1) A student measures the mass of an 8 cm$^3$ block of brown sugar to be 12.9 g. What is the density of the brown sugar?

\[ D = \frac{m}{V} = \frac{12.9 \text{ g}}{8 \text{ cm}^3} = 1.6125 \text{ g/cm}^3 \]

2) A chef fills a 50 mL container with 43.5 g of cooking oil. What is the density of the oil?

\[ D = \frac{m}{V} = \frac{43.5 \text{ g}}{50 \text{ mL}} = 0.87 \text{ g/mL} \]

3) Calculate the mass of a liquid with a density of 2.5 g/mL and a volume of 15 mL.

\[ m = V \times D = 15 \text{ mL} \times 2.5 \text{ g/mL} = 37.5 \text{ g} \]

4) Calculate the volume of a liquid with a density of 5.45 g/mL and a mass of 65 g.

\[ V = \frac{m}{D} = \frac{65 \text{ g}}{5.45 \text{ g/mL}} = 11.93 \text{ mL} \]

5) A machine shop worker records the mass of an aluminum cube as 176 g. If one side of the cube measures 4 cm, what is the density of the aluminum?

\[ L = 4 \times 4 \times 4 \text{ cm}^3 = 64 \text{ cm}^3 \]

\[ D = \frac{m}{V} = \frac{176 \text{ g}}{64 \text{ cm}^3} = 2.75 \text{ g/cm}^3 \]

6) A teacher performing a demonstration finds that a piece of cork displaces 23.5 mL of water. The piece of cork has a mass of 5.7 g. What is the density of the cork?

\[ D = \frac{m}{V} = \frac{5.7 \text{ g}}{23.5 \text{ mL}} = 0.24 \text{ g/mL} \]

7) A carver begins work on the following block of granite that weighs 2700 g. What is the density of the granite?

\[ L = 10 \times 5 \times 2 \text{ cm}^3 = 1000 \text{ cm}^3 \]

\[ D = \frac{m}{V} = \frac{2700 \text{ g}}{1000 \text{ cm}^3} = 2.7 \text{ g/cm}^3 \]

8) A piece of PVC plumbing pipe displaces 60 mL when placed into a container of water. If the pipe has a mass of 78 g, what is the density of PVC?

\[ D = \frac{m}{V} = \frac{78 \text{ g}}{60 \text{ mL}} = 1.3 \text{ g/mL} \]

9) A solid magnesium flare has a mass of 1300 g and a volume of 743 cm$^3$. What is the density of the magnesium?

\[ D = \frac{m}{V} = \frac{1300 \text{ g}}{743 \text{ cm}^3} = 1.75 \text{ g/cm}^3 \]
10) A graduated cylinder has a mass of 50 g when empty. When 30 mL of water is added, the graduated cylinder has a mass of 120 g. If a rock is added to the graduated cylinder, the water level rises to 75 mL and the total mass is now 250 g. What is the density of the rock?

\[ V = 75 \text{ mL} - 30 \text{ mL} = 45 \text{ mL} \]

\[ \text{Mass: } (120 \text{ g} - 50 \text{ g}) \rightarrow (250 \text{ g} - 70 \text{ g}) = 130 \text{ g} \]

\[ D = \frac{130 \text{ g}}{45 \text{ mL}} = 2.89 \text{ g/mL} \]

11) A student performs an experiment with three unknown fluids and obtains the following measurements:

Fluid A: \( m = 2060 \text{ g}, V = 2000 \text{ mL} \)
Fluid B: \( m = 672 \text{ g}, V = 850 \text{ mL} \)
Fluid C: \( m = 990 \text{ g}, V = 1100 \text{ mL} \)

Draw how the fluids would be layered if they were combined in a beaker.

\[ \text{D. A} = \frac{2060}{2000} = 1.03 \]
\[ \text{DB} = \frac{672}{850} = 0.79 \]
\[ \text{DC} = \frac{990}{1100} = 0.9 \]

12) Use your density skills to find the identity of the following mystery objects.

<table>
<thead>
<tr>
<th>Solids</th>
<th>Density g/cm³</th>
<th>Solids</th>
<th>Density g/cm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marble</td>
<td>2.56</td>
<td>Copper</td>
<td>8.92</td>
</tr>
<tr>
<td>Quartz</td>
<td>2.64</td>
<td>Gold</td>
<td>19.32</td>
</tr>
<tr>
<td>Diamond</td>
<td>3.52</td>
<td>Platinum</td>
<td>21.4</td>
</tr>
</tbody>
</table>

While digging in the backyard, you find an old coin. Its mass is 26.76 g and its volume is 3 cm.

\[ D = \frac{26.76}{3} = 8.92 \]

What is the coin made of? **Copper**

You think you have found a diamond. Its mass is 5.28 g and its volume is 2 cm³.

\[ D = \frac{5.28}{2} = 2.64 \]

What did you find? **Quartz**

You find a ring with a mass of 107 g. You fill a graduated cylinder up with 10 mL of water and put the ring into the cylinder. The water rises up to the 15 mL mark.

\[ m = 107 \text{ g} \]
\[ V = 15 \text{ mL} - 10 \text{ mL} = 5 \text{ mL} \]
\[ D = \frac{107}{5} = 21.4 \]

What is the ring made of? **Platinum**

There is a block on your desk that acts as a paperweight. Its measurements are 3 cm by 4 cm by 6 cm. The block has a mass of 184.32 g.

\[ V = 3 \times 4 \times 6 = 72 \text{ cm}^3 \]
\[ m = \frac{184.32}{72} = 2.56 \]

What is the block made of? **Marble**