

Geology 1

- Weathering
- Soil Formation and Layers
- Erosion, Deposition, Sediment

TAKS Warm-Up - Geology 1

1. Which of the following is NOT a type of mechanical weathering?
 - a. Abrasion.
 - b. Oxidation.
 - c. Ice Wedging.
2. Which of the following is NOT a type of chemical weathering?
 - a. Oxidation.
 - b. Acid Rain.
 - c. Plant Root Wedging.

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Geology 1 Guiding Questions

1. What is weathering, and what are the two main types? (pp.226-30)
2. What are five types of mechanical weathering? (p.228-29)
3. What are five agents of chemical weathering? (p.229-30)
4. What is soil, what are its main ingredients, and what factors affect the rate of soil formation? (pp.235-37)
5. How is soil formed, and what are the three soil layers or horizons? (pp.235-37)
6. What was the dust bowl? Why is soil conservation important, and how can it be achieved? (pp.244-46)
7. What are erosion, deposition and sediment? (p.253)
8. What are the four main forces that cause erosion? (p.253)

1. **What is weathering, and what are the two main types? (pp.226-30)**

- Weathering is the process that breaks down rock and other substances at the Earth's surface.
- The two main types of weathering are:
 - (1) mechanical weathering, where rock is physically broken down into smaller pieces;
 - (2) chemical weathering, which breaks down rock through chemical changes.



2. **What are five types of mechanical weathering ? (pp.228-29)**

- The five types of mechanical weathering are:
 - (1) Release of Pressure, as erosion removes material from the surface, the underlying material expands;
 - (2) Ice Wedging, or Freezing - Thawing, where water freezes in a rock crack, expands and wedges the rock apart;



2. Mechanical Weathering (cont.)

- (3) Plant Growth, where roots penetrate and split rocks under the soil;
- (4) Abrasion, where rock particles carried by wind, water and ice wear away rock; and
- (5) Animal Actions, where burrowing animals loosen rocks in the soil.



3. What are five agents of chemical weathering? (pp.229-30)

- The five agents of chemical weathering are:
 - (1) Water (H_2O) dissolves some minerals and rock;
 - (2) Oxygen (O_2) combines with other elements in the rock in an oxidation reaction;
 - (3) Carbon dioxide (CO_2) dissolves in water to make carbonic acid (H_2CO_3);
 - (4) Living organisms produce weak acids that break down or dissolve rock; and
 - (5) Acid rain (H_2SO_4 , HNO_3 , H_2CO_3) contains acids that break down rock or dissolve it.



4. What is soil, what is its main ingredients, and what factors affect the rate of soil formation? (pp.235-37)

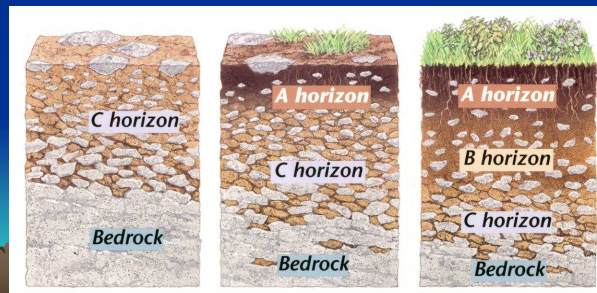
- Soil is a mixture of rock particles, minerals, decayed organic material (humus), air and water.
- Soil forms as rock is broken down by weathering and mixes with other materials on the surface.
- Five factors affect the rate of soil formation: (1) climate; (2) rock type; (3) slope of land; (4) vegetation type; and (5) amount of time rock has weathered.

5. How is soil formed, and what are the three soil layers or horizons? (pp.235-37)

- Soil is constantly formed wherever bedrock is exposed. The amount of weathering determines the size of the rock particles. The smallest particles are clay (<1/256mm), followed by silt (<1/16mm), sand (<2mm) and gravel (>2mm).
- An ideal soil for plant growth is loam, which has 25% air, 25% water, 18% silt, 18% sand, 9% clay and 5% organic matter.
- As soil forms, it develops into different layers called horizons with different color or texture.

5. Soil Horizons (cont.)

- The first horizon to form is the C horizon, as bedrock weathers into particles. The A horizon then forms on top of the C horizon, as plants add organic material (humus) to the soil. The middle B horizon is the last to develop, as clay and minerals wash down from the A horizon.



6. What was the dust bowl? Why is soil conservation important, and how can it be achieved? (pp.244-46)

- The “dust bowl” was an area stretching from west Texas to North Dakota and Montana in the 1930s, where drought, poor plowing practices and wind erosion caused severe loss of topsoil. It caused many farmers to lose their land.
- It takes decades for a single centimeter of soil to be formed. Erosion can destroy soil in a matter of minutes, if topsoil conservation is not practiced.

6. Soil Conservation (cont.)

- Soil conservation is the management of soil to prevent its destruction.
- Contour plowing is the practice of plowing fields parallel to the contour lines, so that water cannot easily run downhill and wash the topsoil away.
- Conservation plowing, also called no-till or low-till plowing, is the practice of leaving stalks and weeds in place after a harvest, either until the spring when they are plowed under, or simply planting through the previous crop's stalks.



7. What are erosion, deposition and sediment? (p.253)

- Erosion is the process by which natural forces move weathered rock from one place to another.
- Sediment is the material moved by erosion. Both weathering and erosion create sediment.
- Deposition occurs where the agents of erosion lay down sediment.



8. What are the four main forces that cause erosion? (p.253)

- The four main forces that cause erosion are gravity, glaciers, wind and water.

