

# *Weathering and Erosion*

## *Unit 8*

### *Weathering and Erosion*

*Ft. Clarke Middle School*

*6<sup>th</sup> Grade Science*

## *Essential Questions:*

- *What evidence can students observe that the Earth is changing?*
- *What processes change rocks from one type to another?*
- *What is meant by weathering?*
- *How many different kinds of weathering processes are there?*

## *Essential Questions:*

- *How are weathering and erosion different?*
- *How are weathering and erosion related?*
- *How does the formation of soil relate to the processes of weathering and erosion?*

# *Sunshine State Standards*

- ***SC.6.E.6.1***

*Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.*

- ***SC.6.E.6.2***

*Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.*

# *Sunshine State Standards*

- ***SC.7.E.6.2***

*Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).*

# *Vocabulary*

- *contour plowing*
- *crop rotation*
- *deposition*
- *desert soils*
- *erosion*
- *forest soils*
- *humus*
- *Leaching*
- *minimum tillage*
- *mountain soils*
- *parent rock*
- *permeability*
- *porosity*
- *prairie soils*
- *soil*
- *soil conservation*
- *soil profile*
- *tropical soils*
- *weathering*

# *Weathering*

**1. What is weathering?**

**1. Weathering is the physical and chemical processes that break down rocks at the earth's surface.**

## **Mechanical Weathering Includes:**



**Unloading**



**Root Wedging**



**Frost Action**



**Temperature Change**

# *Weathering*

## **2. What is mechanical weathering?**



**2. Mechanical weathering is the breaking rock into smaller pieces by mechanical or physical means**

- **Animals dig holes that allow air and water into rock**
- **Plant roots break rocks**
- **Temperature changes make rocks expand and contract unevenly then break**
- **Water rubs sand and rock against other rocks**
- **Wind blows rock particles against rocks**



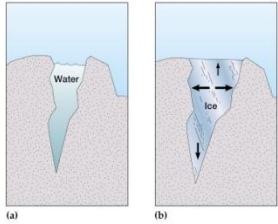
# *Weathering*

**5. What is chemical weathering?**

**5. Chemical reactions change composition of a rock.**

- **Minerals dissolve in water**
- **Oxidation – oxygen in air combines with iron in rock**
- **Carbonation – weathering caused by carbonic acid**
- **Sulfuric acid created when water vapor combines with SO<sub>2</sub> from burning coal and volcanoes**
- **Plant and fungi make acids to help their roots burrow into rock**

# *Weathering*



**3. What is ice wedging?**

**3. Ice wedging is water flows into cracks and freezes.**

**4. What is exfoliation?**



**4. Exfoliation is the process of sheets of rock flake off as a result of reduced pressure over time**

Lichen



Oxidation



Carbonation



Acid Rain



# *Weathering*

**6. What affects the rate of weathering?**

**6.**

- **Size of rock fragments**

**Small weathers faster than large**

- **Composition of the rock. Granite is very resistant. Limestone reacts easily**

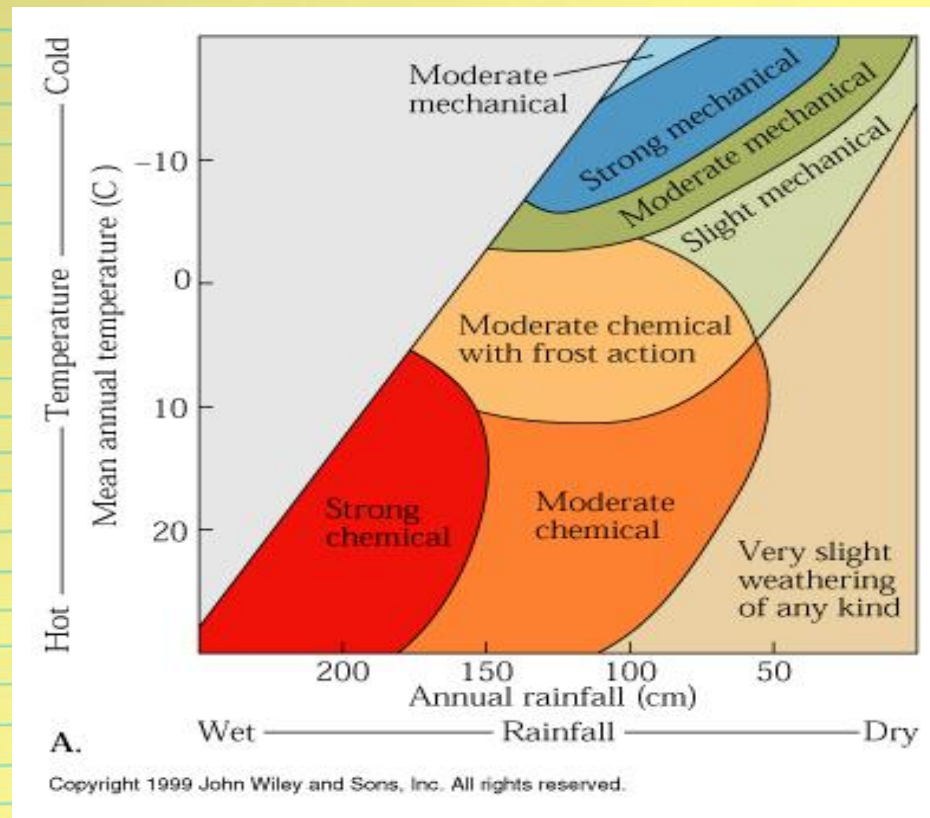
- **Climate; More chemical weathering in hot, humid climates**

- **More physical weathering in temperate climates; Freezing and thawing**

# Weathering

7. Sketch the diagram

7.



# *Weathering and Erosion*

**8. What is erosion?**



**8. The process by which small particles of rock are moved from one place to another.**

- Agents of erosion are moving water, wind, ice, and gravity
- Rate of erosion is affected by the amount of rain, looseness of particles, and slope of the land

# *Weathering and Erosion*

**9. What is deposition?**

**9. The dropping of sediments on the bottom of lakes, valleys, and the ocean floor.**

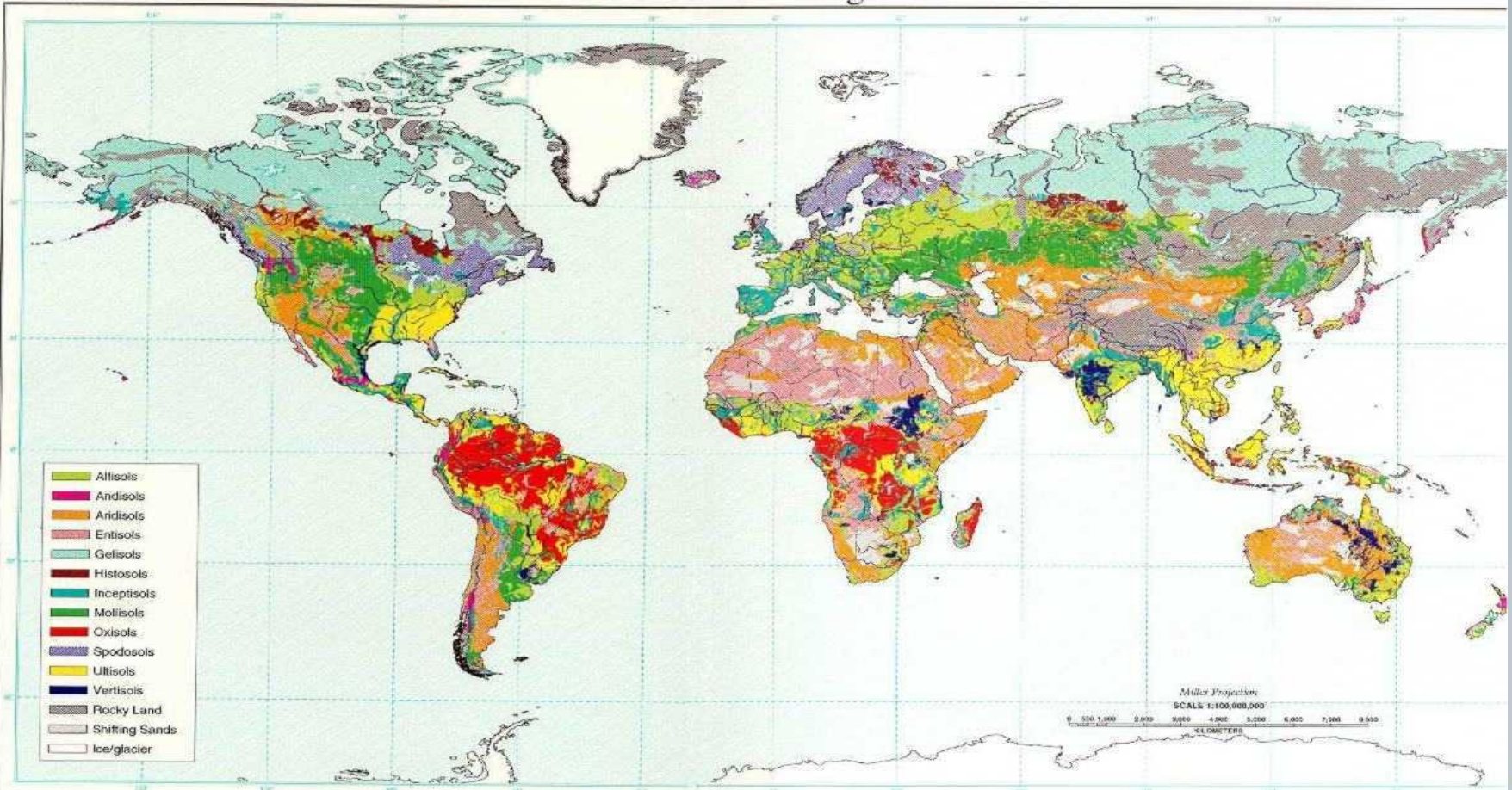
**• Agents of erosion slow down and lose energy**



# Soils

U.S. Dept. of Agriculture  
Natural Resources Conservation Service  
Soil Survey Division  
World Soil Database

## Global Soil Regions



# *Soils*

**10. What is soil?**



**10. Soil is a mixture of weathered rock and organic material at the earth's surface.**

# Soils

11. What makes up soil?

11.

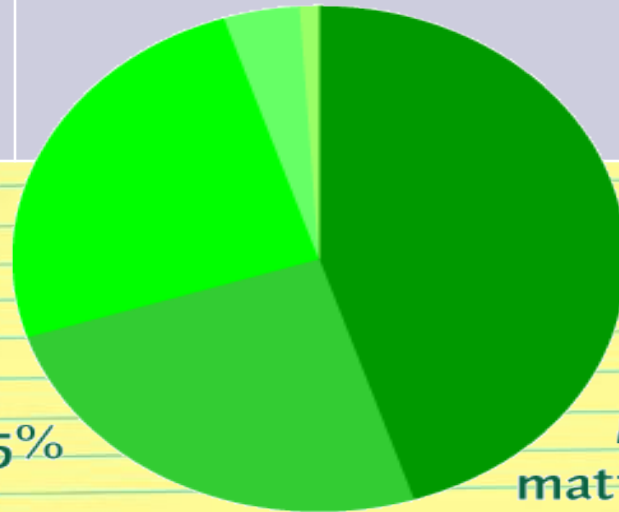
## Typical soil composition

Organic matter 4%      Organisms 1%

Air 25%

Water 25%

Mineral matter 45%



# *Soils*

**12. What is humus?**



**12. Humus is living and partly decayed plant and animal materials**

- Half of soil is water and air

**13. What is parent rock?**



**13. Parent rock :** – rock that breaks apart to produce fragments found in a soil

# *Soils*

**14A. What are the 3 steps involved in soil development?**

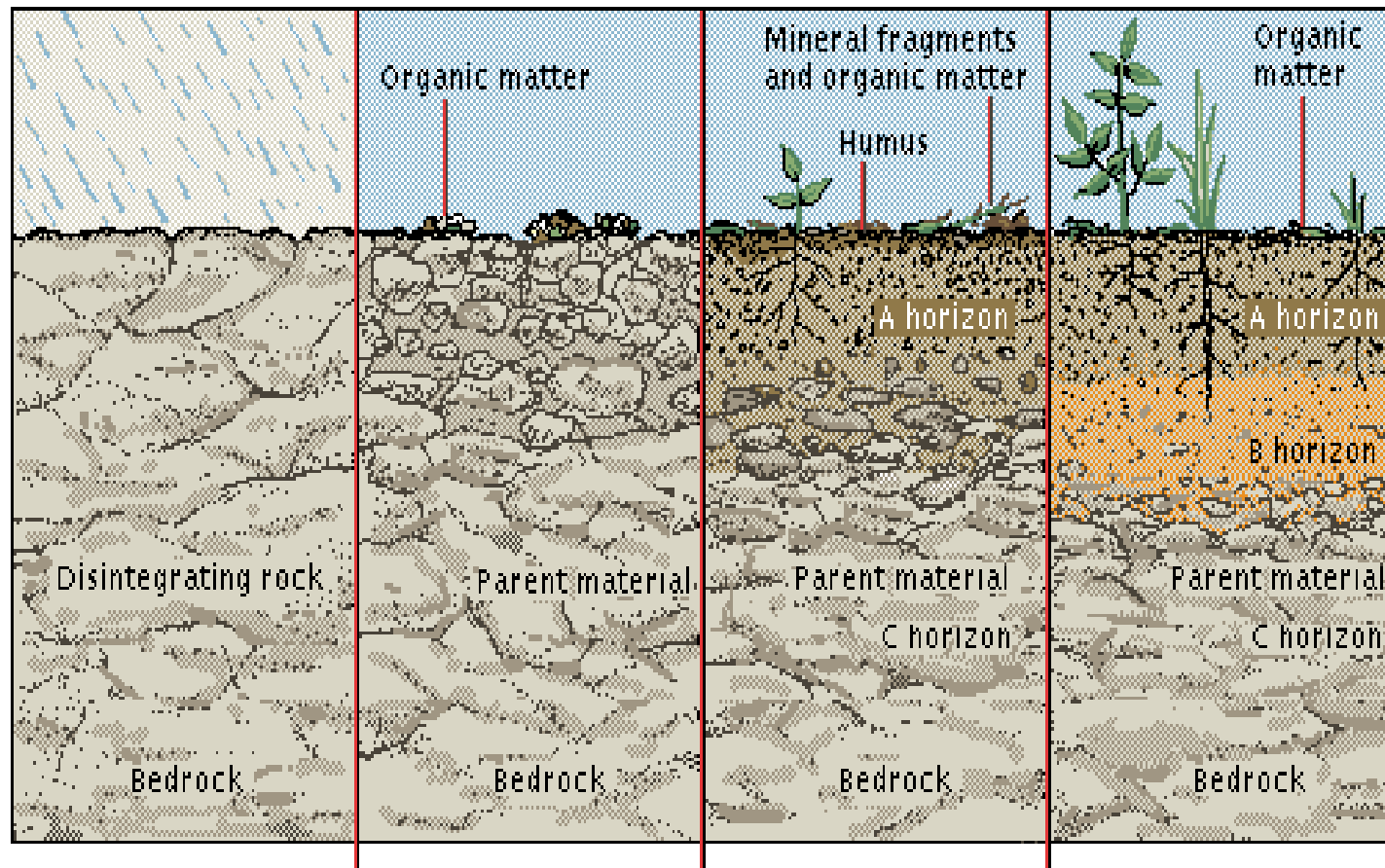
**14A.**

- **Weathered parent rock is broken into smaller fragments.**

- **Small plants grow, die, and decay to form a new layer of immature soil.**

- **Soil matures as organisms burrow into soil and mix humus with rock and water leaches out, forming a new layer under the topsoil.**

# 14 B. Draw



Bedrock begins to disintegrate

I

Organic materials facilitate disintegration

II

Horizons form

III

Developed soil supports thick vegetation

IV



**Puzzle Activity:**

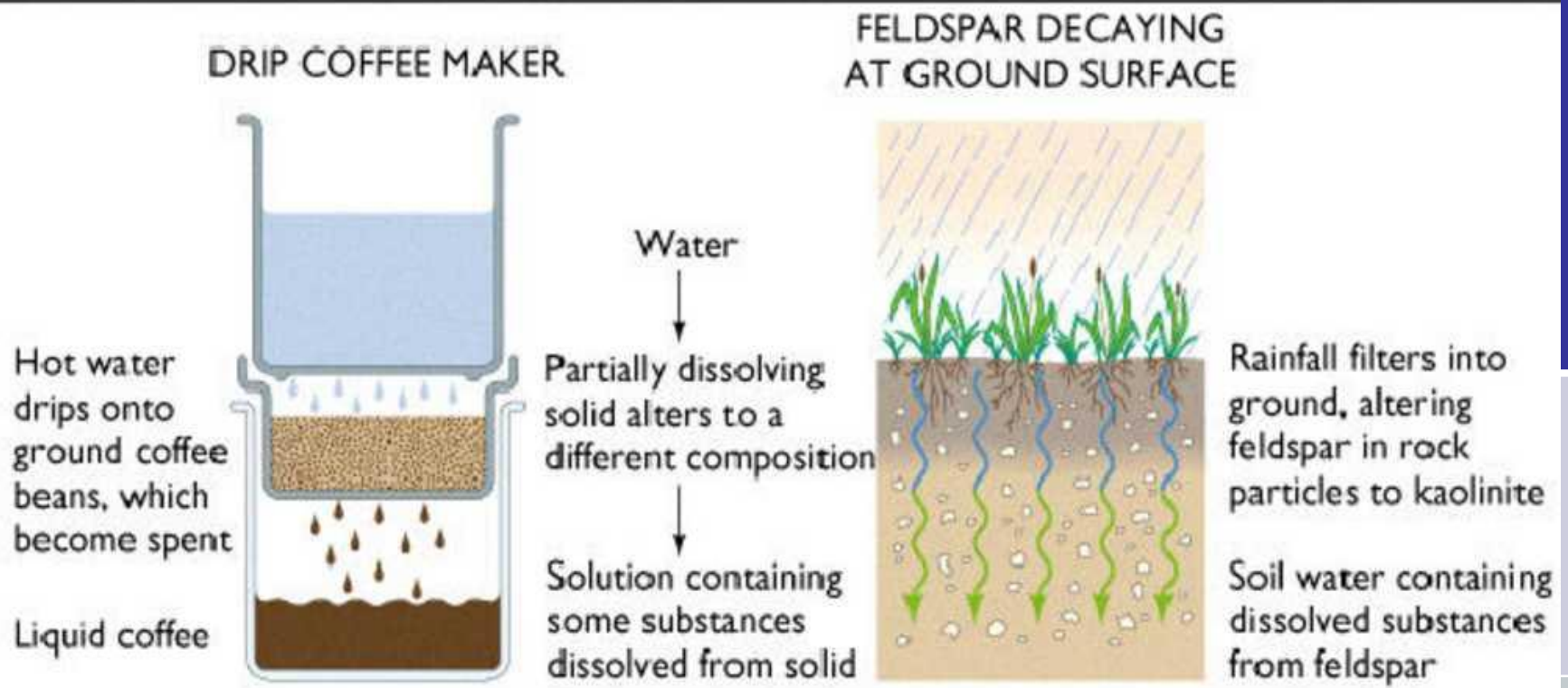
<http://www.harcourtschool.com/activity/dirt/compostion.html>



# Soils

15. What is leaching?

15. Leaching is the process by which soil components are carried from upper layers to lower layers by water.



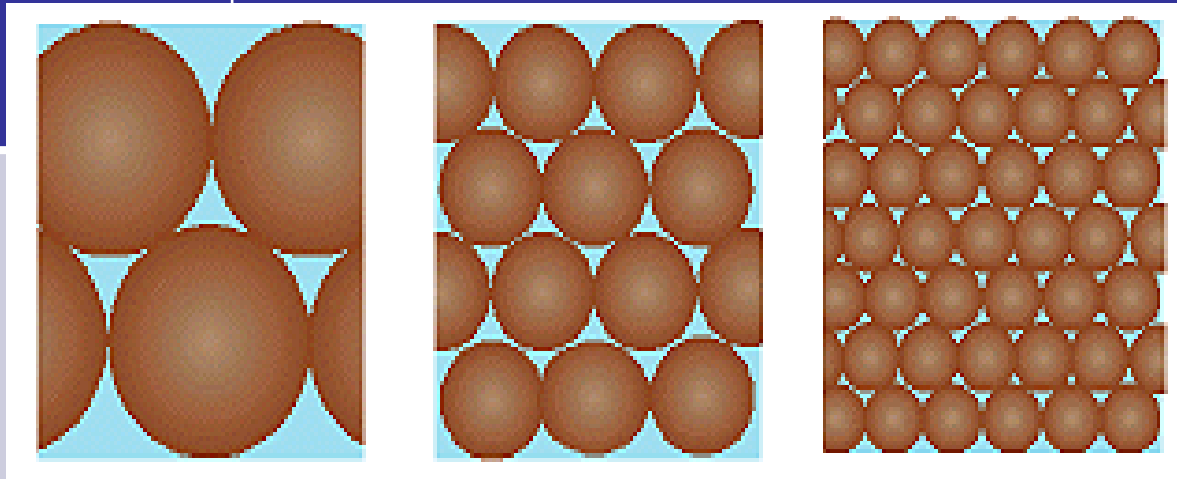
# Soils

**16. What is porosity?**

**16. Porosity is a measure of amount of soil's volume that is composed of pores (holes)**

**•Particle Shape**

**Round matter has more pores for air and water; Flat or angular mater has less pore space.**

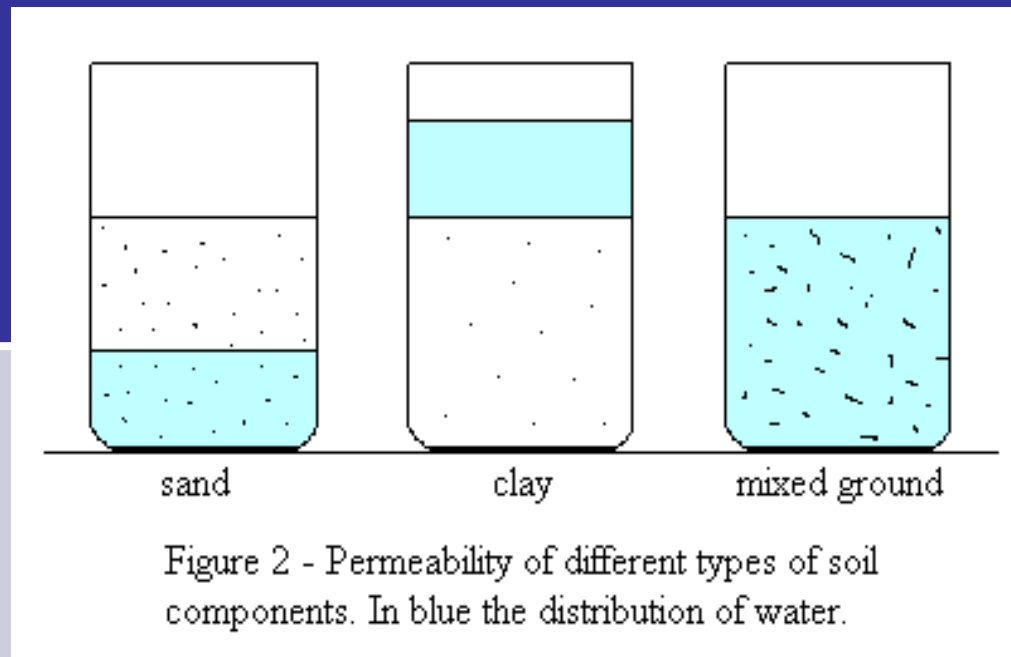


# Soils

17. What is the relationship between particle size and soil formation?

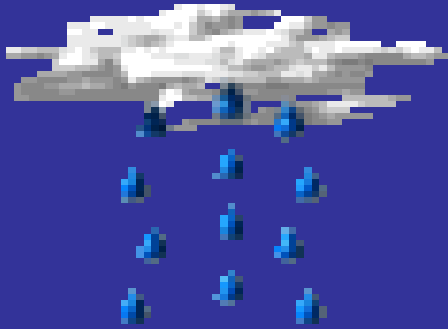
17.

- mixed size makes for fewer pores
- Clay has small pores
- Silt is larger than clay
- Sand is larger than silt.



# *Soils*

18. What is the permeability?



18. Permeability – ability of soil to allow water to flow through

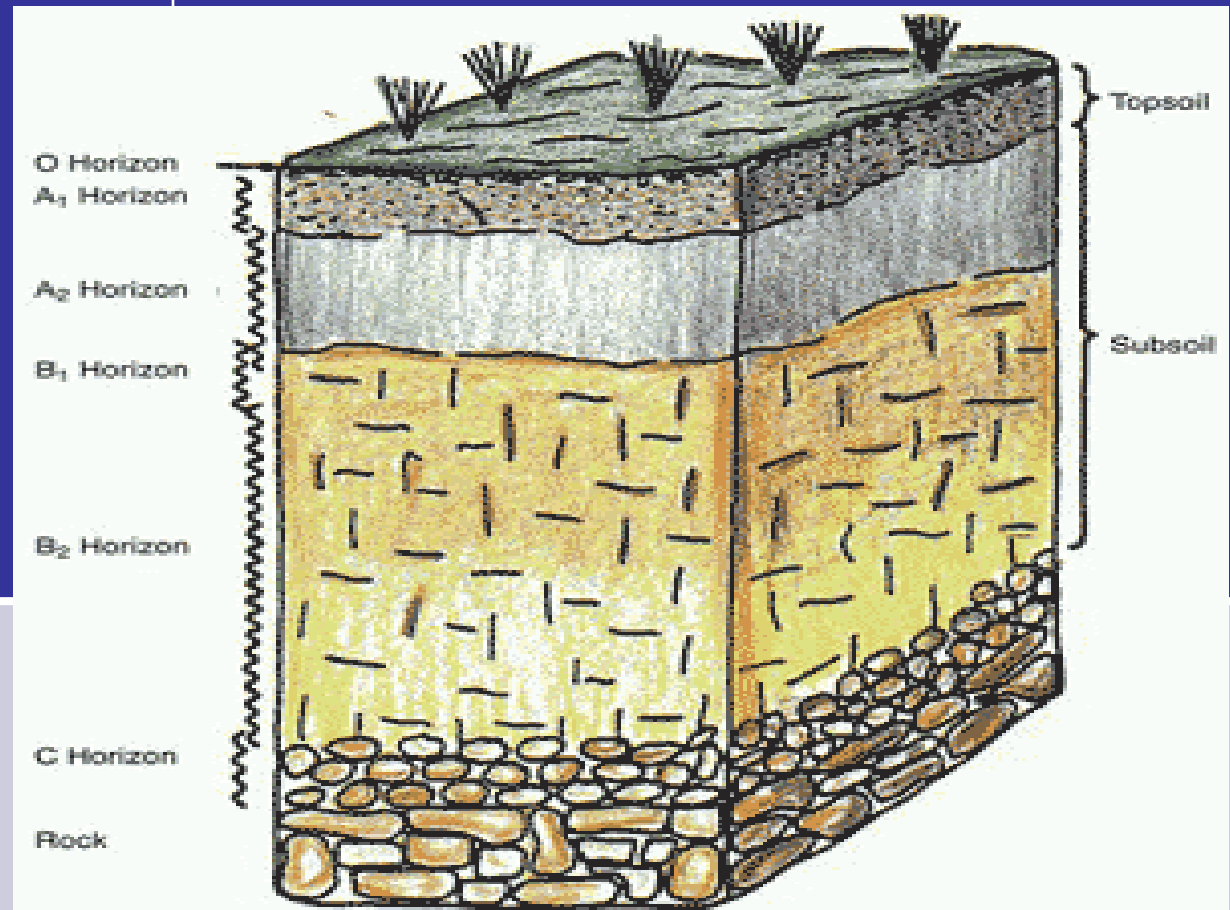


# Soils

19. What is the soil profile?

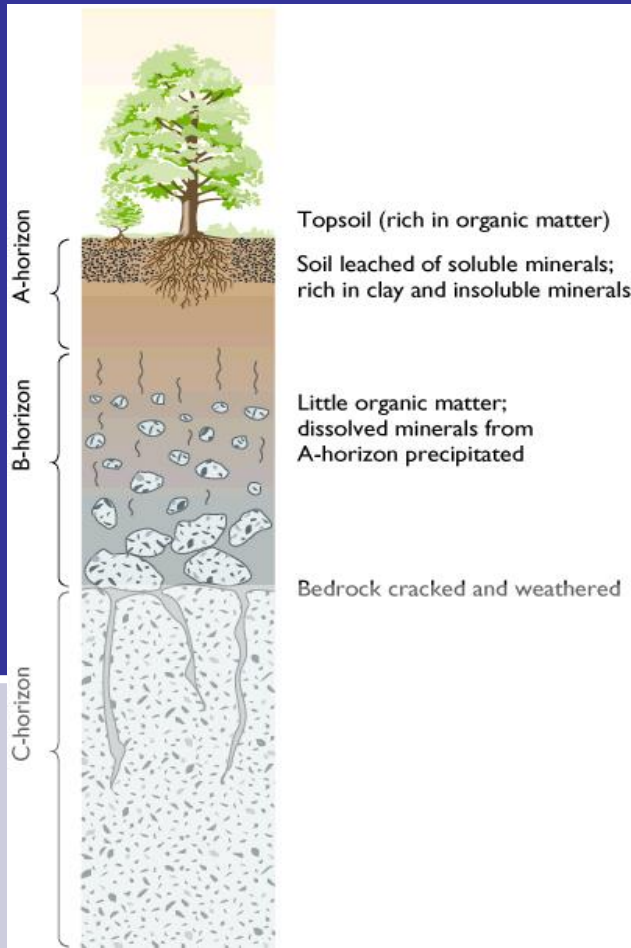
19. A soil profile is the cross section of the layers of soil.

Sketch



# Soils

## 20. What are the A, B, and C Horizons?



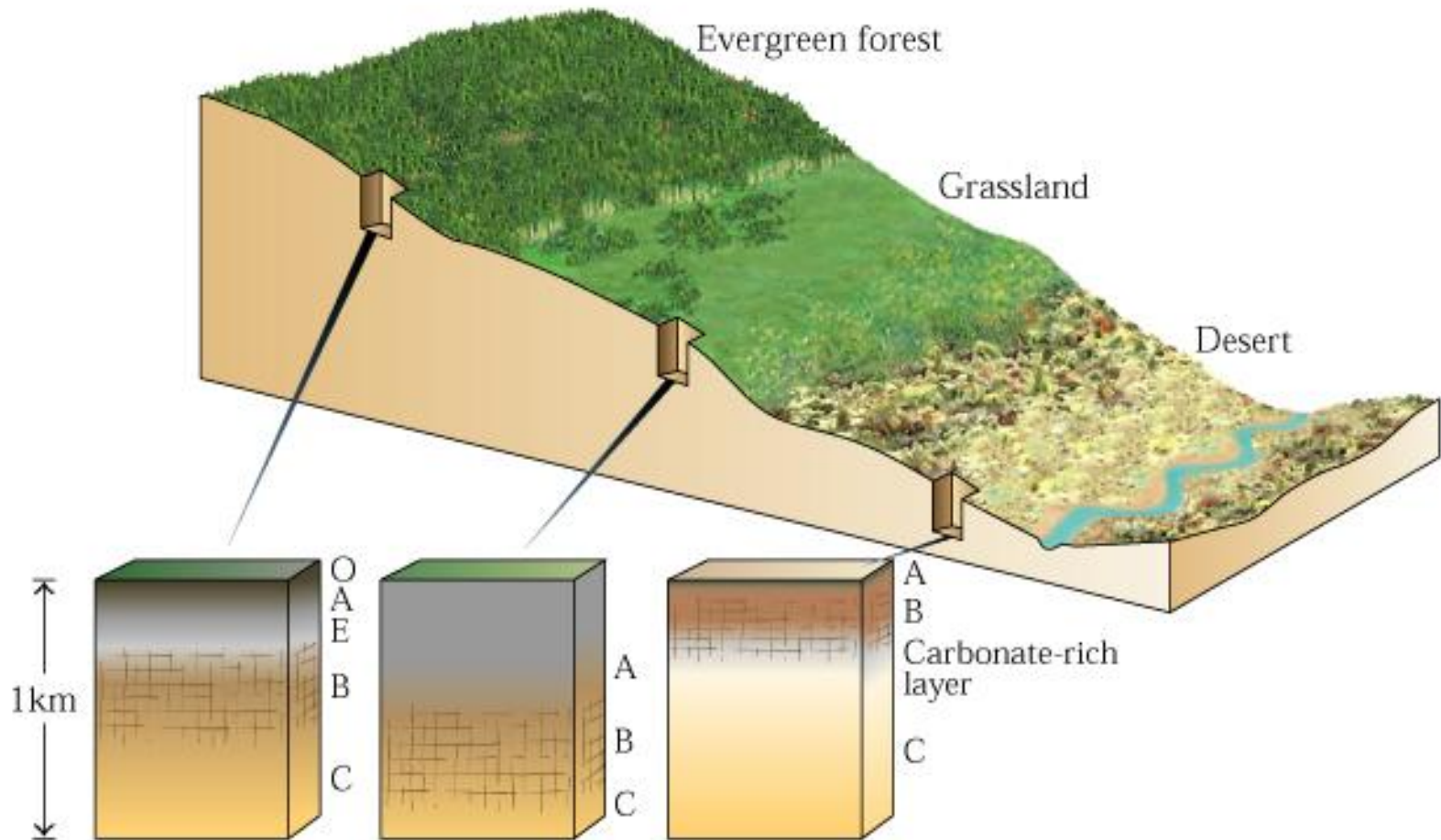
20.

- **A horizon** – called topsoil; humus and rock particles

- **B horizon** – called subsoil; minerals, silt and clay leached down by water

- **C horizon** – rock fragments of parent rock

# Soil Classification

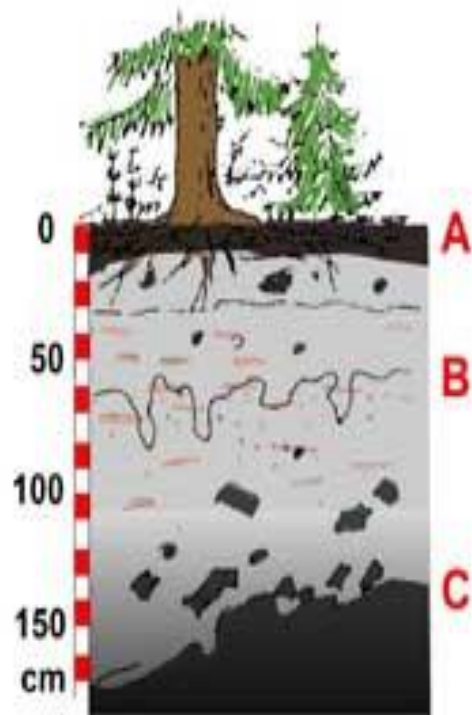


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# Soil Classification

21. Describe forest soil.

21. Forest soil has lots of rain; hot and cold seasons



- **A horizon** – thin, sandy and light colored
- **B horizon** – red or brown clay from acidic leaching
- **Podsol** – forest soil formed from acidic leaching

# *Soil Classification*

**22.**  
**Describe**  
**prairie Soil**



**22. Prairie Soil -medium rain**

- **A horizon** – deep and rich in humus and minerals
- **Example:**  
**Great Plains –The Dakotas, Nebraska, Kansas, Minnesota, etc.**

# Soil Classification

23.  
Describe  
desert soils



23. Desert Soils – almost no rain  
**A horizon** – rich in minerals, little  
or no humus

# *Soil Classification*

**24. Describe mountain soils**

**24. Mountain Soils – steep and rocky**

- **A horizon** – hard to develop, usually very thin



# Soil Classification

25.

Describe  
tundra  
soils



25. Tundra soils -little rain, very cold

**A horizon** – thin and waterlogged; freezes every winter; very small plants; produce little humus

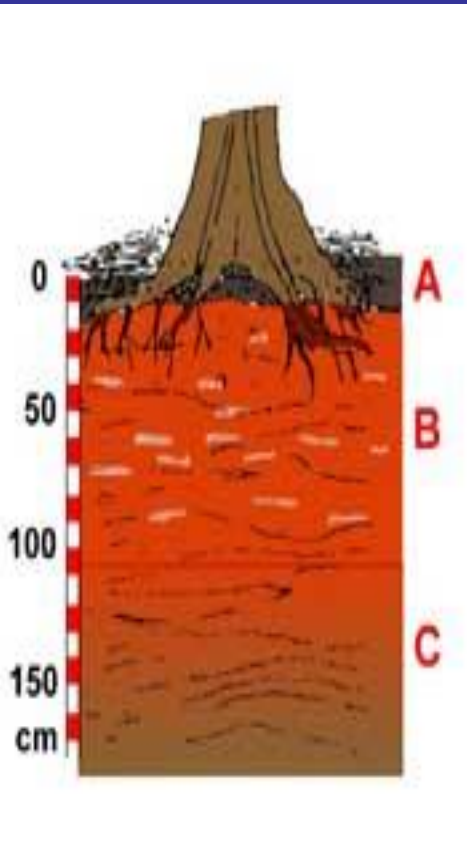
**B horizon** – frozen, keeps water trapped in topsoil

- permafrost – permanently frozen deep layer of subsoil



# Soil Classification

26. Describe tropical soils.



26. Tropical Soils – heavy rain, always warm.

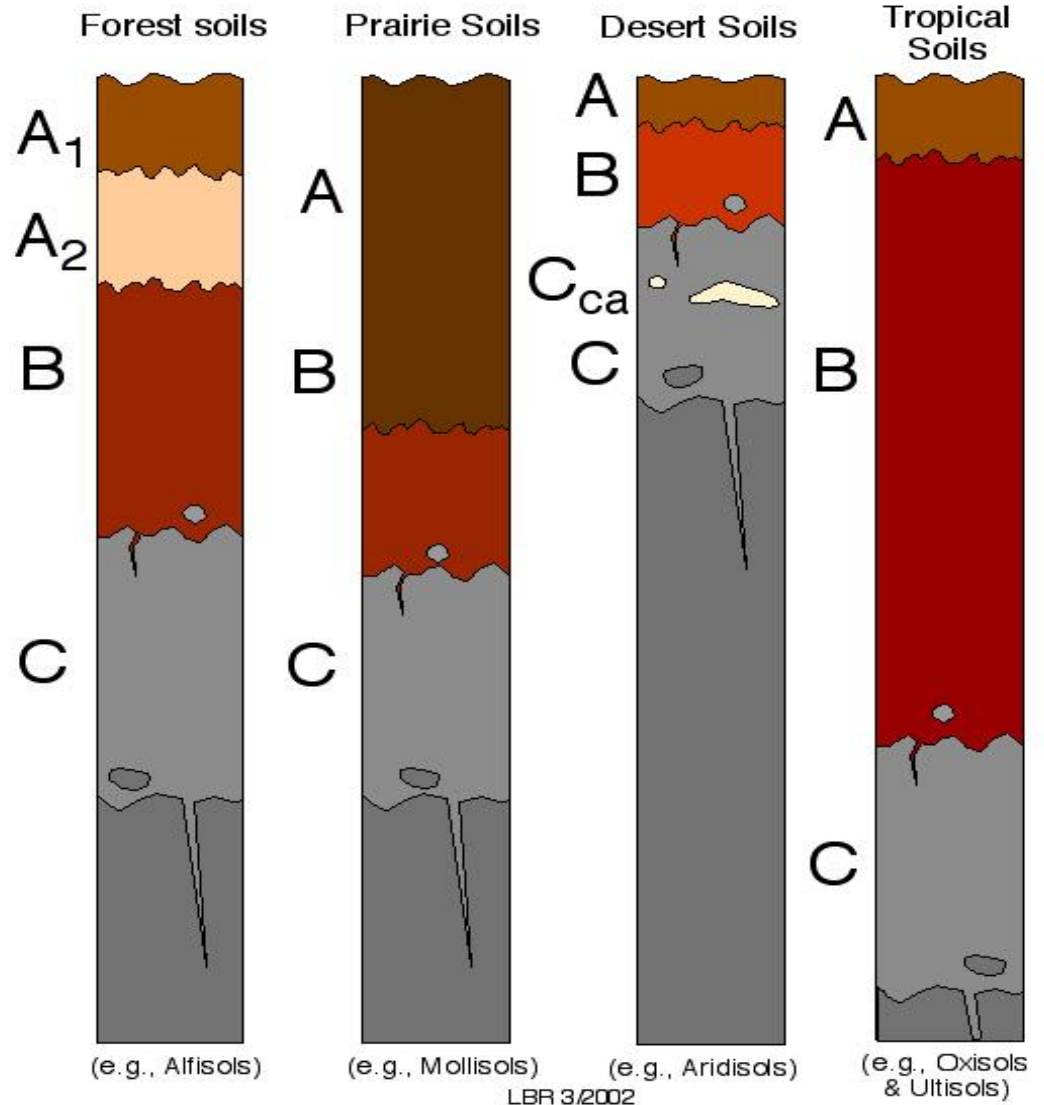
**A horizon** – very little humus and Minerals; dead material decays too fast to build humus; heavy rain leaches minerals very fast; made of iron and aluminum clay

**Laterite** – rusty red tropical soil heavily leached by rain; Soil becomes brick-hard when trees are cut down

# Soil Composition

27. Draw diagram comparing soil composition.

Some (slightly) more realistic soil profiles



# *Soil Conservation*

## **28. What is Contour plowing**

**28. Contour plowing is a practice that plows across a slope following its elevation using contour lines. The rows formed have the effect of slowing water runoff during rainstorms so that the soil is not washed away.**



# *Soil Conservation*

**29. What are windbreaks ?**

**29. Rows of trees planted to slow wind**



# Soil Conservation

**30. What is minimum tillage?**

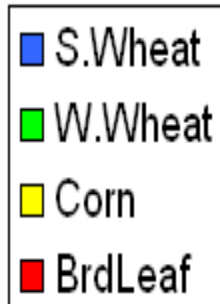


**30. Minimum tillage is a tillage method that does not turn the soil over; Soil stays moist longer and crop roots can grow deeper in the soil.**

# Soil Conservation

**31. What is crop rotation?**

4-Year Crop Rotation



**31. Is a process that rotates the types of crops grown; all;**

- **Allows field to recover nutrients by not planting or planting crops that feed the soil**

# *Links*

*Glencoe Virtual Lab on Weathering:*

[http://www.glencoe.com/sites/common\\_assets/science/virtual\\_labs/E06/E06.html](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E06/E06.html)

*Smithsonian National Museum of Natural History:*

<http://forces.si.edu/soils/interactive/statesoils/index.html>

*Harcourt Publishers: Soil Formation*

<http://www.harcourtschool.com/activity/dirt/composition.html>

# *Links*

- *University of Kentucky: Weathering and Climate*

[http://www.as.uky.edu/academics/departments\\_programs/EarthEnvironmentalSciences/EarthEnvironmentalSciences/Educational%20Materials/Documents/elearning/module07swf.swf](http://www.as.uky.edu/academics/departments_programs/EarthEnvironmentalSciences/EarthEnvironmentalSciences/Educational%20Materials/Documents/elearning/module07swf.swf)

- *United States Department of Agriculture: Is Soil Made Through Magic?*

<http://www.nrcs.usda.gov/feature/education/squm/skQ1.html>