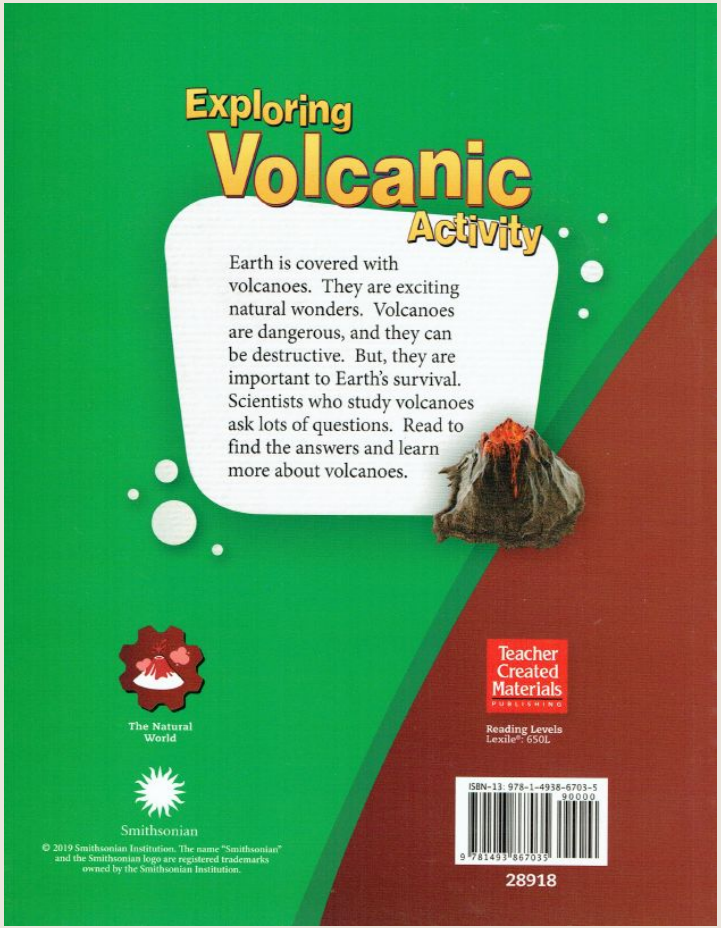
This extensive documentary goes into a brief description of plate technics which were part of the reasons for the formations of the Rocky Mountains and the Volcanoes of British Columbia. It shows how water has affected the landscape over time, how First People's connected to the areas, now with mountain peaks and snow.





Investigating Landforms by Lynn Van Gorp, Teacher Created Materials (2007)





Exploring Volcanic Activity by Nick Cimarusti, Teacher Created Material - Shell Educational Publishing - Available from Pearson

Forces of Nature - Change in Alberta

How did this Natural Event change the Earth's Surface? Research the scientific knowledge and the stories and traditions told by First nations People about Turtle Mountain.

First Nations People passed down stories over time that stated they would never sleep at the base of Turtle Mountain. they called it the "Mountain that moved". The people of the town of Frank had not heard the story.


Global NEWS
Describe Nature's Power that changed the river bed in and around Calgary.
Calgary flood
5 years later
CALGARY FLOOD 5 YEARS LATER
Nature's power and the long-lasting impacts on southern Alberta rivers
By Heide Pearson Global News Published June 19, 2018

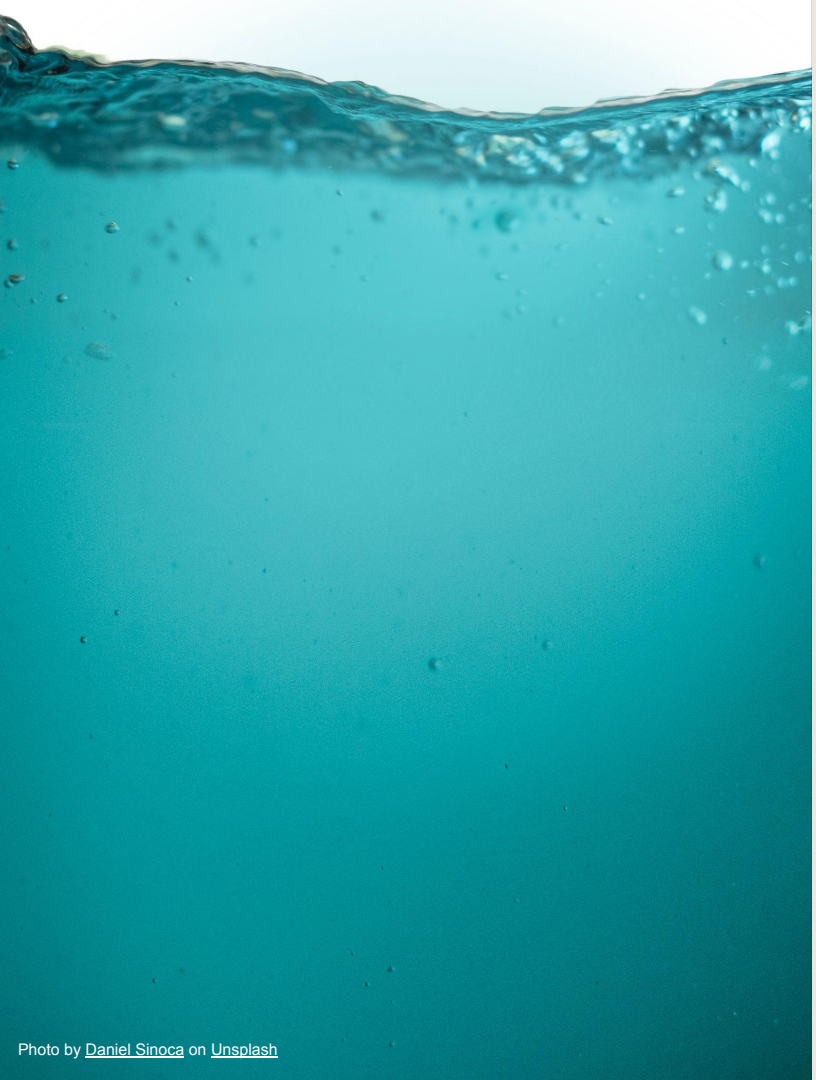
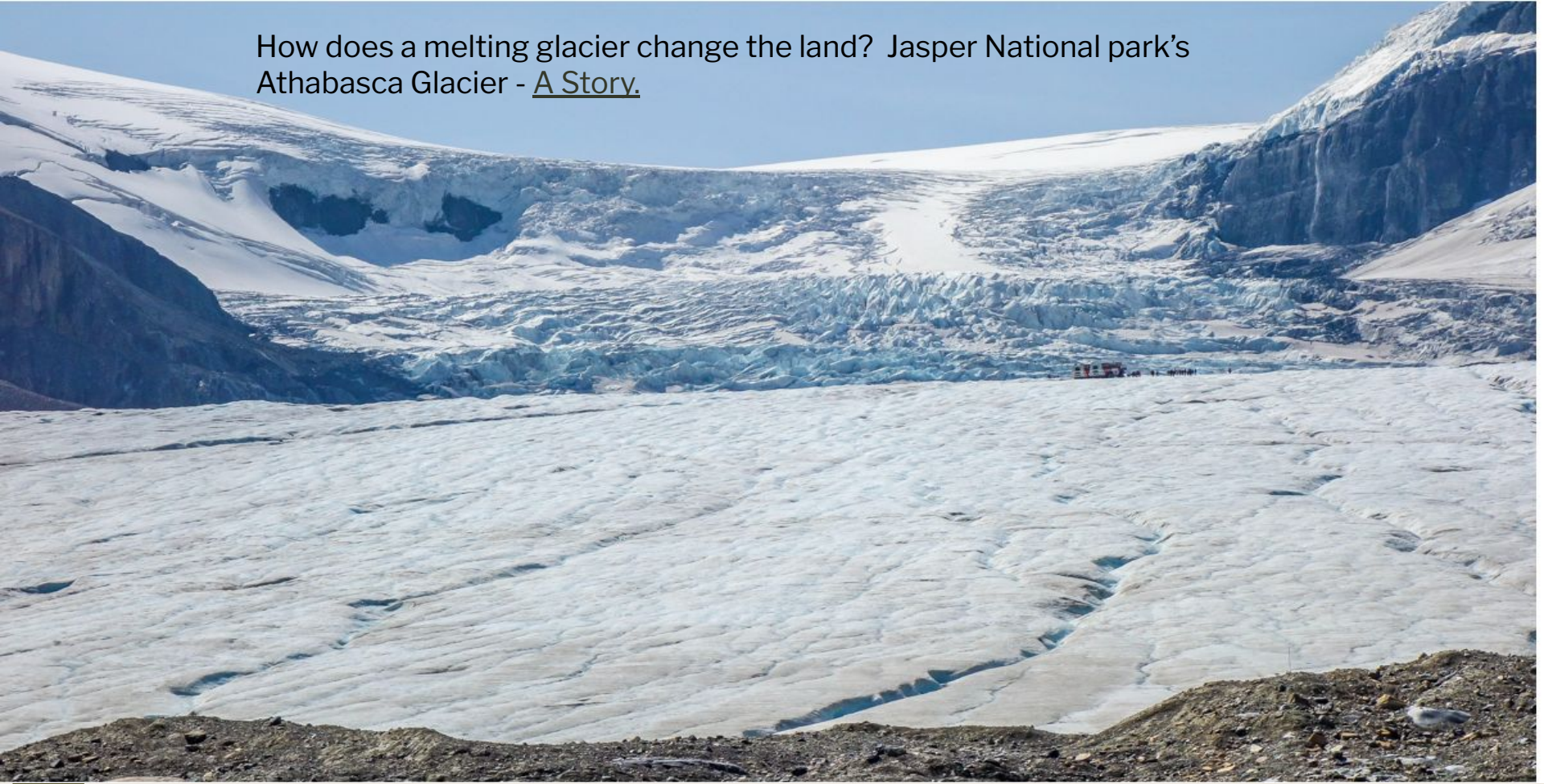


Photo by Daniel Sinoca on Unsplash

07

Deep Level Activities

How does a melting glacier change the land? Jasper National park's Athabasca Glacier - A Story.



The Athabasca Glacier On-Top.ca
http://www.on-top.ca/Outings/2021/Toe-of-the-Athabasca-Glacier-August-2021.html

Water Cuts Through Rock

Summer

Winter

Water changing forms can change the landscape overtime. Explain.

Discuss how human, plant and animal activities can cause changes to land on Earth.

ID 114533895 © Valio84sl | Dreamstime.com

landfill ID 190396454 © Rodrigo Oscar | Dreamstime.com

Pine Beetle

ID 56468756 © Stephan Pietzko | Dreamstime.com

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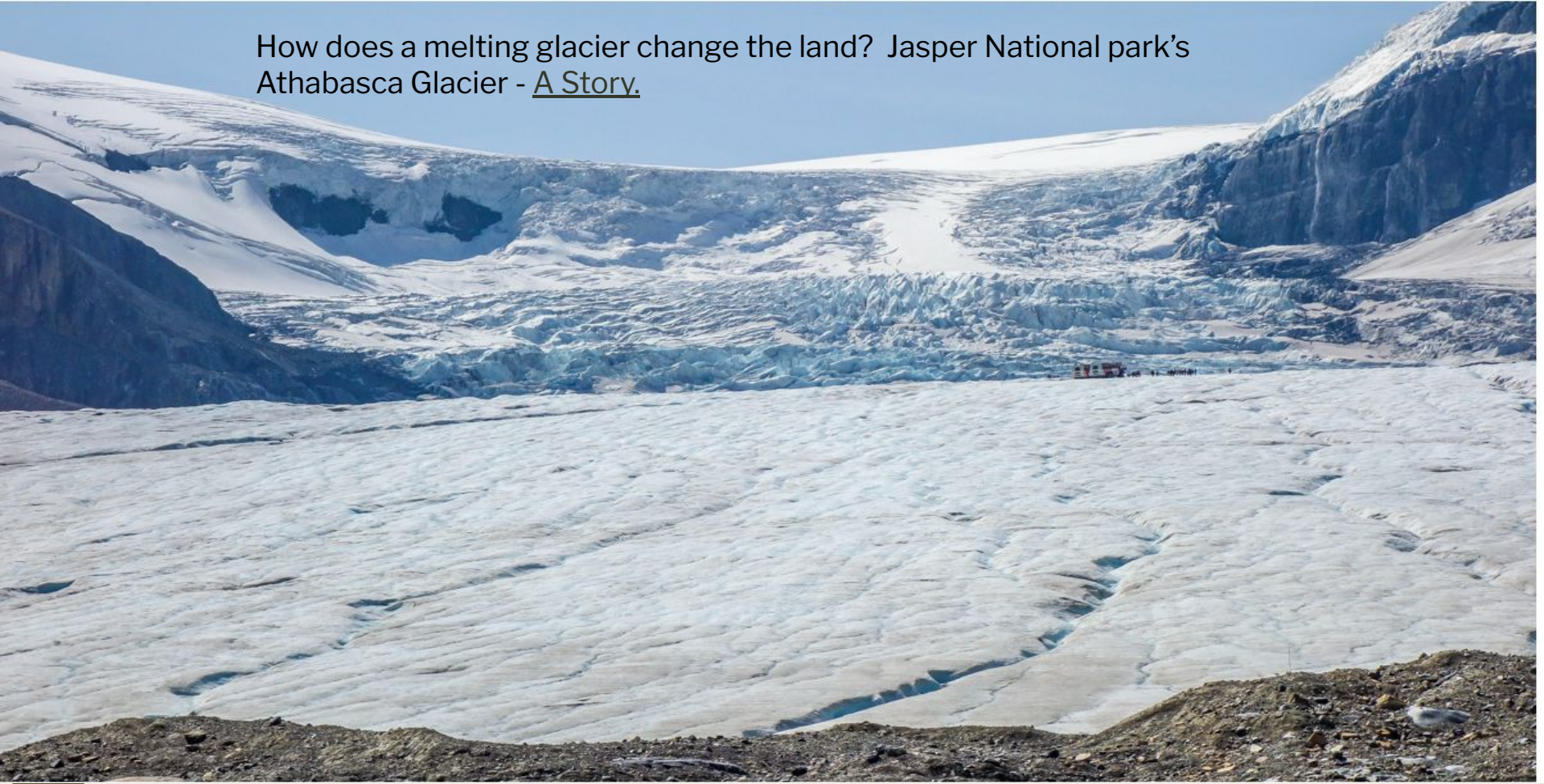

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landfill ID 190396454 © Rodrigo Oscar | Dreamstime.com

Pine Beetle

ID 56468756 © Stephan Pietzko | Dreamstime.com

Time & Change: 37 Seconds

	0:38 - 044	0:45 - 0.51	0:52 - 1:02	1:03- 1:10	1:19 - 1:26	1:40 - 1:50
Describe the change you observed.						
Is the change sudden or slow?						
Is the change a natural event or made by human activity?						

What is the connection (relationship) between change Earth's surface and time?

What is the connection (relationship) natural events, the Earth's Surface, and Change?

What is the connection (relationship) human activity, the Earth's Surface, and Change?

Old versus New!

Our Friends of the Past - **Dinosaurs**

Excavating

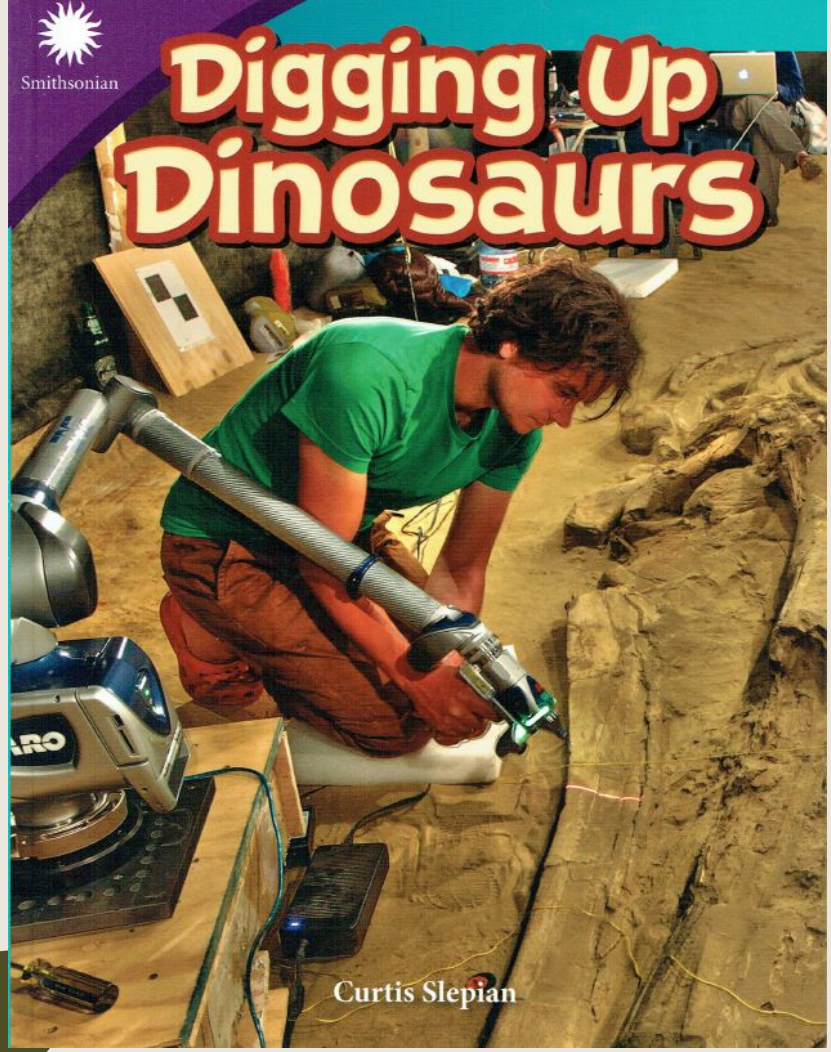
Fossils

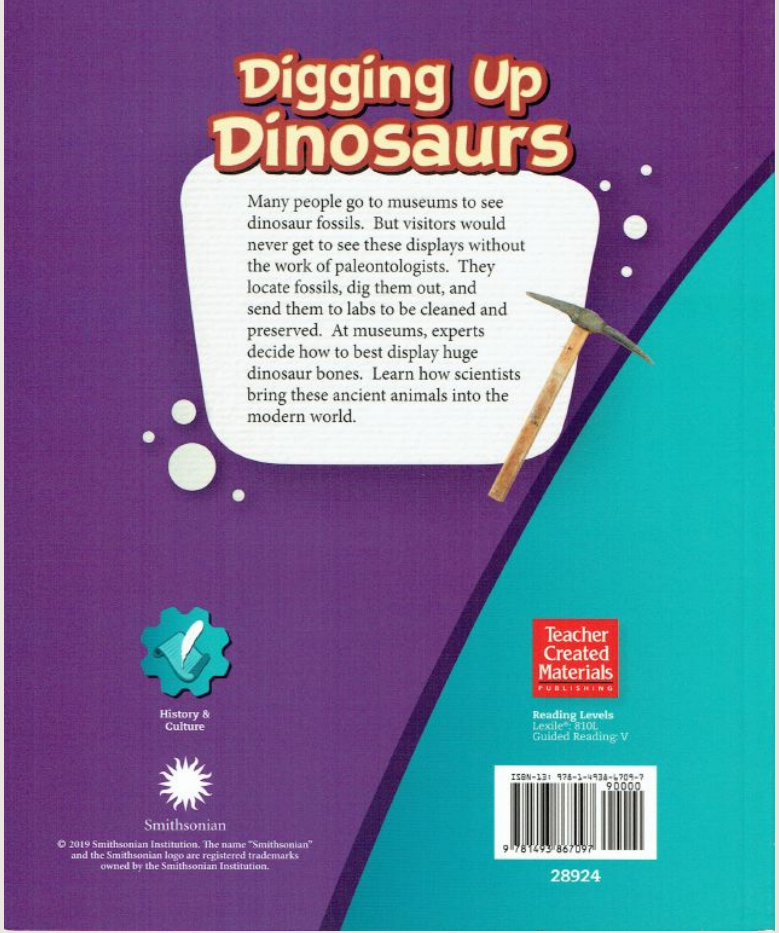
albertosaurus
edmontosaurus
nodosaur
tyrannosaur

Dino Cache: Grande Cache's World Class **Trackway**.
People and Peaks Production

Grande Prairie

Dinosaur Provincial Park





Digging Up Dinosaurs by Curtis Slepian, Teacher Created Materials - Smithsonian Institute (2019) - Available through Pearson.

Soil – Life Giving

Soils Matter, Get the Scoop!

Worms Are Wonderful | Amazing Animals | Backyard Science | SciShow Kids

Source:

Title:

Weathering and Soil

Description:

notes on different types of weathering and soil horizons – PowerPoint PPT presentation

Number of Views:

236

Slides:

36

Provided by:

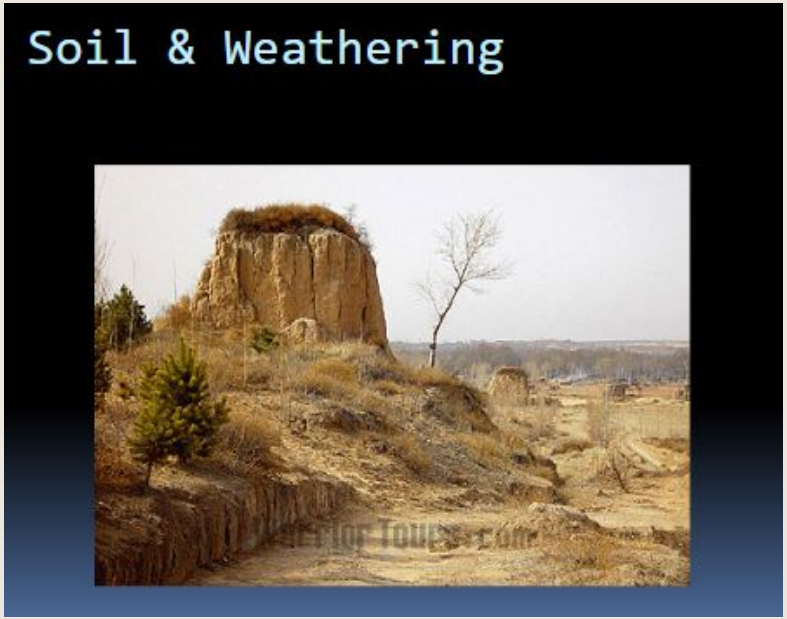
taralynn36

Category:

Medicine, Science & Technology

Tags:

erosion | soil | soil_horizon | weathering



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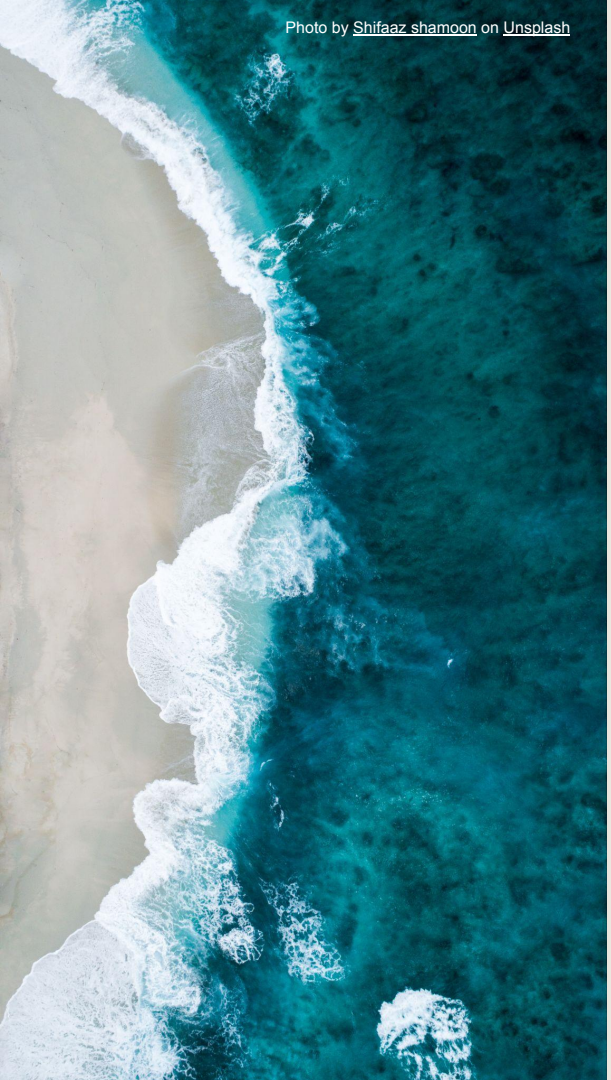


08

Transfer & Assessment

Transfer

Create a model or Investigate a site and describe the relationship between the resulting landform and the impacts of wind, water or ice over time.

Students analyze changes in Earth's surface and explain how layers of the landscape hold stories of the past.

Research:

- A Dinosaur
- Land formation
- Natural Disaster

Students could select one of the locations in teh following sides.

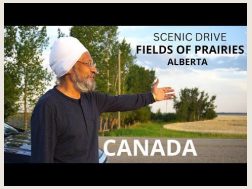
Compare and Contrast two Landforms

Head Smashed in Buffalo Jump

Dinosaur Provincial Park

Mount Edith Cavell

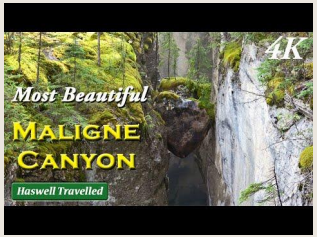
Prairies of Drumheller



Cypress Hills

Wood Buffalo National Park

Maligne Canyon



Banff National Park

Jasper National Park-Maligne Lake

Waterton-Glacier International Peace Park

Writing-on-Stone

Drumheller Badlands

Computer Science
Angela Dearing

- What exactly IS Computer Science?
- What does successful integration of Computational Thinking across the grades look like?
- How can we teach it and support each other integrating computational thinking into instructional practices effectively when we've never taken a computer science course ourselves?

Kindergarten CS Connections to Earth Systems

Grade 3 CS Connections to Earth Systems

Resources

Link

Water

Link

OLogy: American Museum of Natural History

STEM Engagement

Sacred Relationships - Importance of Water and Wetlands

Resources

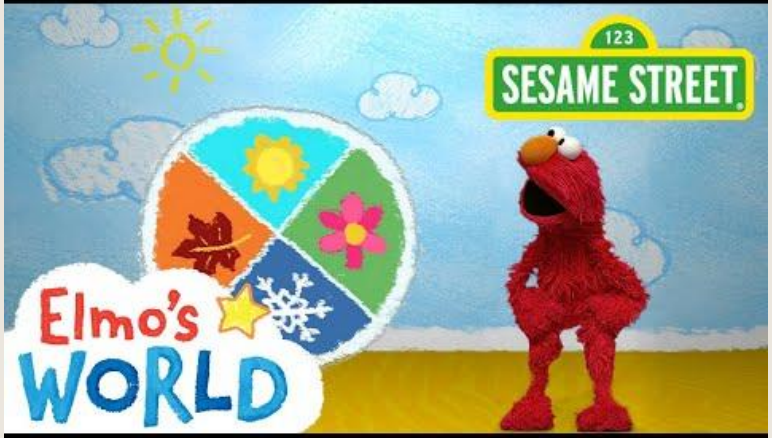
Resources to Consider

- Alberta Regional Professional Development Consortia
- Sparkle Box
- Mystery Science
- Let's Talk Science
- Edmonton Catholic Schools Curriculum Crates
- Sample "concept introduction" activities (ARPDC)
- Concept Maps (ARPDC)
- ARPDC Site
- Common Sense Education
- Edmonton Public Scope and Sequence
- New LearnAlberta

Resources

Previous Grades Resources that may be of interest

Seasons in Ea



Sesame Street: Learn About the Four Seasons |

Using Time Lapse Photography - Can You name the seasons? How will you know?

Winter, Spring, Summer, Fall - Seasonal Transition Timelapse

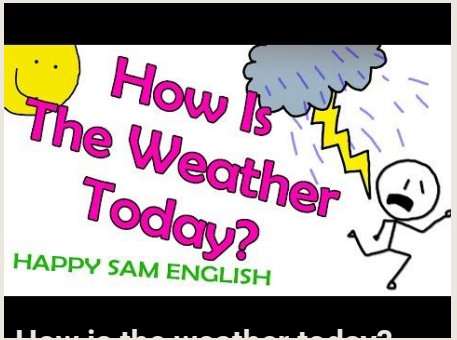
The Season's - Filmed everyday for 1 year

Tree in 4 Seasons | spring, summer, autumn, winter

One year in 40 seconds
Can you name the season as it appears?

How do environments change? [weather, daytime, night time]

https://www.youtube.com/watch?v=_EuNb2k2fKs



Extreme Weather: Interconnections in Extreme Weather (National Geographic)

Posted and Upcoming Sessions (ARPDC)

Have been Completed Before the End of June

- Introductory Videos
- Living Systems - May 1 (Grade 1) +
- Matter - June 8 (Kindergarten) +

Coming in the Next School Year
Fall (6-8 weeks apart)

- Earth Systems (Oct 10 - 19)
- Energy (November 20 - 29)
- Space (Feb 5, 6, 12)

Check the CARC or ERLC website for registrations

Thanks!

Do you have any questions?

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Photo by Gaelle Marcel on Unsplash