**Earth’s Energy Systems Guided Notes**

**Guided Notes: The Structure of Earth**

**Big Idea:** Earth's interior is composed of different \_\_\_\_\_\_\_\_\_\_ with varying \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_.

**Key Concepts:**

* The topmost layer is the \_\_\_\_\_\_\_\_\_\_, which is solid and rocky
* Below the crust is the \_\_\_\_\_\_\_\_\_\_, Earth's thickest layer
* The mantle can be divided into the \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_
* The center of Earth is the \_\_\_\_\_\_\_\_\_\_, divided into the \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_.
* The outer core is \_\_\_\_\_\_\_\_\_\_ while the inner core is \_\_\_\_\_\_\_\_\_\_.

A diagram of the earth's structure

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**Real World Examples:**

1. When an \_\_\_\_\_\_\_\_\_\_ occurs, seismologists can detect the different types of \_\_\_\_\_\_\_\_\_\_ waves to study Earth's interior layers.

2. The \_\_\_\_\_\_\_\_\_\_ layer of Earth is where we live and is the only layer with liquid \_\_\_\_\_\_\_\_\_\_.

**Guided Notes: Earth’s Interior Energy**

**Big Idea:** There is a great amount of \_\_\_\_\_ \_\_\_\_\_ that flows within Earth's interior and out from Earth's interior.

**Key Concepts:**

* Earth's interior has four layers: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ \_\_\_\_\_, and \_\_\_\_\_ \_\_\_\_\_.
* \_\_\_\_\_ \_\_\_\_\_ are the movement of particles within a heated fluid.
* Plates on Earth's crust move due to \_\_\_\_\_ \_\_\_\_\_ in the mantle.
* Energy flows from Earth's interior through \_\_\_\_\_ \_\_\_\_\_ and volcanic eruptions.

A diagram of a liquid in a glass container

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**Real World Examples:**

1. When an \_\_\_\_\_ occurs, it shows the energy flowing out from Earth's interior.

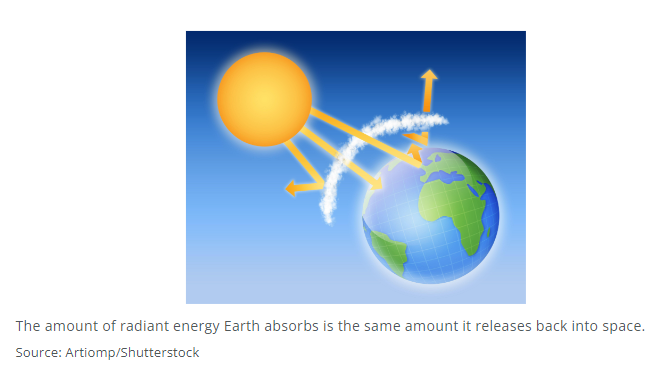
2. Geysers like Old Faithful are evidence of the \_\_\_\_\_ \_\_\_\_\_ within Earth.

**Guided Notes: Radiation from the Sun**

**Big Idea:** The sun's \_\_\_\_\_\_\_\_\_\_ provides energy that is \_\_\_\_\_\_\_\_\_\_ to warm Earth and its \_\_\_\_\_\_\_\_\_\_.

**Key Concepts:**

* Earth's main source of energy is the \_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_ is the transfer of energy by electromagnetic waves.
* \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is energy that travels by radiation.
* Earth \_\_\_\_\_\_\_\_\_\_ some of the sun's radiant energy and \_\_\_\_\_\_\_\_\_\_ some back into space.
* The \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ keeps Earth warm by trapping heat from the sun.



**Real World Examples:**

1. On a hot summer day, the \_\_\_\_\_\_\_\_\_\_ can make surfaces like \_\_\_\_\_\_\_\_\_\_ feel very warm when you walk on them.

2. A \_\_\_\_\_\_\_\_\_\_ works in a similar way to the greenhouse effect by trapping \_\_\_\_\_\_\_\_\_\_ inside while letting sunlight pass through.

**Guided Notes: The Water Cycle**

**Big Idea:** The \_\_\_\_\_\_ \_\_\_\_\_ is the constant movement of water between Earth and the air as water changes \_\_\_\_\_.

**Key Concepts:**

* Water is needed for \_\_\_\_\_ to exist.
* \_\_\_\_\_ is when liquid water turns into water vapor.
* \_\_\_\_\_ is when water vapor cools and forms water droplets/clouds.
* \_\_\_\_\_ is water that falls from clouds as rain, snow, sleet or hail.
* \_\_\_\_\_ is water that flows over land before entering bodies of water.

A diagram of water cycle

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**Real World Examples:**

1. During the process of \_\_\_\_\_, plants release water through holes in their leaves.

2. When you see your \_\_\_\_\_ fog up a mirror, that is actually water vapor from your breath condensing on the cool surface.

**Guided Notes: Physical Weathering of Rock**

**Big Idea:** Physical weathering is the breaking down of rocks into smaller pieces without any \_\_\_\_\_\_\_\_ processes involved.

**Key Concepts:**

* \_\_\_\_\_\_\_\_\_\_ is the wearing or grinding away of rock due to friction or collision.
* \_\_\_\_\_\_\_\_\_\_ is when water that has entered cracks in rock freezes and expands.
* Factors that cause physical weathering include:
* \_\_\_\_\_\_\_\_ blowing sand/particles against rocks
* \_\_\_\_\_\_\_\_ waves crashing against rocks
* \_\_\_\_\_\_\_\_ changes causing expansion/contraction
* \_\_\_\_\_\_\_\_ roots growing in rock cracks
* \_\_\_\_\_\_\_\_ digging/burrowing

A rock formation in the desert

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**Real World Examples:**

1. The \_\_\_\_\_\_\_\_ has shaped the rock in the desert over thousands of years by blowing sand particles that grind against it.
2. The tremendous force of \_\_\_\_\_\_\_\_ beating against the rocky shoreline causes pieces of rock to break off through abrasion.

**Guided Notes: Chemical Weathering of Rock**

**Big Idea:** Chemical weathering is the \_\_\_\_\_\_\_\_ of rocks due to chemical reactions.

**Key Concepts:**

* \_\_\_\_\_\_\_\_ causes some rocks to break down and form salt solutions and clay minerals inside.
* \_\_\_\_\_\_\_\_ occurs when oxygen combines with iron in rocks to form rust.
* \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ is formed when carbon dioxide and rainwater mix, dissolving certain rocks.
* \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ forms when pollutants mix with rainwater, causing faster rock breakdown.

A group of rocks on a white background

Description automatically generated

**Real World Examples:**

1. The Lincoln Memorial shows cracks due to the chemical weathering of the \_\_\_\_\_\_\_\_ it is made from.
2. Many \_\_\_\_\_\_\_\_ release pollutants that mix with rainwater to create acid rain, causing chemical weathering.

**Guided Notes: The Rock Cycle**

**Big Idea:** The \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ is a continuous series of processes that changes one type of rock into another type of rock.

**Key Concepts:**

* There are three types of rocks: igneous, \_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_.
* Igneous rocks form from \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_ rocks are made of pieces of rock pressed/cemented together.
* Metamorphic rocks form from great heat and \_\_\_\_\_\_\_\_\_\_.
* Forces like weathering, erosion and deposition act on the \_\_\_\_\_\_\_\_\_\_.
* Heat and pressure inside Earth act on rocks in the \_\_\_\_\_\_\_\_\_\_.
* The processes of \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ move rocks between the surface and interior.

A diagram of rock formation

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**Real World Examples:**

1. The beautiful arches in Arches National Park, Utah were formed by the \_\_\_\_\_\_\_\_\_\_\_\_\_ of sandstone over millions of years.

2. Bauxite, used to produce aluminum, is a sedimentary rock where aluminum \_\_\_\_\_\_\_\_\_\_\_\_\_ have cemented together over time.

**Guided Notes: Plate Tectonics and the Rock Cycle**

**Big Idea:** Heat energy from inside Earth's interior drives the movement of tectonic \_\_\_\_\_\_\_\_\_\_ and causes rocks to continuously change form in the \_\_\_\_\_\_\_\_\_\_ cycle.

**Key Concepts:**

* Earth's crust and upper mantle are divided into huge slabs of rock called \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_.
* Tectonic plates move due to convection \_\_\_\_\_\_\_\_\_\_ of hot magma in the mantle.
* Rocks change form through the rock cycle by processes like:
  + \_\_\_\_\_\_\_\_\_\_\_\_, erosion, deposition (sedimentary rocks)
  + Heat and \_\_\_\_\_\_\_\_\_\_\_\_ (metamorphic rocks)
  + Cooling of \_\_\_\_\_\_\_\_\_\_\_\_ (igneous rocks)

**A diagram convection currents
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**Real World Examples:**

1. As a pot of water boils, the hot water rises and cool water sinks, driven by \_\_\_\_\_\_\_\_\_\_ currents - just like how hot magma in the mantle causes tectonic plates to move.
2. An igneous rock on Earth's surface can break down into sediment, get buried and compacted into a \_\_\_\_\_\_\_\_\_\_ rock, then get heated deep underground to become a \_\_\_\_\_\_\_\_\_\_ rock over millions of years.