**Types of Rocks and The Rock Cycle**

Date: \_\_\_\_\_\_\_\_\_\_\_\_

SWBAT: Explain the rock cycle in enough detail to relate the cycling of materials.

**Igneous Rocks**

* Igneous rocks are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Two things will determine which igneous rock is formed :

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Illustrate the difference in Magma and Lava**

Lava

Magma

|  |  |  |  |
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| **Igneous rocks can either form deep within the Earth or near/on the surface** | | | |
| **INtrusive igneous** | | **EXTrusive Igneous** | |
| Form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  and have been cooling for millions of years. These rocks are characterized by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | Form on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ When lava erupts out of a volcano it cools quick and there is little to no crystal growth | |
| Example: | | Example: | |
| **Texture: How big the crystals are in an igneous rock.** | | | |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: Large crystals, slow cooling  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: Both large and small crystals, slow cooling with different minerals | | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: Small crystals, fast cooling  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: No crystals, instant cooling | |
| Composition: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Most common minerals on Earth | | | |
| **Silica vs Iron** | | | |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (light) rock made up mostly of silicates, over 65% silica | Andesitic (medium)- rock that is half dark/light, between 55-65% silica | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**(dark) rock that is rich in Fe and Mg, Between 45-55% silica | Ultra **-** rocks rich in Fe and Mg, Under 45% silica |

**Sedimentary Rocks -** Made from an accumulation of various types of sediments

* + What is sediment?
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
      * Ex. Gravel, clay, silt, pebbles, sand, mud, shells, dirt
    - **Most sedimentary rock \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
      * Ex. Limestone, halite

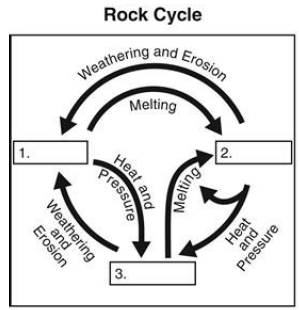
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sedimentary rock forms from these processes:** | | | | | |
| Weathering  Erosion  Deposition  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: sediments are pushed together and as a result, water and air are squeezed out.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: water passes through the sediments and dissolved minerals left behind act as a cement to hold the sediments together. | | | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: minerals clump together and fall out of solution | | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Water evaporates and leaves dissolved minerals behind. |
| **Three Types of Sedimentary Rocks** | | | | | |
| **Clastic** | **Organic** | | **Chemical** | | |
| Definition: | Definition: | | Definition: | | |
| Classified By: |  | | Classified By: | | |
| Two Examples: | Two Examples: | | Two Examples: | | |
| **Features of Sedimentary Rocks** | | | | | |
| http://www.mirrorservice.org/sites/gutenberg.org/1/5/8/8/15884/15884-h/images/006.png\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: (aka. Layering) occurs when there is a change in the kind of sediment deposited. | | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: formed from the action of wind or water on sand (seen in sandstone) | | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: remains or traces of plants and/or animals  http://rudolphandclausclassroom.weebly.com/uploads/1/3/8/0/13802513/7709791_orig.jpg | |

**Metamorphic rocks**

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (igneous, sedimentary, or metamorphic) as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (from magma) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (plate tectonics).
  + Most metamorphic rock forms below the surface of the earth.

|  |  |
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| **Metamorphic rock can form in 2 ways:** | |
| **Contact Metamorphism:** occurs\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and changes the structure and composition of the surrounding rock. The original minerals may form larger crystals. | **Regional Metamorphism:** occurs when tectonic plates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (most metamorphic is formed this way). |
| **Metamorphic Rocks are classified according to their structure** | |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Metamorphic rock   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. * Minerals with different densities separate into different bands   + EX. Slate, schist, gneiss | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Metamorphic Rock   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   + EX. Quartzite, marble |
| http://images.slideplayer.com/25/8059863/slides/slide_9.jpgParent rock: the rock from which a metamorphic rock is formed   * + Limestone--> Marble (u)   + Shale--> Slate (f)   + Granite --> gneiss (f)   + Slate --> schist (f)   + Quartz --> Quartzite (u)   + Sandstone --> quartzite (u)   + Talc --> soapstone (u)   + Gneiss --> Schist (f) | |

**Rock Cycle**

* Rock materials are constantly being recycled and each rock type can become a different type on its journey through the rock cycle.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that drives the rock cycle are:
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Formation and destruction of the three major rock types**

* Forces responsible
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – create sediment
  + Deposition and Bedding – sediment is deposited
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – transform parent rock
  + Foliation – minerals pushed into bands
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– turns material into magma/lava

**Weathering and Erosion**

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

SWBAT: Differentiate between and categorize types of weathering

1. Weathering- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ due to exposure to the atmosphere (H2O + gases)
2. Erosion - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by natural agents (glaciers, water, winds)

|  |  |
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| **Types of Weathering** | |
| **Mechanical Weathering- rock is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into smaller pieces of the same material**   * No change in the composition   + Ex. Rock \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | **Chemical Weathering - rock’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **Change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Occurs when a chemical reaction takes place between the rock and H2O, CO2, O2, or acid** |
| **Agents of Mechanical Weathering** | **Agents of Chemical Weathering** |
| 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – rocks hitting other rocks 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – water seeps into cracks in rocks, then freezes🡪expands🡪melts🡪refreezes 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– effective in breaking up rocks containing clay) Clay swells up when wet and shrinks when dry🡪 causing rocks to fall apart 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– (mosses, ants, earthworms, moles)    1. plant roots grow into cracks 🡪 wedging rock apart; animals dig into the earth 5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – peeling of rock layers due to gravity (sheet of rock peels away) Happens to granite | 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    1. EX. Feldspar + H2O 🡪 Kaolin (clay) 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – Chemical reaction of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (occurs in rocks with iron)    1. Ex. Fe + O2 🡪 FeO2 (iron oxide) Hematite or rust 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Chemical reaction of \_\_\_\_\_\_\_\_\_\_ (dissolved in water) and minerals🡪 produces carbonic acid and results in a mineral changing 4. Acids – (plant decay, industrial runoff, and acid rain)   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_🡪 rocks break apart |
| ***These two processes rarely occur alone! Mechanical and chemical weathering almost always act together.*** | |
| **Factors that affect Weathering Rates** | |
| * Amount of rock surface exposed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Climate: Rainfall, alternating freeze/thaw cycles   + \*\*\*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   + \*\*\*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Type of Rock: all rocks do not weather at the same rate   + EX. Marble tombstones weather faster than granite or slate because of acid rain. | |

**Soil**

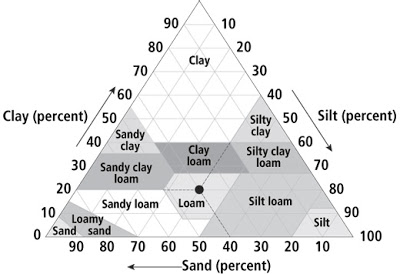
Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SWBAT: Describe and diagram layers of a soil profile and determine how soil is formed.

**Rock layers related to soil**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: layer of weathered rock fragments that covers most of the earth’s surface
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: solid, unweathered rock that lies beneath the regolith
  + 2 types of bedrock: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
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| * Made of a mixture of weathered rock particles, organic material (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_), and air!   + Humus: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (from plants mostly!) | | |
| Soil is mostly sand, clay or silt | | |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: smallest particle size (less than .002 mm); weathered from rocks containing feldspar or aluminum. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: medium particle size (.002 mm - .06 mm); often found around river banks, river beds or lake beds. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: largest particle size (.06 mm – 2 mm); weathered from rocks containing quartz. |



**Reading a Soil Pyramid**

1. What is the name of soil that is

* 30 % Clay
* 50 % Silt
* 20% Sand

1. What is the name of soil that is

* 20 % Clay
* 40 % Silt
* 40% Sand

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| **Soil Profile**  Cross section in which layers (a.k.a. horizons) of soil and bedrock can be seen | | |
| O Horizon |  |  |
| A Horizon | Consists of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Usually includes leached soil deficient in humus and minerals. |
| B Horizon | Subsoil \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Made mostly of clay; rich in minerals and nutrients |
| C Horizon | Deepest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Unweathered bedrock |

|  |  |
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| **Climate determines the type of soil found in an area.** | |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Thick O horizon🡪**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (acidic soil) |
| Desert climates | Thin soil consisting mostly of regolith |
| Temperate climates  (Where we live!) | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** found in areas E. of Mississippi River that receive more than 65 cm of rain a year; mostly clay, quartz and iron; acidic |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** found in areas W. of Mississippi River in areas receiving less than 65 cm of rain a year; contains Ca, less acidic, very fertile |

* Soil on a mountain or hill is usually thin and of poor quality. This is because rainwater runs down and washes it away.

**NC Soil**

* North Carolina’s main soil type is Cecil
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Soil Conservation and Traditional/Sustainable Agriculture**

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SWBAT: Describe methods of soil conservation.

Soil erosion is a big problem for the agriculture industry and is affected by the following factors:



Soil Conservation combats this erosion

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| **Methods of Soil Conservation** | | | | |
|  | | Step like ridges are built and arranged sideways on a hill. Slows down water erosion. | | |
|  | | Cultivated rows run sideways, rather than up and down. Slows down water erosion. | | |
|  | | Different crops are grown on the same piece of land and rotated the next year. Catches soil eroded from other crop. | | |
|  | | Rows of trees are planted close together to help force wind movement upward, away from the ground. | | |
| **Traditional Agriculture Techniques** | | | **Sustainable Agriculture Techniques** | |
| ­­­­­­­­­­­­­­­­­­­­ | The cutting and burning of plants in forests or woodlands to create fields | |  | Growing different crops in succession in the same field   * Replenish soil nutrients |
|  | Most or all trees in an area are uniformly cut down | |  | Prevent soil erosion and suppress weeds (\*DUST BOWL\*) |
|  | Preparing a field by digging, stirring, or overturning soil | |  | Adding a layer of manure, mulch, or compost |
|  | Growing a single crop or plant species over a wide area and for many consecutive years | |  | Solve pest problems while minimizing risks to people and the environment |
|  |  | |
|  |  | |

\*Techniques are evaluated on environmental quality by: Magnitude, Duration, and Frequency

**Erosion and Mass Movement**

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SWBAT: Identify and describe the four types of mass movement.

Erosion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Ex. Wind, gravity, glaciers, ocean waves and currents, streams

Mass Movement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Talus: a pile of rocks that accumulate at the base of a slope.

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| **Types of Mass Movements:** | | | |
| http://www.conservation.ca.gov/cgs/geologic_hazards/landslides/PublishingImages/debris_slide.JPG | | * Sudden movement of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and soil down a slope of a hill, mountain or cliff.   + An avalanche is a type of landslide. * Caused by heavy rainfall, spring thaws, volcanic eruptions and earthquakes. | |
| http://www.tulane.edu/~sanelson/images/creep.gif | | * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ movement of rock and soil; it will cause fixed objects such as trees, fence posts, light poles in soil to lean downhill.   + Usually goes unnoticed until objects begin to lean. * Caused by excess water in the soil, plant roots, burrowing animals, and alternating freezing/thawing. | |
| http://maps.unomaha.edu/maher/geo117/part2/masswastingpics/USGSslumpdia.GIF | | * A mass of loosened rock and soil moves downhill in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. * Caused by excess water in the soil which causes a loss of friction allowing rock to slip downhill. | |
| http://www.unicaen.fr/mountainrisks/spip/local/cache-vignettes/L500xH260/landslide_ph6-83627.png | | * Clay and silt saturated with   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   * + Caused by heavy rain. * **Usually occurs in dry, mountainous regions during sudden heavy rainfall.**   + Very dangerous….can wash out roads and destroy buildings. | |
| **Stabilization Methods** | | | |
| * In mountainous areas where mass movement is potentially possible steps are needed to prevent death and damage to property. | | | |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ retaining bolts | Drainage pipes to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Grading the slope | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Erosion by Wind**

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SWBAT: Define saltation and describe the process of dune formation.

* Remember, erosion is the process by which weathered products are **moved**. Wind is one way weathered products are moved.

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| Where does wind erosion occur? | * Places where there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (plants, trees, grass) * Places where there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (moisture makes the soil heavier🡪 harder to move) * Ex. Beach and desert | | |
| How does wind move sand? | * Wind causes the sand to jump and bounce. This is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. * Grains of sand only rise above the surface * ~1 m even in the strongest wind. | | |
| **Effects of Wind Erosion** | | | |
| 1. Deflation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and leaves rock fragments that are too large to be lifted. Common in deserts. | | 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: rocks get worn down and smoothed mostly by blowing sand. | 1. Dunes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and causes dunes to form.    * Dunes: mounds of sand blown by the wind.    * Common in deserts, on beaches and on the shores of large lakes. |

**Glaciers**

Date: \_\_\_\_\_\_\_\_\_\_\_\_

SWBAT: Define the boundaries of world glaciers and discuss the trends in advancing vs retreating glaciers.

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| **What are glaciers?** | | | |
| * Glaciers are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * They form near Earth’s poles and in mountains at high elevations. (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) | | * The snow in these areas is compacted and recrystallized into ice.   + An example of this is making a snowball. * They cover \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the Earth’s surface!!! * In the last ice age the glaciers covered 30%   + This ice age ended 10,000 years ago | |
| **There are two types of glaciers: valley & continental** | | | |
| * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   + Valley glaciers are form in valleys in mountainous areas.   + They flow down the valleys like a thick liquid. (ex. Slushi)   + These glaciers will carve and widen a valley | | * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   + A continental glacier covers a continent-sized area.   + These form in very cold, polar regions. (Ex. Antartica, Greenland) | |
| **Advancing and Retreating** | | | |
| * When we have glaciers that are changing size we call then advancing and retreating. * Advancing glaciers are growing, while retreating glaciers are shrinking. * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | |
| **Glacier Erosion and Deposition** | | | |
| **Icebergs**   * Icebergs come from glaciers in a process called   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | **Till and Moraine**   * As the glacier moves and melts it leaves behind sediment. This sediment is called   **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.   * An accumulation of sediment on the sides of a glacier is called a   **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.** | **Kettle Lake and Meltwater**   * Since glaciers are ice they leave behind a large amount of water as they melt. * A kettle lake is formed when a large piece of ice breaks off and is left to melt. * A meltwater stream is a stream formed from melted glacier water. | **Glacial Deposition**   * These meltwater streams can carry sediment down the glacier and then deposit them on dry land. * This land is called an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |