1. A sedimentary particle is dropped into a cylinder of water. The particle will take the longest time to settle if the particle has

A) low density, small size, and spherical shape
B) low density, small size, and flattened shape
C) high density, large size, and spherical shape
D) high density, large size, and flattened shape

2. Diagram I below shows a laboratory setup for observing the settling pattern in water of sediments composed of the same mineral. When the sediments in the container were poured into the tube of water, they settled to the bottom in the pattern shown in diagram II below. [Diagram II is enlarged to show the sedimentary particles.]

Which characteristic of the sedimentary particles most likely caused the pattern of deposition shown in diagram II?

A) particle size
B) particle composition
C) particle density
D) particle shape

3. Which property is used to classify the land-derived sedimentary rocks listed in the Earth Science Reference Tables?

A) particle size
B) mineral composition
C) fossil content
D) color

4. Base your answer to the following question on the Earth Science Reference Tables and the diagrams below. The diagrams represent particles of the same type of sedimentary rock material collected from a streambed. The diagrams are drawn actual size.

Which inference about the density of particle A and particle B is most accurate?

A) Particle A and particle B have the same density because they are made of the same material.
B) Particle A has a greater density than particle B because particle A has a greater volume.
C) Particle A has a greater density than particle B because particle A has a greater mass.
D) Particle B has a greater density than particle A because particle B has been worn to a smaller size.

5. Which characteristics of a particle would usually result in the longest settling time for the particle in calm water?

A) low density and round shape
B) low density and flat shape
C) high density and round shape
D) high density and flat shape
6. The graph below shows the relationship between particle shape and settling rate.

Which statement best describes the relationship shown?

A) Flatter particles settle more slowly than rounder particles.
B) Flatter particles settle faster than rounder particles.
C) All particles settle at the same speed.
D) Particle shape does not affect settling rate.

7. The diagram below shows three beds of sediment deposited at different times in a quiet body of water.

The sediment deposited in each bed is best described as

A) sorted mainly according to particle size
B) sorted mainly according to particle shape
C) a mixture of sorted and unsorted particles
D) showing no evidence of sorting
8. Base your answer to the following question on the diagrams and descriptions of the two laboratory activities below. The particles used in these activities are described below.

### Particles Used in Activities

<table>
<thead>
<tr>
<th>Particle</th>
<th>Diameter</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mm Al (aluminum)</td>
<td>2.7 g/cm³</td>
<td></td>
</tr>
<tr>
<td>10 mm Al (aluminum)</td>
<td>2.7 g/cm³</td>
<td></td>
</tr>
<tr>
<td>5 mm Al (aluminum)</td>
<td>2.7 g/cm³</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Particle</th>
<th>Diameter</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mm Fe (iron)</td>
<td>7.9 g/cm³</td>
<td></td>
</tr>
<tr>
<td>15 mm Pb (lead)</td>
<td>11.4 g/cm³</td>
<td></td>
</tr>
</tbody>
</table>

### Activity 1

Three aluminum particles of different sizes were released in a plastic tube filled with water. The length of time each particle took to drop from point A to point B is shown in data table 1.

**Data Table 1**

<table>
<thead>
<tr>
<th>Particle Size</th>
<th>Time of Settling</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mm Al</td>
<td>3.2 sec</td>
</tr>
<tr>
<td>10 mm Al</td>
<td>5.4 sec</td>
</tr>
<tr>
<td>5 mm Al</td>
<td>7.2 sec</td>
</tr>
</tbody>
</table>

### Activity 2

Different combinations of particles were placed in a tube filled with a thick liquid and allowed to fall to the bottom. The tube was then stoppered and quickly turned upside down, allowing the particles to settle. The different combinations of particles are shown in data table 2. The diagram of the particle sorting in data table 2 has been omitted intentionally.

**Data Table 2**

<table>
<thead>
<tr>
<th>Combination</th>
<th>Particles Mixed</th>
<th>Diagram of Sorting</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>15 mm Al, 10 mm Al, 5 mm Al</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>15 mm Al, 15 mm Fe, 15 mm Pb</td>
<td></td>
</tr>
</tbody>
</table>

During Activity 1, as the 10-millimeter aluminum particles drops from A to B, the potential energy of the particle

A) decreases  
B) increases  
C) remains the same
9. The chart below shows the results of an activity in which three samples of copper (A, B, and C) of equal mass were timed as they settled to the bottom of a column of water.

<table>
<thead>
<tr>
<th>Sample A</th>
<th>Sample B</th>
<th>Sample C</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.10 sec</td>
<td>13.75 sec</td>
<td>13.50 sec</td>
</tr>
</tbody>
</table>

The differences in the settling time of the three samples are probably due to differences in their
A) density       B) composition
C) color         D) shape

10. If all the particles below have the same mass and density, which particle will settle fastest in quiet water? [Assume settling takes place as shown by arrows.]

A)  
B)  
C)  
D)  

11. In a soil sample, the particles have the same shape but different sizes. Which graph best represents the relationship between particle size and settling time when these particles are deposited in a quiet body of water?

A)  
B)  
C)  
D)  

12. Which graph shows the relationship between the density of particles and their settling time in still water? [Assume that the particles have the same size and shape.]

A)  
B)  
C)  
D)  

13. A sample of rounded quartz sediments of different particle sizes is dropped into a container of water. Which graph best shows the settling time for these particles?

A)  
B)  
C)  
D)  

IN STILL WATER: THE LARGEST, ROUNDEST, DENSEST PARTICLES SETTLE FIRST.
14. Quartz particles of varying sizes are dropped at the same time into deep, calm water. Which cross section best represents the settling pattern of these particles?

A)  

B)  

C)  

D)  

15. Four differently shaped samples of equal mass and density are dropped into still water. The diagrams below indicate the position of each sample as it settles.

Sample A  
Sample B  
Sample C  
Sample D

Which graph best shows the relationship of the settling time of the four samples?

A)  

B)  

C)  

D)
16. The diagram below shows four identical columns containing the same amount of water. Four different-sized spherical particles, made of the same uniform material, are dropped into the columns and settle to the bottom.

Which graph best shows the relative settling times of the four particles?

A) ![Graph A]

B) ![Graph B]

C) ![Graph C]

D) ![Graph D]
17. Four different kinds of particles (A, B, C, and D) with the same shape and diameter were mixed and poured into a column of water. The mass, volume, and density of the particles are shown below.

<table>
<thead>
<tr>
<th>Particle</th>
<th>Mass (g)</th>
<th>Volume (cm³)</th>
<th>Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100</td>
<td>67</td>
<td>1.5</td>
</tr>
<tr>
<td>B</td>
<td>100</td>
<td>33</td>
<td>3.0</td>
</tr>
<tr>
<td>C</td>
<td>100</td>
<td>22</td>
<td>4.5</td>
</tr>
<tr>
<td>D</td>
<td>100</td>
<td>17</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Which diagram best shows how the particle beds would be arranged in the column of water after settling?

A) ![Diagram A]
B) ![Diagram B]
C) ![Diagram C]
D) ![Diagram D]

18. The diagram below represents a geologic cross section of sedimentary rock layers that have not been overturned. From the evidence in this cross section, which graph most clearly represents the relative age of the rocks along reference line AB?

A) ![Graph A]
B) ![Graph B]
C) ![Graph C]
D) ![Graph D]