UNIT SEVEN

Sediments and Sedimentary Rocks

*Dedicated to: __________________________
**Anticipation Guideline (Sedimentary Rock)**

Read page 127-131 in your Earth Science Textbook. Base on the reading: **decide** whether or not each statement below is true (yes) or False (no). If the statement is no, please **indicate** the page# and line# where the correct answer is located in the text. In addition, be sure to **correct** the wrong word in the statement with the correct vocabulary. You may only fill out yes or no on one side of the table. The other side of the table will be done by you after hurricane topics.

<table>
<thead>
<tr>
<th>Your hypothesis</th>
<th>correct answer after reading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Statements</strong></td>
<td><strong>Page#</strong>&lt;br&gt;<strong>Line#</strong></td>
</tr>
<tr>
<td>Sedimentary Rock forms through the compacting and cementing of sediments</td>
<td></td>
</tr>
<tr>
<td>Clastic sedimentary rocks are formed from lava</td>
<td></td>
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<tr>
<td>Clastic rocks are made of loose sediments</td>
<td></td>
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<tr>
<td>The water in seas, lakes often contain dissolved minerals</td>
<td></td>
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<tr>
<td>Organic sedimentary rocks are formed from dissolved minerals</td>
<td></td>
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<tr>
<td>Halite is an example of organic sedimentary rock</td>
<td></td>
</tr>
<tr>
<td>Common organic sedimentary rocks are limestone and coal</td>
<td></td>
</tr>
<tr>
<td>Fossils is not a feature of sedimentary rock</td>
<td></td>
</tr>
<tr>
<td>Other sedimentary rock features are ripple marks and mudcracks</td>
<td></td>
</tr>
</tbody>
</table>
Key Concept #1

- How do those layers form?
  - **Order or process:**

Mechanical Weathering

- ________________________________________

Examples:
- __________________________
- __________________________
- __________________________
- __________________________

Chemical Weathering

- ________________________________________

Examples:
- __________________________
- __________________________
- __________________________
- __________________________
- __________________________
Key Concept#2
- What affects the rate of chemical Weathering? ______________________

Key Concept#3
- What type of climate would increase the rate of physical and chemical weathering?
  - Chemical weathering: ______________________
  - Mechanical weathering: ______________________

Key Concept #4
- Erosion____________________________________

### Agents of Erosion

<table>
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<tr>
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</tr>
</tbody>
</table>

**Effects of Erosion or Natural Disaster from Erosion**

- ______________________
- ______________________

**Evidence of Stream and Glacial Erosion**

<table>
<thead>
<tr>
<th>Stream Erosion</th>
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<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Glacier Erosion</th>
<th></th>
</tr>
</thead>
</table>
Key Concept #5

Factors of Deposition

1. ____________________
2. ____________________
3. ____________________

Two types of deposition by water and Glacial

a) Water - ____________________
b) Glacier-______________________
1. Which property of water makes frost action a common and effective form of weathering?
   - Water dissolves many earth materials.
   - Water expands when it freezes.
   - Water cools the surroundings when it evaporates.
   - Water loses 334 Joules of heat per gram when it freezes.

2. At high elevations, which is the most common form of physical weathering?
   - Abrasion of rocks by the wind
   - Alternate freezing and melting of water
   - Dissolving of minerals into solution
   - Oxidation by oxygen in the atmosphere

3. Which process involves either a physical or chemical breakdown of earth materials?
   - Deposition
   - Sedimentation
   - Weathering
   - Cementing

4. In which climate would the chemical weathering of limestone occur most rapidly?
   - Cold and dry
   - Warm and dry
   - Cold and humid
   - Warm and humid

5. Which type of climate has the greatest amount of rock weathering caused by frost action?
   - A wet climate in which temperatures remain below freezing
   - A wet climate in which temperatures alternate from below freezing to above freezing
   - A dry climate in which temperatures remain below freezing
   - A dry climate in which temperatures alternate from below freezing to above freezing

6. Which characteristic would most likely remain constant when a limestone cobble is subjected to extensive abrasion?
   - Shape
   - Mass
   - Volume
   - Composition

7. Water is a major agent of chemical weathering because water
   - Cools the surroundings when it evaporates
   - Dissolves many of the minerals that make up rocks
   - Has a density of about one gram per cubic centimeter
   - Has the highest specific heat of all common earth materials

8. Which geologic feature is caused primarily by chemical weathering?
   - Large caves in limestone bedrock
   - A pattern of parallel cracks in a granite mountain
   - Blocks of basalt at the base of a steep slope
   - The smooth, polished surface of a rock in a dry, sandy area

9. Which activity demonstrates chemical weathering?
   - Freezing of water in the cracks of a sandstone sidewalk
   - Abrasion of a streambed by tumbling rocks
   - Grinding of talc into a powder
   - Dissolving of limestone by acid rain

10. The diagram below represents a geologic cross section of a portion of the Earth's surface. The letters identify different layers of sedimentary rock.

Which rock layer is probably the most resistant to erosion?
   - A
   - B
   - C
   - D

11. Four pieces of the same rock material which have different shapes but equal volumes are exposed to the atmosphere. Which piece would probably weather fastest?
   - A piece shaped like a sphere
   - A piece shaped like a cube
   - A piece shaped like a cylinder
   - A piece shaped flat and thin

12. A large rock is broken into several smaller pieces. Compared to the rate of weathering of the large rock, the rate of weathering of the smaller pieces is
   - Less
   - Greater
   - The same
13. In the cartoon below, Lucy gives Linus incorrect information about pebbles.

If Lucy wanted to give Linus correct information about pebbles, which statement would be most accurate?
1. Pebbles can become cemented together to form a rock called gabbro.
2. Pebble is the name given to the smallest-size sediment.
3. Any large rock that weathers could become a pebble.
4. Magma is composed of pebbles.

14. Base your answer to the following question on the graph below, which shows the effect that average yearly precipitation and temperature have on the type of weathering that will occur in a particular region.

Which type of weathering is most common where the average yearly temperature is 5°C and the average yearly precipitation is 45 cm?
1. moderate chemical weathering
2. very slight weathering
3. moderate chemical weathering with frost action
4. slight frost action
Weathering and Erosion HW

Base your answers to questions 15 and 16 on flowchart below, which shows a general overview of the processes and substances involved in the weathering of rocks at Earth’s surface. Letter X represents an important substance involved in both major types of weathering, labeled A and B on the flowchart. Some weathering processes are defined below the flowchart.

**Definitions**

<table>
<thead>
<tr>
<th>Process</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost action</td>
<td>The breakup of rocks caused by the expansion of substance X</td>
</tr>
<tr>
<td>Abrasion</td>
<td>The wearing down of rocks or particles as they rub or bounce against other rocks</td>
</tr>
<tr>
<td>Exfoliation</td>
<td>The peeling away of large sheets of loosened material at the surface of a rock</td>
</tr>
<tr>
<td>Hydrolysis</td>
<td>The change in a material caused by contact with substance X</td>
</tr>
<tr>
<td>Carbonation</td>
<td>The change in a material caused by contact with carbonic acid</td>
</tr>
</tbody>
</table>

15. Which weathering process is most common in a hot, dry environment?
   1. abrasion  
   2. carbonation  
   3. frost action  
   4. hydrolysis

16. Which term best identifies the type of weathering represented by A?
   1. physical  
   2. biological  
   3. chemical  
   4. glacial

17. Which statement best characterizes the soils found in New York State?
   1. All the soil has been removed by glaciation.
   2. Wind erosion has been the dominant agent in soil formation.
   3. Transported soils are similar in composition to underlying bedrock.
   4. Transported soils are far more common than residual soils.
18. Base your answer to the following question on the photographs and news article below.

**Old Man’s Loss Felt in New Hampshire**

FRANCONIA, N.H. — Crowds of visitors were drawn to Franconia Notch on Sunday to mourn the loss of New Hampshire’s well-known symbol — the Old Man of the Mountain granite profile.

The 700-ton natural formation was just a pile of rocks after breaking loose from its 1,200-foot-high mountainside perch. It was unclear when the outcropping fell because clouds had obscured the area Thursday and Friday; a state park trail crew discovered the collapse Saturday morning.

The famous mountain’s history dates millions of years. Over time, nature carved out a 40-foot-tall profile resembling an old man’s face, and it eventually became New Hampshire’s most recognizable symbol.

The Buffalo News, May 5, 2003

Which agent of erosion is most likely responsible for the collapse of the granite profile?

1. running water  
2. glacial ice  
3. wave action  
4. mass movement

19. The four limestone samples illustrated below have the same composition, mass, and volume. Under the same climatic conditions, which sample will weather fastest?

1  
2  
3  
4

20. Which graph best represents the chemical weathering rate of a limestone boulder as the boulder is broken into pebble-sized particles?
Weathering and Erosion HW
Answer Key
[New Exam]

1. 2
2. 2
3. 3
4. 4
5. 2
6. 4
7. 2
8. 1
9. 4
10. 2
11. 4
12. 2
13. 3
14. 4
15. 1
16. 3
17. 4
18. 4
19. 4
20. 1
## Relationship of Transported Particle Size to Water Velocity

![Graph showing the relationship between particle size and water velocity.](image)

This generalized graph shows the water velocity needed to maintain, but not start, movement. Variations occur due to differences in particle density and shape.

### Scheme for Sedimentary Rock Identification

#### Inorganic and Derived Sedimentary Rocks

<table>
<thead>
<tr>
<th>Texture</th>
<th>Grain Size</th>
<th>Composition</th>
<th>Comments</th>
<th>Rock Name</th>
<th>Map Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clastic</td>
<td>Pebbles, cobbles,</td>
<td>Mostly quartz, feldspar, and clay minerals</td>
<td>Rounded fragments</td>
<td>Conglomerate</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>and/or boulders</td>
<td></td>
<td>Angular fragments</td>
<td>Breccia</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>embedded in sand,</td>
<td></td>
<td>Fine to coarse</td>
<td>Sandstone</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>silt, and/or clay</td>
<td></td>
<td>Very fine grain</td>
<td>Siltstone</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Compact; may split</td>
<td>Shale</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>(0.008 to 0.2 cm)</td>
<td></td>
<td>easily</td>
<td></td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>Sand (0.008 to 0.006 cm)</td>
<td></td>
<td></td>
<td></td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>Silt (0.0004 to 0.006 cm)</td>
<td></td>
<td></td>
<td></td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>Clay (less than 0.0004 cm)</td>
<td></td>
<td></td>
<td></td>
<td><img src="image" alt="Symbol" /></td>
</tr>
</tbody>
</table>

#### Chemically and/or Organically Formed Sedimentary Rocks

<table>
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<th>Grain Size</th>
<th>Composition</th>
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</thead>
<tbody>
<tr>
<td>Crystalline</td>
<td>Fine to coarse crystals</td>
<td>Halite</td>
<td>Crystals from chemical precipitates and evaporites</td>
<td>Rock salt</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gypsum</td>
<td></td>
<td>Rock gypsum</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dolomite</td>
<td></td>
<td>Dolostone</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>Crystaline or bioclastic</td>
<td>Microscopic to very coarse</td>
<td>Precipitates of biologic origin or cemented shell fragments</td>
<td>Limestone</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>Bioclastic</td>
<td>Carbon</td>
<td>Compacted plant remains</td>
<td>Bituminous coal</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
</tbody>
</table>
How do sedimentary rock form chemically and biologically?

Rock Salt, Gypsum and Limestone

- Evaporite: __________________________________________________________
- Precipitate: ________________________________________________________

Step #1

Step #2

Step #3

Step #4

Formation of organic limestone

Formation of Coal
Base your answers to questions 1 through 3 on the cross section below, which represents a glacier moving down a mountain valley. The water from the melting glacier is flowing into a lake. Letter A represents location on the bottom of the lake.

![Cross Section Diagram]

1. Describe the most likely shape of a cross section of the glacial valley as viewed from the lake. [1]

2. After the glacier melts, what evidence might be found on the surface of the bedrock indicating that the glacier had passed over the surface? [1]

3. Sediments found at location A range in diameter from 0.0004 to 0.006 centimeter. What name is given to this size sediment? [1]
### Scheme for Sedimentary Rock Identification

#### Inorganic Land-Derived Sedimentary Rocks

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</tr>
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<td>Sand (0.006 to 0.2 cm)</td>
<td></td>
<td>Angular fragments</td>
<td>Breccia</td>
<td><img src="image" alt="Breccia" /></td>
</tr>
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<td></td>
<td>Silt (0.0004 to 0.008 cm)</td>
<td></td>
<td>Fine to coarse</td>
<td>Sandstone</td>
<td><img src="image" alt="Sandstone" /></td>
</tr>
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<td></td>
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</tr>
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</table>
1. A rock that forms directly from land-derived sediments is
   1) sandstone 3) gabbro
   2) dolostone 4) granite

2. The diagram below represents a conglomerate rock. Some of the rock particles are labeled.

   ![Diagram of a conglomerate rock]

   Which conclusion is best made about the rock particles?
   1) They are the same age.
   2) They originated from a larger mass of igneous rock.
   3) They all contain the same minerals.
   4) They have different origins.

3. Which rock was most likely formed from pebble sized sediment deposited in shallow water at an ocean shoreline?
   1) shale 3) siltstone
   2) basalt 4) conglomerate

4. Which sequence of events occurs in the formation of a sedimentary rock?
   1) 
      ![Diagram of the sequence of events]

   2)

   3)

   4)

5. Base your answer to the following question on the diagram below.

   ![Diagram of the transformation of sediments to a sedimentary rock]

   Which two processes formed this rock?
   1) folding and faulting
   2) melting and solidification
   3) compaction and cementation
   4) heating and application of pressure

6. Which feature is characteristic of sedimentary rocks?
   1) layering 3) distorted structure
   2) foliation 4) glassy texture
Sedimentary Rock HW

7. Base your answer to the following question on the diagram below which shows the structure of a student-developed chart for identifying some rock samples. The circles labeled choice 1 through choice 4 represent decision-making steps leading either to path (a) or path (b). Choice 5 has not been completed.

Student Chart

Before the student can select either path (a) or path (b) at choice 1, the student must make a decision about
1) mineral composition 3) the temperature at which rocks form
2) crystal size 4) the appearance of the rock grains

8. Which rock is made up of angular fragments of rock held together by a natural cement?
1) breccia 3) granite
2) scoria 4) quartzite
9. The profile below shows the average diameter of sediment that was sorted and deposited in specific areas A, B, C, and D by a stream entering an ocean.

As compaction and cementation of these sediments eventually occur, which area will become siltstone?
1) A   2) B   3) C   4) D

10. Base your answer to the following question on the cross section below, which shows a typical bedrock structure where oil and natural gas deposits are found.

According to the diagram, in which type of rock are these natural gas and oil deposits found?
1) coarse-textured igneous rock   3) porous clastic sedimentary rock
2) foliated metamorphic rock   4) intrusive crystalline sedimentary rock

11. Which rock type most often contains fossils?
1) gabbro   3) limestone
2) quartzite   4) metaconglomerate

12. Which map symbol is used to represent an organically formed sedimentary rock composed mostly of carbon?
1)   3)   2)   4)
Sedimentary Rock HW

13. Limestone, gypsum, and salt are rocks formed by the processes of
   1) melting and solidification
   2) evaporation and precipitation
   3) erosion and deposition
   4) weathering and metamorphism

14. Which sedimentary rocks are formed by chemical precipitation from seawater?
   1) gypsum and limestone
   2) fossil limestone and shale
   3) sandstone and siltstone
   4) conglomerate and dolostone

15. Dolostone is classified as which type of rock?
   1) land-derived sedimentary rock
   2) chemically formed sedimentary rock
   3) foliated metamorphic rock
   4) nonfoliated metamorphic rock
1. 1
2. 4
3. 4
4. 1
5. 3
6. 1
7. 4
8. 1
9. 3
10. 3
11. 3
12. 2
13. 2
14. 1
15. 2
Sedimentary Rock HW

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Base your answers to questions 1 through 3 on the cross section below, which represents a glacier moving down a mountain valley. The water from the melting glacier is flowing into a lake. Letter A represents location on the bottom of the lake.

1. Describe the most likely shape of a cross section of the glacial valley as viewed from the lake. [1]

2. After the glacier melts, what evidence might be found on the surface of the bedrock indicating that the glacier had passed over the surface? [1]

3. Sediments found at location A range in diameter from 0.0004 to 0.006 centimeter. What name is given to this size sediment? [1]