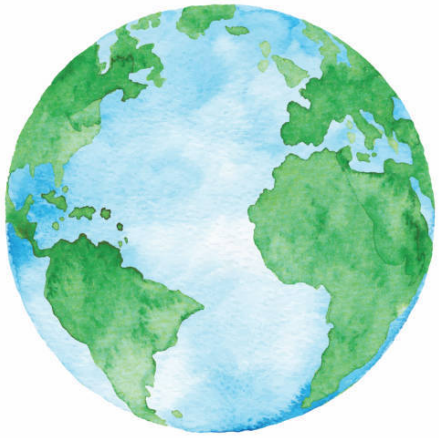
Whole School Planet Earth Unit 2020

CMU Children's School
Educator / Parent Discussion 1/31/2020

Overall Goal: **We chose Planet Earth for our Whole School Unit to intentionally focus our learning community on our home in the universe.** With respect to life science, we will discuss the features of a habitable planet in terms of its temperature, water, atmosphere, energy and nutrients. Our earth science focus will be on geography and geology, starting with the collection and study of rocks. Everyone will focus on environmental studies with an emphasis on human impact, conservation, and sustainability. Physical science principles of gravity and magnetics will likely interest our older children.



Key Concepts Related to Planet Earth

We will experience our unit flow from exploring rocks and crystals, to learning about the rock cycle, to peering inside the earth to study caves, to considering the history of the earth with evidence from fossils, etc., to the ways we use rocks in our culture and art.

A Rock is Lively (Dianna Hutts Aston & Sylvia Long, 2012)

A rock is lively … bubbling like a pot of soup
deep beneath the earth's crust … liquid … molten … boiling.
[physical science - solid, liquid, melting point]
A rock is mixed up. *[earth science / geology - mix of minerals]*
A rock is galactic. Outer space is a shower of rocky fireworks.
[astronomy - meteoroids -> meteorites, comets, asteroids]
A rock is old. *[history - before the dinosaurs and people]*
A rock is huge … or tiny. *[math - mountains to sand]*

A rock is helpful. *[life science – animals using rocks purposefully]*
A rock is surprising. *[earth science / geology – geodes, crystals, gems]*

A rock is inventive. *[history / culture – sharpen for tools, mortar & pestle, now cement, bricks, glass, etc.]*
A rock is creative. *[history / culture / art – pictographs, petroglyphs]*

In more recent history, artists and builders have chiseled great sculptures and monuments from all kinds of rock. *[more culture & art]*

A rock is recycled. *[geology - sedimentary, metamorphic, igneous -> rock cycle]*
Then a rock is once again … lively!

Developmental Benefits of Exploring Planet Earth

• **Self-Esteem & Independence** – managing risk when trying new things, confidently sharing discoveries with the group, self-regulating emotions and impulses when working with new tools and materials, using self-care skills such as hand-washing after contact with earth elements

• **Interaction & Cooperation** – caring for the natural and classroom environment, sharing tools and materials respectfully, taking others' perspectives when discussing preferences, hypotheses, etc., engaging in cooperative inquiry and compromising when necessary, persisting with tasks to completion

• **Communication** – learning new vocabulary to describe features of rocks and their formations, considering ways that people have used earth elements to communicate (e.g., pictographs, petroglyphs), writing labels or drawing illustrations for journals, collections, etc.

• **Discovery & Exploration** – exploring rocks in our local environment and beyond, observing carefully to be able to categorize, compare and contrast rocks and rock formations, using observation tools such as magnifying glasses and measurement devices, associating rock structures with potential functions, predicting the ways rocks may change when impacted by different forces in the environment

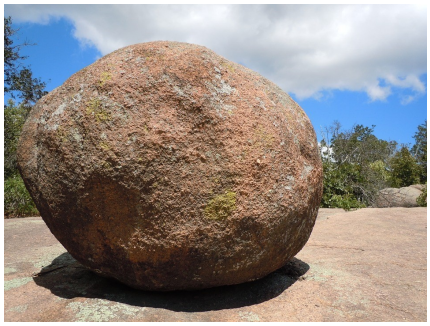
• **Physical Capabilities / Health & Safety** – strengthening eye-hand coordination for observing, measuring, and interacting with rocks in safe ways, both indoors and outdoors, using large motor movements to safely navigate on and around rocks, following health and safety procedures related to outdoor explorations

• **Artistic Expression & Appreciation** – creating with various earth elements and color schemes in a variety of artistic ways, including 2D and 3D visual arts, exploring the musical sounds associated with earth elements as they interact, using dramatic representations to better express understanding of geology, the rock cycle, etc.

Adult Support for Rock Explorations

[I wonder … I think … I learned …]

• Explore **WITH the children** to gently support their investigation without directing or frustrating them.
• Take the **child's lead**, follow the child's interest, and provide only the level of support they need.
• Allow children to **collect rocks** and create their own **journal / museum** with their discoveries.
• Allow children to **photograph rocks** that they can't collect because they are embedded in the earth or built into our environment.
• Foster **play on and around rocks** so children can experience their texture, structure, stability, etc. with their whole bodies.



"Advice from a Rock:
Live in balance.
Stay grounded.
Try your hardest.
Be well rounded.
Never take life for granite."

PLANET EARTH UNIT FLOW 2020

FOCUS	WHERE ON THE MAP?
Week 1 – Rocks / Crystals	
• What is geology? • What does a geologist do? • What are rocks? • What are crystals? • What are minerals? • What are different sizes of rocks called? (pebbles, boulders, stones, etc.) • Do rocks sink or float? • How are the texture, color, and shape of rocks different or similar?	• Where are rocks found? • Where are crystals found?
Week 2 – Rock Cycle	
• How are rocks made? (sedimentary, metamorphic, igneous) • How do rocks relate to volcanoes? • How do rocks relate to earthquakes?	• Where do we find volcanoes? • Where do earthquakes occur? • Where are sedimentary, metamorphic, and igneous rocks found in the world?
Week 3 – Inside the Earth	
• What is in the center of our Earth? • How are caves formed? • How does the inside of the Earth affect the outside of the Earth? • What do we use caves for today?	• Where are caves found?
Week 4 – History of the Earth	
• What is a petroglyph? • How are fossils made? • How do we know dinosaurs lived?	• Where are fossils found? • Where did dinosaurs live?
Week 5 – Culture / Art	
• How do we use rocks in our culture? (roads, buildings, etc.) • What types of art are created from the Earth? • What crystals and minerals are used to make jewelry? • How is salt formed? • Why is coal important to Pittsburgh? • How can we help the Earth?	• Where are diamonds found? • Where is halite (salt) found? • Where is gold found? • Where are emeralds found?

KEY VOCABULARY BY WEEK for PLANET EARTH 2020

Week 1 – Rocks / Crystals

Geology- study of the earth and its history
Geologist- scientists who study the earth and its history
Rocks- a hard substance made of minerals.
Crystals- a solid whose molecules are arranged in a repeating pattern.
Ex. Diamond, salt, sugar, and snowflakes
Gemologist – gem experts who work with and identify precious stones and gems
Gem- a valuable stone cut and polished for jewelry.
Ex. Emerald, diamond
Minerals- a substance that is formed naturally in earth.
Ex. Coal, salt, iron
Pebbles, Boulders, Texture, Color

Week 2 – Rock Cycle

Sedimentary Rock- made when sand, mud, and pebbles get laid down in layers. The layers are squashed and eventually turn to rock.
Metamorphic Rock- form deep in the earth when heat and pressure are applied to either igneous rocks or sedimentary rocks. It doesn't melt the rock, but changes it.
Igneous Rock- form when magma cools and hardens
Volcano- a hole in the Earth where magma and gas erupt.
Earthquake- shaking and vibrating on the Earth from underground movement along a fault or from volcanic activity.
Magma- hot, liquified rock deep below the Earth.
Lava- hot, liquified rock that flows from a volcano. When it comes to the surface magma is called lava.

Week 3 – Inside the Earth

Inner Core- the deepest and hottest layer of our planet
Outer Core- the second hottest layer of the earth. It is a liquid and made of iron and nickel.
Mantle- a layer on the inside of the Earth between the crust and the core.
Crust- the last layer on our Earth. It is where we walk and play.
Cave- a hollow space under ground that is large enough for humans to enter.

Week 4 - History of the Earth

Petroglyph- carvings on rocks
Pictograph – paintings of rocks
Fossil- remains of plants and animals that lived long ago.

Week 5 – Culture / Art

Sculpture- art created by shaping stone
Monument – something built in memory of a person, event, or special deed

Relation to "A Framework for K-12 Science Education"

• Scientific & Engineering Practices – Inquiry & Design

BOX 3-1

PRACTICES FOR K-12 SCIENCE CLASSROOMS

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

• Cross-Cutting Concepts

SEVEN CROSSCUTTING CONCEPTS OF THE FRAMEWORK

The committee identified seven crosscutting scientific and engineering concepts:

1. *Patterns.* Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.
2. *Cause and effect: Mechanism and explanation.* Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.
3. *Scale, proportion, and quantity.* In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.
4. *Systems and system models.* Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.
5. *Energy and matter: Flows, cycles, and conservation.* Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.
6. *Structure and function.* The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
7. *Stability and change.* For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

- **Disciplinary Core Ideas for Earth & Space Sciences**

BOX 7-1

CORE AND COMPONENT IDEAS IN EARTH AND SPACE SCIENCES

Core Idea ESS1: Earth's Place in the Universe

- ESS1.A: The Universe and Its Stars
- ESS1.B: Earth and the Solar System
- ESS1.C: The History of Planet Earth

Core Idea ESS2: Earth's Systems

- ESS2.A: Earth Materials and Systems
- ESS2.B: Plate Tectonics and Large-Scale System Interactions
- ESS2.C: The Roles of Water in Earth's Surface Processes
- ESS2.D: Weather and Climate
- ESS2.E: Biogeology

Core Idea ESS3: Earth and Human Activity

- ESS3.A: Natural Resources
- ESS3.B: Natural Hazards
- ESS3.C: Human Impacts on Earth Systems
- ESS3.D: Global Climate Change