Name

Exploration 2: Evidence of Change September 4

Identify the components of El Niño. Which of Earths systems are impacted by El Niño?
(Biosphere, geosphere, atmosphere, hydrosphere)

- ocean water, winds
- hydrosphere, geosphere, atmosphere, biosphere

- model: simplified representation of how Earth's systems have changed over time.
- Gather evidence that shows atleast one way in which the Earth has changed in 4.5 billion years.
  - the fossil record shows how earth systems have changed
    - cute furry wolly mammoths in Missouri imply that Missouri used to be cold
  - ice core samples trap atmospheric gasses which are analyzed to determine the composition of the atmosphere long ago.

Name

Exploration 2: Evidence of Change

September 6

- How can gathering data and analyzing patterns help us explain phenomena and predict future conditions?

- We can predict the amount of coral bleaching based on trends in water temperature. The warmer the water, the more coral bleaching occurs. Therefore we can predict coral bleaching patterns based on water temperature models.

Name

1.2 Earth Systems September 9

- Record observations about Earth's systems and the ways scientists use models to understand Earth's systems.

- How is Earth divided into systems? How do they interact? What are their boudaries?

geosphere: all of the hard or liquid rock on Earth
- the inside of the earth to the mountains

atmosphere: all of the air and particles surrounding the Earth
- within 100km of Earths surface is the boundary

hydrosphere: includes all forms of water on the Earth's surface, underground, or in the air
- How does the hydrosphere interacts with other earth systems

Black Table - gets the caves wet which causes erosion, affects geosphere

green table -> Evaporation of water impacts the humidity of the atmosphere.

- biosphere: all living things on Earth

Name

Exploration 1: Modeling Earth September 11

Compare Earths four systems. how are they related, what are each of the systems made of?

When rain drops down on the hill it goes to the ocean where it is absorbed by sunlight. The hydrosphere is made up of water and the geosphere is made up of all rock both liquid and solid. The absorbtion (evaporation) of water into water vapor increases the humidity of the atmosphere. The atmosphere is made up of all the gasses/air surrounding the Earth.

Water vapor condenses into rain which allows for plant growth. This plant growth is part of the biosphere which is composed of all living organisms.

Name

Earth Systems: Exploration 2 September 16

- Based on the data, what happened to the size of the hole in the Ozone from the mid 1970's to the mid 1990's?

in 1979 the graph had increase, in 1988 it had decrease bad. [The graph is every where now.]

Stating In 1979, the hole in the ozone increased in size. This trend continued until 1988 when there was a sharp decrease in the size of the hole in the ozone. The trend of an increase in the size of the hole in the ozone resumed after 1988 through 1994.

- How does the release of CFC's affect the amount of UV-B that reach the Earths surface?

The release of CFC's reduces the thickness of the ozone layer which causes holes in the ozone to form. This reduction in the ozone increases the amount of UVB that

reaches the earth's surface.

- Why is it more important to protect your skin when outdoors now compared to the 1950s?

The UV lights burn your skin, because the ozone got reduced over the years

The ozone has reduced in size since the 1950's. This reduction allows more UV-B light to reach Earth's surface, therefore causing higher levels of skin damage.

Based on the 3D model

1) What is the cause of the difference in the ozone hole between 1979 to 1990?

The CFCs react with O_3 causing a hole to form in the ozone layer.

2) What would the 1990 map look like if no CFCs were emitted?

Name

Exploration 3: Viewing Earth... September 18

DO NOW

2) The four major Earth systems are the biosphere, geosphere, hydrosphere, and atmosphere. The hydrosphere and the atmosphere interact with eachother during the water cycle. Water from the hydrosphere is converted into water vapor by evaporation. The oceans give all of the cute fish a place to live. This is an example of the biosphere interacting with the hydrosphere. The geosphere and the biosphere interact because the rocks of the geosphere provide minerals for plants (biosphere) to grow.

1) Can you tell which way the river is flowing based on the map? The map does show that the river flows to the southeast because of the higer elevation of the rocky area. Water must travel from areas of higher elevation to lower elevation due to gravity.

2) Based on the map, can you tell why the lakes formed?
The map shows that there are two lakes but does not show exactly why those lakes exist. We can infer how the lakes might have formed based on the elevation data shown by the topographical map.
3) What other information would be useful for knowing why the rivers and lakes are located where they are?
Precipitation data would be useful to know in order to determine the source of the lake water. Snow pack and rainfall could be the factors that supply the ecosystems with water.

Name

Earth's Energy

September 25

- Why might large volcanic erruptions have a cooling effect of Earth's surface?
  Volcanic erruptions lower the temperature of the earth's surface due to the release of particles into the atmosphere. These particles from the erruption block some of the sunlight from reaching earths surface therefore cooling Earths temperature.
- radiation: the emission and propagation of energy in the form of electromagnetic waves also moving sub atomic particles.
- conduction: the transfer of heat energy through the collisions of atoms or molecules.
- convection: movement of matter caused by differences in density

Name

Exploration 1: Earths Energy October 1

Name

Exploration 2: Earths External Energy October 4

albedo: the measure of the percentage of light that a particular surface will reflect.

- Draw a model of how earth's external energy changes when albedo increases due to a volcanic erruption. How is surface temperature impacted by this increase in albedo?

Name

Exploration 4: Earths Internal Energy October 9

DO NOW

Define albedo, how does albedo play a role in earths level of solar radiation?

Which two earth systems redistribute energy around the earth? How do those systems function?

The hydrosphere and the atmosphere redistribute solar radiation around the planet. Solar radiation warms the ocean water at the equator. This warm ocean water creates a current that flows towards the poles. This current pushes cool ocean water from the poles towards the equator, where that water is warmed by solar radiation. This cycle repeats.

- accretion: gradual increase in size due to addition
- Do you think that collision heating can happen today? Why or why not.
- isotope: one or more elements that have additional neutrons in the nucleus

- How would the earths mantle and crust be different without radioactive isotopes?

Radioactive isotopes provide thermal energy for the mantle & crust. Without those radioactive isoptopes, the mantle would cool.

Name

Exploration 1: Introducing Minerals October 14

- crystal: a solid whose atoms are arranged in a repeating pattern
- element: a substance that cannot be broken down into simpler substances by chemical means
- compound: more than one element chemically combined

Name

Exploration 2: Properties of Minerals October 16

- Describe the luster, color, and transparency of three mineral examples from the text.

Quartz has a pink color, glassy luster, and is transparent.

Name

Exploration 1: Rocks and Rock Cycle October 23

DO NOW

What are three tests that geologists use to determine the identity of a mineral?

The Scratch test, Shape test, and streak test

↓ hardness

Cleavage

↓ pattern structure

↓ powder color

Which of Earth's spheres might be a source of the material for the rock (pg 72)?

Claim: The biosphere was a source of the material for the rock.

Evidence: The rock has fossils of sea shells embedded in the rock sample.

Reasoning: Living things, such as crustaceans, use sea shells for protection. Many seashells together in a small space indicates living things inhabited the area.

Name

Exploration 2: Sedimentary Rock October 25

Types of Sedimentary Rocks

1) clastic: made from pre existing rock
2) chemical: formed when minerals dissolved in water form a precipitate (solid)
3) organic: made from organic material such as sea shells

Name

Exploration 3: Igneous Rock October 28

DO NOW

1) What are three types of sedimentary rocks?

Three types of sedimentary rock are clastic, chemical, and organic.

- extrusive igneous: rock formed when lava on the earths surface cools quickly. Small to no crystals visible
  - Examples
    - Obsidian
    - Rhyolite
- intrusive igneous: magma cools underneath the earths surface. Longer cooling period results in larger, more coarse grained texture.
  - Example
    - granite
- Compare the composition of mafic and felsic rocks.
  - Mafic rocks are lower in silicon dioxide composition (≈50%) whereas felsic rock is higher in silicon dioxide (≈70%).

- How can geologist use color to determine the composition of fine grained igneous rock?

- Basalt forms in sills and dikes because sills and dikes are pockets of empty space beneath the earths surface. Magma seeps into these pockets, then cods quickly to form basalt igneous rock.

Name

Exploration 4: Metamorphic Rock October 30

Do Now

- How do geologists classify igneous rock?

- foliated metamorphic rock: metamorphic rock that breaks along parallel lines
- nonfoliated metamorphic Rock: metamorphic rock that does not break evenly
- What test could we run to determine the identity of an unknown metamorphic rock?
  - We can use the cleavage test to determine the pattern of the internal structure of the rock.

Name

Exploration 4: Metamorphic Rock November 6

Types of Metamorphic Rock

1) Foliated metamorphic
   - ↳ breaks along flat or parallel planes
   - Example
     - Slate
     - schist

2) Non Foliated Metamorphic
   - ↳ breaks less evenly, have a texture like igneous
   - Example
     - Marble

CHECK FOR MISSING WORK

Name

Exploration 1: Carbon in Earth Systems November 11

- Which sphere does carbon in coral reefs come from?
  - Carbon in the coral reefs originated from the atmosphere. Carbon dioxide molecules dissolved into the oceans.
- carbon cycle: the movement of carbon between the geosphere, atmosphere, biosphere, and hydrosphere
- reservoir: a place where something is stored.
- How would the processes and reservoirs of the carbon cycle change over time if photosynthesis stopped?
  - The plants would no longer absorb carbon dioxide from the atmosphere. This would increase the amount of carbon stored in the atmosphere.

Name

Exploration 2: System Models December 2

- Black box model: only shows the inputs & outputs of a system, Does NOT show how inputs are converted into outputs.
- positive Feedback: original change is increased
- negative feedback: original change is decreased

Exploration 3: Other Chemical Cycles December 4

- biochemical cycle: the movement of a chemical between the biosphere and the geosphere.

Name

Unit 3 Natural Resources

January 22

Exploration 1 - Designing Solutions to Resource Problems

- non renewable resource: a resource that is consumed more quickly than it is replaced.
- renewable resource: a resource that is replaced as quickly as it is consumed.
- sustainable resource: a resource that is used in the present without compromising the resources use for future generations
- fossil fuels: source of energy derived from the fossilized remains of organisms.

Name

Exploration 1: History of Rock & Mineral Extraction January 24

- alloy: homogenous mixture of more than one metal.
- Why did people mine native minerals at first before mining minerals from far away?
  - Native minerals are more easily accessed due to close proximity.

Name

Exploration 2 - Minerals for New Technologies January 27

- rare earth minerals: heavy minerals that easily bond with other elements

Name

Exploration 3 Rock & Mineral Extraction January 29

DO NOW

1) What are rare earth minerals? What are some products where they are used?
Rare earth minerals are heavy minerals that easily react with other minerals. Most technology products contain rare earth minerals.

-mining: the process of extracting ore, or minerals from the ground.

Surface Mining

1) Open pit: resources at or just below the surface are dug out to be processed.
   - copper, iron, marble
2) Strip mining: horizontal strips of rock are removed to expose underlying rock surfaces.
   - aluminum
3) Hydraulic mining: powerful water jet streams are used to remove dirt from valuable minerals.
   - gold, platinum, ruby, diamond
4) Solar evaporation ponds: sea water is dumped into shallow pit so the water evaporates leaving salt behind.

Subsurface Mining

1) Solution Mining: pump hot water or acidic solvents to dissolve minerals to be extracted
   - gold, copper
2) Block caving: drill holes and break apart surrounding underground ore to expose minerals.

Exploration 4 - Impacts of Mineral Use

- recycling: the recovery of useful materials from waste

Name

Exploration 3 - Rock & Mineral Extraction January 29

- mining: the process of extracting ore, minerals or other solid materials from the ground

Surface Mining

1) Open Pit: Digging holes in the earth to extract materials that are close to the earts surface
   - marble, copper
2) Strip mining: remove horizontal sections of the surface to reveal valuable minerals
   - aluminum
3) Hydraulic Mining: power wash the surface of the earth to expose delicate or high value minerals.
   - gold, platinum, ruby, emerald
4) Solar Evaporation Ponds: small, shallow holes dug into the ground that are filled with sea water. Sea water evaporates leaving behind salt.

Name

Exploration 1: Petroleum & Fossil Fuels February 3

- How does horizontal drilling impact extracting of oil and natural gas?
  - Horizontal drilling drills in the same direction as the gas bearing formations are aligned under the surface of the earth. This makes oil extraction more efficient requiring fewer drill holes to extract the oil.

- Three types of coal
  1) Anthracite - highest carbon
  2) Bituminous
  3) Lignite - lowest carbon

Name

Exploration 1: Petroleum & Natural Gas

February 3

Name

Exploration: Agents of Change

February 21

- surface processes: processes that happen at or near the Earth's surface in the geosphere.
- List examples of how earths spheres interact with the geosphere as surface processes
  - biosphere:
  - atmosphere:
  - hydrosphere:
- weathering: natural process by which wind and water change rock formations
- Erosion: the removal & transport of material such as sediment
- Deposition: dropping of material

Name

Exploration 2: Weathering February 24

- Mechanical Weathering: weather is abrasive "rough" with rocks causing them to break apart
  1) Change in Pressure
  2) Change in Weather
  3) Movement of water, air, & ice
  4) Organisms
     - cute animals dig into soil exposing geosphere to erosion.

Name

Exploration 2: Weathering February 24

DO NOW

- What are the three categories of surface processes?
  Weathering, deposition, and Erosion.
- Mechanical Weathering: weathing that occurs when weather patterns are 'rough' and break apart rock
  1) Change in Pressure
  2) Change in Weather
     - big changes in temperature causes minerals to contract & expand quickly. This leads to the formation of cracks in mineral deposits.
- Temperature changes cause weathering in rock by freezing water in the cracks of rock formations. The freezing of water causes expasion within the crack, causing the crack to widen.
  3) Air & water
  4) Organisms
- Chemical Weathering
  1) Lichens & Moss create acids on the surface of minerals. These acids can breakdown rock formations
  2) Atmosphere / Oxygen reacts with

metals to cause oxidation. (rust)

- Rates of Weathering are impacted by:
  1) Surface area & particle size
     - The greater the surface area, the faster the chemical weathering
     - rough surfaces have greater surface area than smooth surfaces
  2) Composition
     - some materials weather more quickly than others.
  3) Environment
     - amount of water or temperature change impacts rate of weathering.

Name

Exploration 3: Transport of Material February 26

- mass wasting: when gravity pulls rock downhill
  - creep: materials move downhill slowly
  - landslides: when large amounts of material move downhill quickly

Name

Exploration 2: Weathering February 26

Chemical Weathering

Defining Sustainability

April 28

- sustainability: the ability for natural systems and human needs to remain in balance indefinitely
- ecosystem services: functions or processes that help sustain life or contribute to other important resources.
- anthrosphere: the part of the environment made or modified by humans and used for their activities.
- Sustainability is measured by the ability to balance three key dimensions:
  1) environmental
  2) social
  3) economic
- environmental sustainability: ability to maintain levels of nonrenewable resource consumption, depletion and pollution creation that can be continued for a long time.