CORNELL NOTES
Directions: You must create a minimum of **5 questions** in this column **per page** (average). Use these to study your notes and prepare for tests and quizzes. Notes will be turned in to your teacher at the end of the Unit for scoring.

UNIT 4: Earth Science
Chapter 21: Earth's Changing Surface (pages 644-683)

I. Weathering and Soil

A. _____- process of physical or chemical breakdown of a material at or near Earth's surface.

1. Involves the interaction of **air**, **water**, and **rock** over _____

2. Everyday weathering- is going on all around you everyday

B. **Mechanical Weathering**- "turning big pieces into little pieces"

1. Prying rock apart

a. _____ can enter fractures in rock. When **freezes** and expands will crack apart

b. **Growing** _____ **roots** example of biological force

c. **Rocks** can act as _____ **agents**. Falling rocks can hit and split other rocks

2. **Smaller rocks** have <u>greater surface area</u> to <u>volume</u> which increases likelihood that material will be attacked by _____ **agents**

C. Chemical Weathering

1. Forms new compounds and release elements into the _____

a. Elements released enrich **soil** and **nourish** _____

b. Without weathering of rocks there would be <u>no</u> _____

2. Matter on the Move- **Cycles of chemical** weathering <u>affect</u> all environments from _____ to _____

3. **Rock Rust**- _____ is a common weathering process

a. Iron combines with oxygen to form iron oxide (_____)

b. Other minerals also form oxide minerals (i.e. _____ oxidizes to greenish-colored patina)

4. **Feldspar Weathering**- important process for _____ rocks

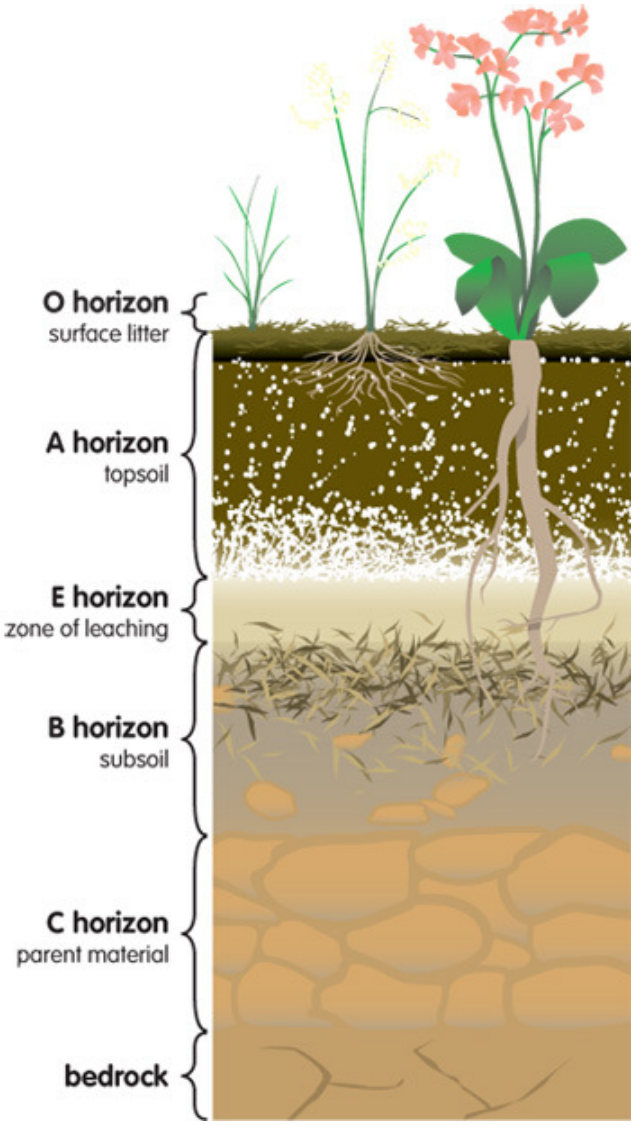
5. **Differential Weathering**- different rock formations tend to weather at different _____

D. **Soil**- <u>mixture</u> of weathered rock, organic matter, water, and air that is capable of **supporting plant** _____

1. **Soil** _____- layers with unique texture and color

a. **Soil** _____ shows specific layers for given area

b. Composition of parent **bedrock**, **climate**, kind of **organisms** on surface, **shape of land**, **slope** angles determine specific _____.



2. **Soil Types**- many different types

a. _____ used as basis to characterize many types of soil

b. Separated by **composition** and _____ **properties**

c. **Precipitation** and **temperature** range affect _____ that forms

d. _____ important for providing supply of **organic matter**

e. In **arctic** and **deserts** where there is no **vegetation**, there is no _____

3. Parent material-

a. Some _____ form in **same place** as parent bedrock

b. Some soils forms from **transported materials** from distant sources (_____ and **glaciers**)

II. Shaping the Landscape

A. Erosion, Transport, ad Deposition

1. Mountains and other landforms subject to **continuous** _____

a. _____ a factor

b. Action of _____, _____, or _____.

2. _____- removal of surface material through process of weathering

3. _____ **transport**- movement of eroded material from one place to another by **water**, **wind**, and/or **glaciers**

4. _____- When transporting agent drops it load of eroded material

B. Running Water

1. **Drainage basins**- all the land that gathers _____ for a major river

a. Like branching tree (include _____)

b. Drainage basins _____ in area for major rivers

2. **Channel Development**- a path for water created by _____.

a. Rivers can create ___**-shaped valleys**

b. **Steep canyons** can form when downcutting is _____

3. **Stream** _____- accumulations or bars of sediment in stream channels

a. Sediment is dropped when running water _____

b. Usually forms on **inside bend** of rivers where speeds are _____

4. **Floodplains**- sediment left after floodwaters subside along the valley _____

a. Floodplain part of river, but only submerged during _____

b. Can rejuvenate _____ **quality**

C. **Glaciers**

1. Formed when winter snowfall exceeds summer melt

a. Must take place **year after year** for hundreds to thousands of _____

b. **Compaction** within thick mass of snow creates _____ **ice**

c. Begins to **spread out** under its own _____

d. Become effective agents of _____

e. As ice moves, act like **giant** _____ **-** scraping, gouging, and plucking soil and surface rocks

2. Erosional features

a. **Valley and continental glaciers** leave behind deep grooves or striations

b. Glaciers convert ____**-shaped** valleys into ____**-shaped** valleys

c. **Cutting force** is dependent on _____

d. **Bowl shaped depression** (cirque) is formed where _____ first accumulates

3. Glacier deposits

a. When glaciers _____, they **dump material** they were carrying

b. Material called _____- composed of random sediments **ranging in size** from tiny clay particles to house-sized boulders

c. _____- large ridges of till that accumulates at edge of glacier

1). **End moraine** forms at _____ of glacier

2). **Lateral moraine**- forms at _____ of glacier

3). _____ **moraines**- formed when glaciers join together

4). **Ground moraine**- forms _____ melting continental ice sheets

d. Deposits of outwash material are **layered** and **sorted** by _____ by action of water

e. Deposits in flat areas often become **fertile** _____

D. Wind

1. **Wind** _____ ability to pick up and carry **large particles**

a. Can act like _____**-blaster**

b. Can _____ and **smooth** landforms

2. Erosion by wind

a. _____- the removal of small particles by wind

b. _____ **pavement**- rocky, rough texture caused by deflation

3. **Wind deposits**- sediment dropped as _____ decreases

a. **Shapes** and **sizes** of landforms depend on how constant the wind velocity is and supply of _____

b. _____ form as wind moves sand-sized particles

E. Wave Action

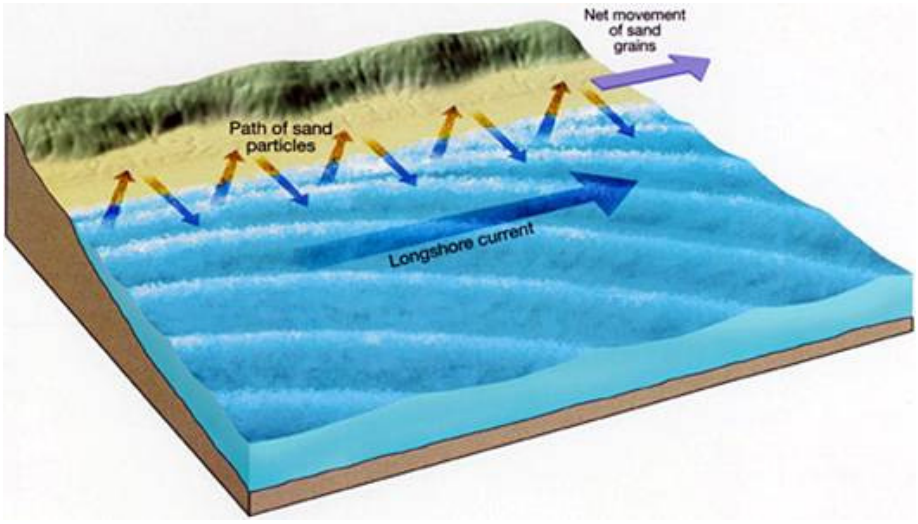
1. Extreme _____ operate where **land** meets **open water**

2. Currents from wave action

a. _____ churn up **beach sediment**

b. **Sediment** carried back toward _____

c. Then moved toward shore at angle- **transporting sediment (_____ current)**



3. Erosion from wave action

a. Action of **waves** with sediment works like _____ and causes **abrasion**

b. Results in _____ pebbles and cobbles on beach

4. Deposition by wave action

a. Sediments can be deposited as offshore sand ridges or _____

b. _____ **bar**- sandbar that seals off a bay

c. _____- sand bars that project into water from land and curve back toward land in a hook shape

d. _____ **islands**- sand deposits formed offshore

F. Mass Wasting

1. When erosion occurs as a result of _____

a. Occurs where **slopes are overly steep** or lacking _____

b. Usually <u>begins</u> when support at **base** of slope is _____

2. Erosion by mass wasting

a. <u>Dependent</u> upon type of **event** and type of _____involved

b. **Landslides** or **rockslides** can produce distinct _____ on slopes

c. **Mudflows** occur after heavy _____ or snowmelt

3. Deposition by mass wasting

a. Materials _____ in **disorganized** masses

b. Material replaces **undermined** material at _____

c. Slope becomes **stabilized** when material builds up and **mass wasting** _____

III Groundwater

A. The Water Cycle

1. **Oceans** contain _____% of Earth's water

a. **2.8%** is _____ (3/4's tied up in **glacial ice**)

b. Less than _____% of Earth's water available

2. Water cycle

a. The cycling of freshwater

b. Enters cycle through _____ of seawater

c. Lesser amount enters through _____ (from plant leaves as water vapor)

d. _____ provides **energy** for evaporation and transpiration

e. Water vapor forms **clouds** which provide _____

f. Most precipitation goes back to _____

g. Water falling on land can **evaporate**, **runoff** as stream flow, or **infiltrate Earth**

H. _____- process by which water enter Earth to become **groundwater** below surface

B. Groundwater

1. Water stored underground

a. Moves through _____ spaces of sediment and rock

b. _____ **zone**- region near surface where water infiltrates freely

c. _____ **zone**- area below where water completely fills pore space

d. **Water** _____- boundary separating two zones

2. Groundwater storage

a. Absorption of water depends on material, saturation level, and _____

b. _____- A rock unit that can transmit water through its pore space

1). **Sandstone** and **limestone** make _____ aquifers

2). **Shale** or **clay** _____ or _____**infiltration**

3. Porosity and Permeability

a. Combined **volume** of **pore spaces** defines materials _____

b. _____- measure of how well a fluid can pass through a material

C. Water Resources

1. Obtaining groundwater

a. _____- where water table intersects the ground surface

b. _____- holes dug or drilled into Earth to reach water table

c. Natural _____ of groundwater has both **horizontal** and **vertical** components

2. Water under pressure

a. _____ **wells**- wells drilled into aquifers that are under natural pressure to force water up into well

b. These wells are usually **free flowing** at the _____

3. Pollution and groundwater resources

a. _____ can enter **groundwater** through infiltration

b. Particles can _____ larger contaminants

c. Some can _____ groundwater (i.e. arsenic)

IV. Geologic Time

A. Time

1. Absolute and Relative Dating

a. _____ **dating**- process of assigning a precise numerical age to an organism, object, or event

b. _____ **dating**- process of placing objects or events in their proper sequence of time

2. **Uniformitarianism**- states that the laws of nature operate _____ s they have in the _____

a. By studying how geologic events take place today, can infer how events took place in the past

b. "The _____ is the key to the _____"

B. Principles of Relative Dating

1. **Principle of superposition**- the oldest rocks in an undisturbed sequence of rock layers will be at the _____

2. **Original Horizontality**- sedimentary layers start off _____

a. If layers not horizontal they have been _____

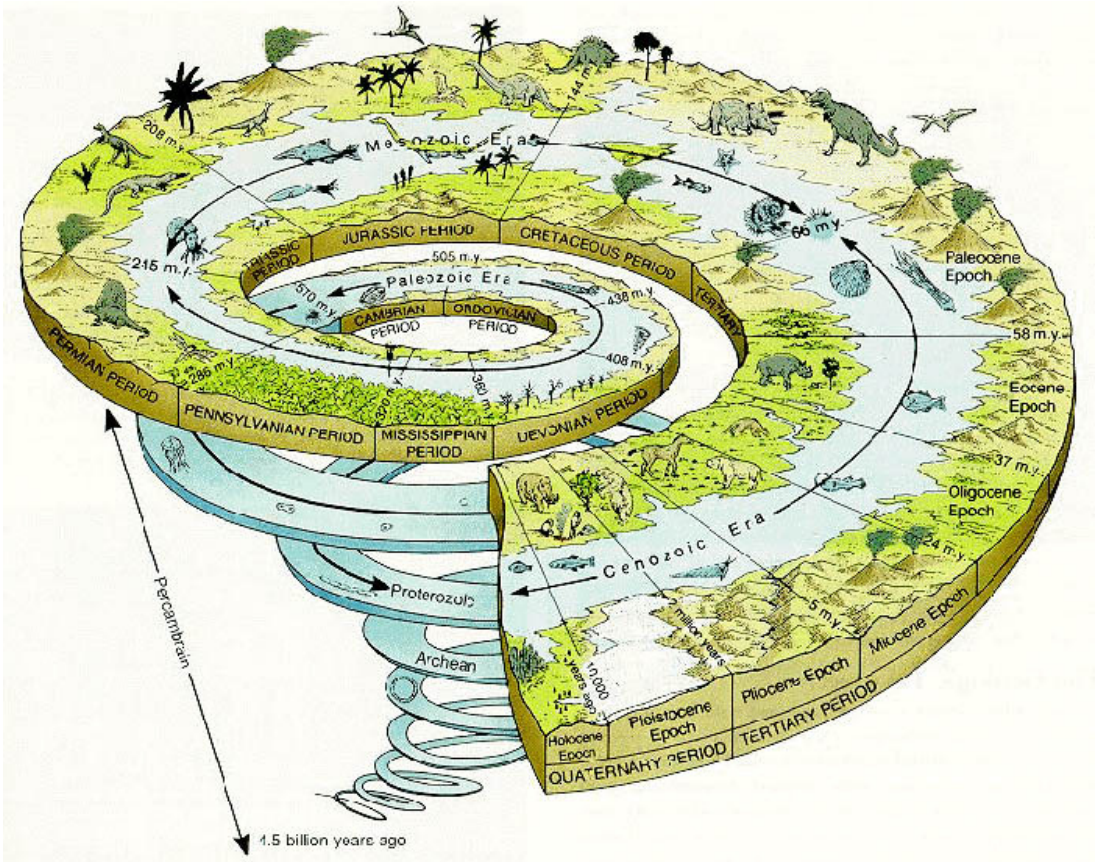
b. Must have been moved by some _____

3. **Overlapping Features**- Any **rock formation** or **fault** is _____ than the rock or feature that it cuts through

4. **Unconformities**- represent _____ in the rock record during which **erosion** occurred or **deposition** was absent

C. Fossils

1. _____- remains or traces of organisms found in the geologic rock record



2. _____- The process of <u>matching</u> **distinctive rock units** from different regions

a. Used by **paleontologists** in correlating fossil-bearing rock units on a _____ scale

b. _____ **fossils**- organisms what were widespread geographically, but lived in narrow, well-defined period of time

3. **Geologic Time Scale**- boundaries of time that _____ existence of certain life forms and catastrophic geologic events

D. Absolute Dating

1. Use the **radioactive atoms** in minerals like a _____ to measure passing of time

2. **Radioactive decay**- some types of atoms are _____ and decay to produce new isotopes

3. **Half-life**- the time it takes for 1/2 of a radioactive sample to _____

4. Useful Isotopes

a. **Carbon-14** useful in dating _____ **organisms**

b. Other isotopes used to date ages of rock (use unaltered minerals in _____ **rocks**)

1). Use isotopes with very _____ **half-lives**

2). Do not use **sedimentary** or **metamorphic** rock because action of _____ or other fluids affect composition

E. **Geologic Maps**- show horizontal distribution of various rock formations

1. _____ **and** _____- compressional forces due to plate tectonics cause layer to **fold** and **dip downward**

2. _____- folding and wrinkling of crust caused by compression

3. **Plunging Folds**- _____ forces produce tilted folds