NOTES FOR THE SOILED GLACIOFE

Name:_____

(DO NOT LOSE)

AREA OF FOCUS: WEATHERING

Weathering

- The breaking of rock into smaller pieces.
- Either mechanical or chemical

Mechanical Weathering: Physically breaking rocks into smaller pieces without chemicals.

Mechanical Weathering

- Heat
- Water
- Ice
- Pressure

- Ice/Frost Wedging: Water enters cracks in the rocks, freezes, expands and breaks rocks.

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Water

- It crashes into rocks and causes rocks to hit each other and become smaller and smoother.

Sheeting / Exfoliation – layers fall off like an onion.

Thermal Expansion: repeated heating and cooling of rocks will induce stress and breakage.

Root Wedging: Plant roots enter crack, grow and expand the crack.

Animal Activity: Animals mechanically wear away the rock.

Human Activity – Humans mechanically break up rock. Occurs at a rate faster than nature.

Wind weathering: Particles of sand, pebbles, and dust are carried by wind and cause abrasion and slowly break down rock.

Angle of Repose -The maximum angle of a stable slope determined by friction, cohesion and the shapes of the particles.

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Chemical Weathering: Chemical processes dissolve and decay earth materials.

- Chemical weathering rate depends on

- Temperature
- Amount of surface area
- Availability of water or natural acid

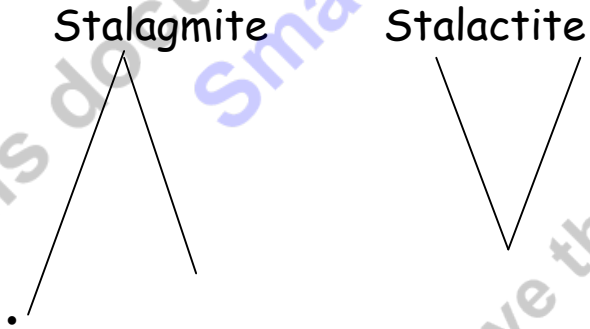
Examples of Chemical Weathering

•Carbonation: Water and CO_2 create carbonic acid which wears down rock.

•Hydrolysis: Chemical reaction between the minerals in the rock and hydrogen in rain water (H_2O) wear down rock.

•Oxidation: The process by which oxygen combines with water and minerals in the rock to weaken it.

•SOLUTION: Process by which minerals in the rocks dissolve directly in water.



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HYDRATION: Process where minerals in the rock absorb water and expand, creating stress.

•Other sources of chemical weathering

- Sulfuric Acids from volcanic activity.
- Organic acids in soil and from plant like lichens.
- Salts (Chemical)
- Human air pollution

Mass movement: The down slope movement of earthen materials from gravity.

Landslide: A slide of a large mass of dirt and rock down a mountain or cliff.

Soil Creep: The slow, steady downhill movement of soil and loose rock.

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Freezing soil expands, melting contracts it. Gravity pulls it down slope. (Soil Creep)

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Slump: A landslides in which the moving material moves in a block, more or less.

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Synergism of mechanical and chemical weathering.

- Mechanical weathering increases surface area, which speeds chemical reaction rates.
- Chemical weathering weakens rocks which facilitates entry of water and further mechanical weathering.
- Biological processes accelerate both types of weathering.

Surface area affects rate of weathering. As pieces get smaller, they have more surface area and thus weather faster.

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NEW AREA OF FOCUS: SOIL

Soil is

- A mixture of weathered rock and decaying organic material.
- Plants, animals, fungus, bacteria…

Dirt is…

- Mainly mineral based
- Pebbles and finely ground rock

Color

If soil is black

- Lots of organic matter (carbon).
- May be poorly drained.
- Usually fertile.

If soil is brown

- Lots of sand and clay
- Well drained
- Good soil

Very light browns, whites, orange, red, yellow.

- Many compounds present, Iron, Manganese, Sulfur.
- High in salt.
- Not as healthy.

-Particle Size in soils (large to small)

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Boulder – Largest (Greater than 25 cm)
Cobble (6-25 cm)
Gravel (2cm-7.5cm)
Coarse Sand (2mm)
Sand (2mm - .125mm)
Fine Sand

Very Fine Sand
Clay (less than .002mm)
Dust – (Into the micrometers)

Close-up of soil particles

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Soil Permeability: The rate at which water and air move through the soil.

Soil Porosity: The spaces that allow air and water to move through the soil.

Holds Nutrients	Water Can Pass Through	Holds Water / Sponge	Has Air Spaces 1-10 scale	Can Work / Move Popsicle stick

Clay

Loam

Sand

Gravel

Cobble

Soil Horizon – Layers of different types of soil.

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O Horizon (Organic Matter) Leaves
A – Topsoil – High in organic matter
B - Subsoil
C – Parent Material
D- Bedrock

NEW AREA OF FOCUS: SOIL CONSERVATION

Erosion - Process of wearing or grinding something down.

Deposition: The natural process of laying down a deposit of something. (Sediment)

Soil degradation is a real and serious problem.

- Soil takes hundreds of years to form.
- It takes very little time to destroy it.

Two key factors to conserve soil

- - Reduce erosion
- - Restore fertility (nutrients)

Soil Conservation Measures

- -Conservation Plowing: Disturbing the ground and plant cover as little as possible.
  -Use of a seed injector.
- -Terracing: Creating steps against water erosion.
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- -Contour plowing: A practice of slowing water run-off by planting across a hills contours.
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- -Cover Crop: A plant that grows first and protects the cash crop.
    - Strip Cropping: Alternate the type of plant on each row to control water and nutrient uptake.

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- -Alley Cropping: Plant trees in between ground crops
  Provides shade, wind break, and prevents water loss.

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- -Crop Rotation: Planting different crops each year.
  Changes nutrient uptake (increased soil fertility over a long period)

- -Gully Reclamation: Dam gullies to trap silt
  Plant ground vegetation to stabilize slopes.

- Plant Wind Breakers: Trees at edge of field to break the wind.

Increasing Fertility: Adding animal manure to plants for nutrients.

Green Manure: Add plants to plants

NEW AREA OF FOCUS - GLACIERS

Erratic Boulders entry question

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Glacier- A moving mass of snow and ice that moves downhill.

Glaciers form when more snow and ice accumulate than melt. It takes many years and the snowfall compacts into ice.

- Two types of glaciers
  - -Continental Glaciers: A Giant ice sheet that spreads out from a center of accumulation.
  - -Alpine Glaciers: A glacier that starts in a mountain and moves into a valley.

Glaciers form when more snow and ice accumulate than melt. It takes many years and the snowfall compacts into ice.

Iceberg – A giant piece of freshwater ice that broke off of a glacier or ice shelf.

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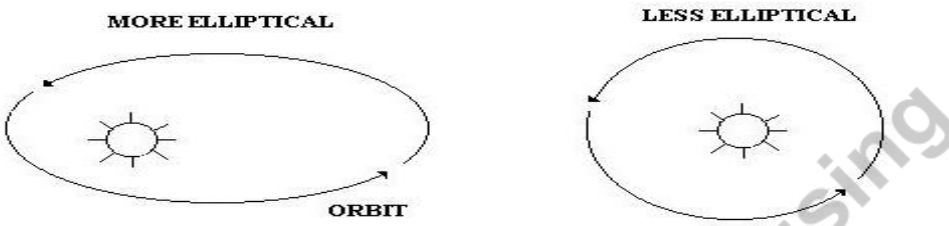
Ice Age: A cold period marked by episodes of extensive glaciation alternating with episodes of relative warmth.

Theories of why ice ages occur

- -Cosmic rays (Shaviv theory)
- **Changes in the Earth's orbit**

ECCENTRICITY



PERIODICITY:

100,000 YEARS

- Eccentricity
- Changing continental positions
    - Gulf Stream: A warm water current that travels up to the Northern Atlantic.
- Uplift of continental blocks
- Reduction of CO_2 in the atmosphere
- Tilt (Milankovitch Theory)

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- Glacial erratic: A piece of rock carried by glacial ice some distance from the rock outcrop from which it came.

Talus – Piles of weathered glacial rock.

Cairn: Manmade pile of stones, usually conical, and often marks the path of an alpine trail.

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Glacial Landforms

Glacial Striations: Multiple, straight parallel lines which represent the movement of the sediment loaded base of a glacier.

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U-Shaped Valley: Glaciers carve valleys into a U shape.

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Fjord: U-Shaped valley near the sea

Kettle Lake : A depression filled with water left by a glacier. Most of the Lakes in N.H.

Tarn: A glacial lake produced by scouring. These are often found in cirques.

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Horn - A sharp peak on a mountain cut by glaciers.

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Cirque - a steep-sided carve into a mountain by a glacier.

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Aret'e- A knife edge caused by glaciers and erosion.

Esker- A narrow, steep-sided ridge of sediment, the remains of sediment piling up in a winding river under the glacier.

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Moraine- Material transported by a glacier and then deposited. Many types of Moraines.

Drumlins: Formed glacial till (sediment). They are elongated features that can reach a kilometer or more in length.

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Outwash - Material deposited by the debris-laden glacial valley.

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