

Types of Rocks and The Rock Cycle

Date: _____

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

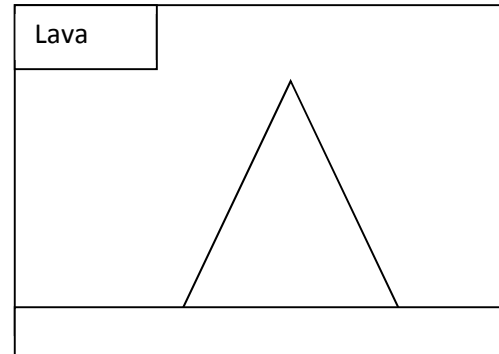
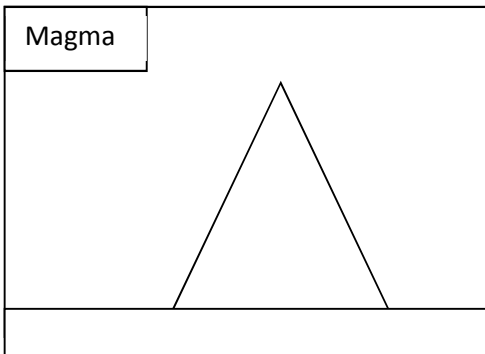
Igneous Rocks

- Igneous rocks are _____.
- Two things will determine which igneous rock is formed :

1. _____

2. _____

Illustrate the difference in Magma and Lava



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	_____ : Small crystals, fast cooling
_____ : Both large and small crystals, slow cooling with different minerals	_____ : No crystals, instant cooling

Composition: _____

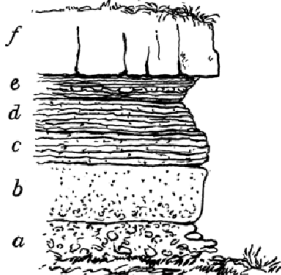


_____ : Most common minerals on Earth

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

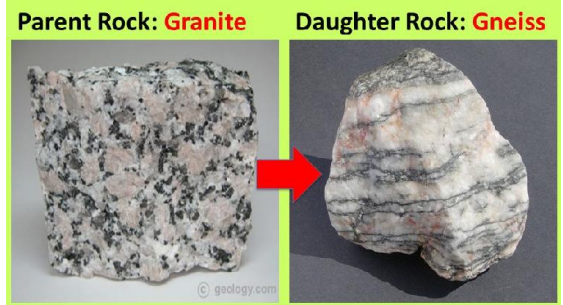
- What is sediment?
 - _____.
 - Ex. Gravel, clay, silt, pebbles, sand, mud, shells, dirt
- **Most sedimentary rock** _____.
 - Ex. Limestone, halite

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		
_____: (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 

Metamorphic rocks

- _____ (igneous, sedimentary, or metamorphic) as a _____ (from magma) _____ (plate tectonics).
- Most metamorphic rock forms below the surface of the earth.

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
Parent rock: the rock from which a metamorphic rock is formed <ul style="list-style-type: none"> ○ 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

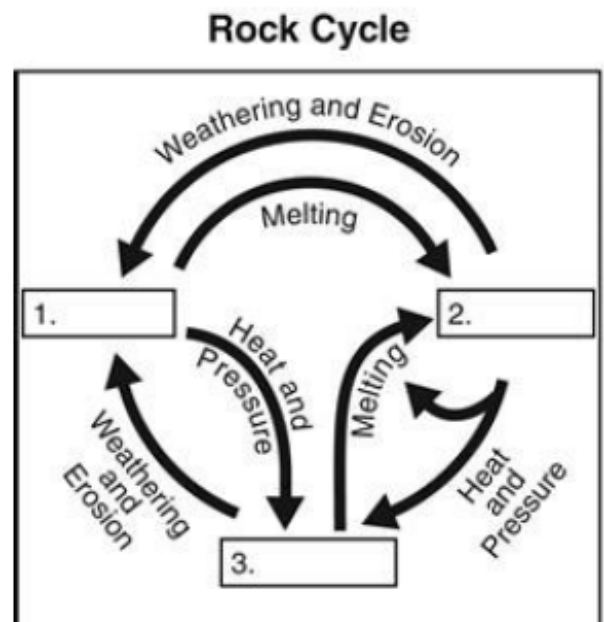
- Rock materials are constantly being recycled and each rock type can become a different type on its journey through the rock cycle.

- _____ 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 <ul style="list-style-type: none"> • No change in the composition <ul style="list-style-type: none"> • 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
<ol style="list-style-type: none"> 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) <ol style="list-style-type: none"> a. 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 	<ol style="list-style-type: none"> 1. _____ <ol style="list-style-type: none"> a. EX. Feldspar + H₂O → Kaolin (clay) 2. _____ – Chemical reaction of _____ (occurs in rocks with iron) <ol style="list-style-type: none"> a. 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.

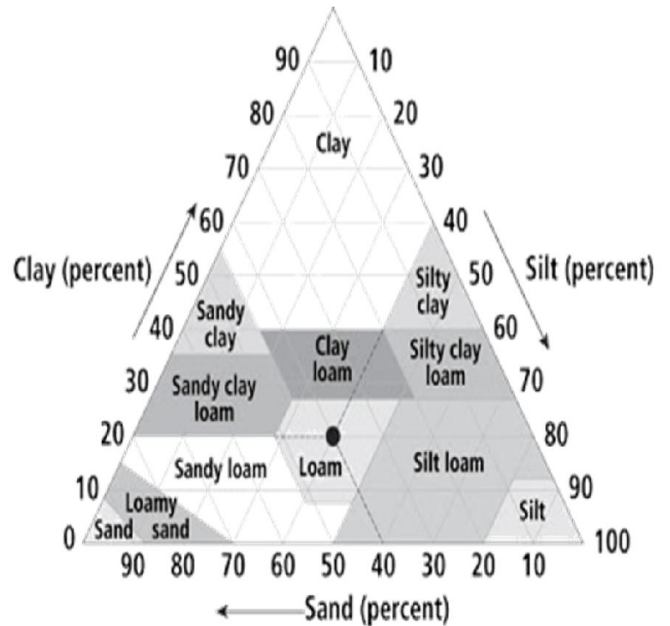
Rock layers related to soil

- _____: 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

- What is the name of soil that is
 - 30 % Clay
 - 50 % Silt
 - 20% Sand
- 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	

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.
- 3.

Soil Conservation combats this erosion

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 <ul style="list-style-type: none"> • 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.

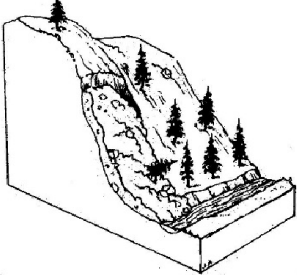
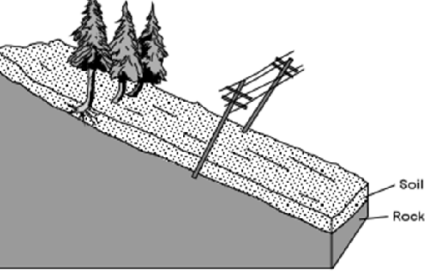
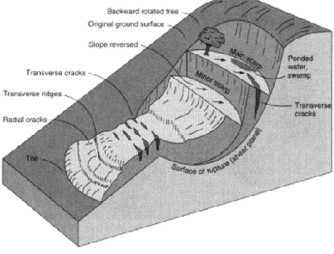
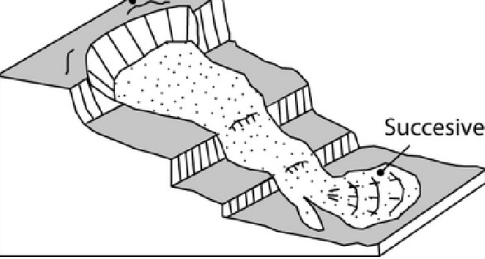
Erosion: _____

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

Mass Movement: _____

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

Types of Mass Movements:

	<ul style="list-style-type: none"> • Sudden movement of _____ and soil down a slope of a hill, mountain or cliff. <ul style="list-style-type: none"> • An avalanche is a type of landslide. • Caused by heavy rainfall, spring thaws, volcanic eruptions and earthquakes.
	<ul style="list-style-type: none"> • _____ movement of rock and soil; it will cause fixed objects such as trees, fence posts, light poles in soil to lean downhill. <ul style="list-style-type: none"> • Usually goes unnoticed until objects begin to lean. • Caused by excess water in the soil, plant roots, burrowing animals, and alternating freezing/thawing.
	<ul style="list-style-type: none"> • 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.
	<ul style="list-style-type: none"> • Clay and silt saturated with _____. • Caused by heavy rain. • Usually occurs in dry, mountainous regions during sudden heavy rainfall. <ul style="list-style-type: none"> • 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	_____
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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.

Where does wind erosion occur?	<ul style="list-style-type: none">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?	<ul style="list-style-type: none">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.	2. _____: rocks get worn down and smoothed mostly by blowing sand.	3. Dunes: _____ _____ and causes dunes to form. <ul style="list-style-type: none">– 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.

What are glaciers?

- | | |
|---|--|
| <ul style="list-style-type: none"> Glaciers are _____ They form near Earth's poles and in mountains at high elevations. (_____) | <ul style="list-style-type: none"> The snow in these areas is compacted and recrystallized into ice. <ul style="list-style-type: none"> An example of this is making a snowball. They cover _____ of the Earth's surface!!! In the last ice age the glaciers covered 30% <ul style="list-style-type: none"> This ice age ended 10,000 years ago |
|---|--|

There are two types of glaciers: valley & continental

- | | |
|--|---|
| <ul style="list-style-type: none"> _____ <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> _____ <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Icebergs come from glaciers in a process called _____. | Till and Moraine <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> These meltwater streams can carry sediment down the glacier and then deposit them on dry land. This land is called an _____. |
|--|--|--|---|