1. A rock sample has a mass of 16 grams and a volume of 8 cubic centimeters. When the rock is cut in half, what is the volume and density of each piece?
   (1) 8 cm³ and 0.5 g/cm³
   (2) 8 cm³ and 1.0 g/cm³
   (3) 4 cm³ and 2.0 g/cm³
   (4) 4 cm³ and 4.0 g/cm³

2. The accompanying graph shows the relationship between mass and volume for three samples, A, B, and C, of a given material. What is the density of this material?

   ![Graph](image)

   (1) 1.0 g/cm³
   (2) 5.0 g/cm³
   (3) 10.0 g/cm³
   (4) 20.0 g/cm³

Note that question 3 has only three choices.

3. As air on the surface of Earth warms, the density of the air
   (1) decreases
   (2) increases
   (3) remains the same

4. If the mass of a spinel crystal is 9.5 grams, what is the volume of this spinel crystal?

<table>
<thead>
<tr>
<th>Gemstone</th>
<th>Mineral</th>
<th>Composition</th>
<th>Hardness</th>
<th>Average Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>emerald</td>
<td>Be₂Al₂(Si₂O₆)</td>
<td>7.5-8</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>sapphire</td>
<td>Al₂O₃</td>
<td>9</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>spinel</td>
<td>MgAl₂O₄</td>
<td>8</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>zircon</td>
<td>ZrSiO₄</td>
<td>7.5</td>
<td>4.7</td>
<td></td>
</tr>
</tbody>
</table>

   (1) 0.4 cm³
   (2) 2.5 cm³
   (3) 5.7 cm³
   (4) 36.1 cm³

5. Liquid $W$ was added to the graduated cylinder containing liquid $C$. Objects $A$ and $D$ were then dropped into the cylinder. Which statement is correct?

   ![Diagram](image)

   (1) Liquid $W$ is denser than liquid $C$ and object $D$.
   (2) Liquid $C$ is denser than liquid $W$ and object $A$.
   (3) Liquid $C$ is less dense than object $A$, but more dense than liquid $W$ and object $D$.
   (4) Object $A$ is denser than liquid $C$, but not as dense as liquid $W$ and object $D$.
6. The diagram below represents a solid object with a density of 3 grams per cubic centimeter. What is the mass of this object?

(1) 0.5 g  (3) 18 g  
(2) 2 g  (4) 36 g  

6 [Blank]

7. Which graph best represents the relationship between mass and volume of a material that has a density of 5 grams per cubic centimeter?

(1) 
(2) 
(3) 
(4) 
7 [Blank]

8. What is the density of cube A?

(1) 0.2 g/cm³  
(2) 5.0 g/cm³  
(3) 12.8 g/cm³  
(4) 64.0 g/cm³  

8 [Blank]

9. What is the mass of cube B?

(1) 3 g  (3) 27 g  
(2) 9 g  (4) 81 g  

9 [Blank]

10. Assume cube B was broken into many irregularly shaped pieces. Compared to the density of the entire cube, the density of one of the pieces would be

(1) less  
(2) greater  
(3) the same  

10 [Blank]

11. Explain how heat would change the density of a parcel of air.