

EPSc 413 SP17 Homework #1 ANSWER KEY

1. Components of soil:

a.

Minerals: ~45%

Organic matter: ~5%

Water: 20-30%

Gases: 20-30%

b.

Minerals: Inorganic materials, occur as sand, silt, and clay. Made of physically and chemically broken down rock.

Organic matter: Carbonaceous substances that are from the decay of living organisms; also includes biomass.

Water: Water held in pore spaces in soil, contains dissolved inorganic and organic substances that include plant nutrients. Controls soil pH.

Gases: Air that is in soil pore spaces. May have the same composition as air but often is more humid and has more CO₂ and less O₂ than the atmosphere.

c. Possible answers include:

Minerals: Structural stability; water retention; nutrient retention; traps contaminants

Organic matter: Promotes soil structure; water retention; food for microbes and macrofauna; stores and releases nutrients

Water: Needed for plants and other organisms; driving force for soil formation; contains nutrients in forms accessible to plants; buffers soil pH

Gases: Provides oxygen so that organisms, including roots, can breathe; helps CO₂ and other respiration products leave; affects humidity

2. Soil horizons:

O: Occurs as the surface layer of some soils; made of organic matter from the residue of dead plants and animals; dark in color; more common in forests and wetlands; rare in grasslands

A: Uppermost mineral horizon; will be the surface layer unless an O horizon is present; generally dark in color for the addition of a few percent organic matter; often coarser in texture than lower horizons because fine materials washed out into lower horizons or lost through erosion

E: Present only in some soils; occurs below A if present; zone of maximum leaching; clays and oxide minerals leached out, leaving behind inert minerals like quartz; generally light in color; rare in grasslands, more common in forests

B: Occur below O, A, and E; zone of accumulation of materials washed down from above; often contains more clay, oxides, carbonates, or salts than higher horizons; show clear alteration of parent material

C: Below other horizons and below zone of most biological activity; may contain the parent material for the soil; little soil genesis has occurred here; may contain carbonates or salts in dry regions

3. Diagnostic horizons:

The answers to **a** and **b** will depend on the horizons selected. See section 3.2 of textbook.

4. Soil orders.

a. Multiple answers possible for each soil order. See textbook for information on each order.

b. Answers are specific to the states that you selected.