**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

|  |
| --- |
| **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

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| **Sedimentary rock forms from these processes:** |
| WeatheringErosionDeposition\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: 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 animalshttp://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)

|  |
| --- |
| **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: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |
| --- |
| * 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

|  |
| --- |
| **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:

* 1.
	2.

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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
 |