Scaling, Sinking, and the Shape of Science

Density is an **intrinsic property** - it does **not** change when you cut, reshape, or scale an object, because both **mass** and **volume** change in proportion.

$$D = \frac{m}{V}$$

If both m and V double → density stays the same.

Density determines floating/sinking, not weight or size.

Shape can affect **stability** in fluids, but not density itself.

1. A solid aluminum cube has a density of **2.7 g/cm³**.
If it is cut into four equal pieces, what is the density of each piece? _____

2. A 10 cm³ sample of gold has a mass of 193 g.
What would be the mass of a 1 cm³ piece? _____

3. A wooden block (0.6 g/cm³) and a large wooden log (0.6 g/cm³) are both made of the same material.

Which will float higher in water? _____

4. A plastic cube has a mass of **20 g** and a volume of **40 cm³**. If the cube were compressed to **30 cm³** without losing any mass, what would its new density be?

_____

5. Two spheres are made of the same material. Sphere A has radius 2 cm; Sphere B has radius 4 cm. How do their densities compare? _____

6. If you double the **radius** of a sphere, its volume increases by a factor of:

a) 2   b) 4   c) 6   d) 8   _____

7. A boat made of steel (7.8 g/cm³) floats even though steel is denser than water.

Explain how this is possible. _____

8. A small object floats with **40% of its volume above water**.

What is the object's density? _____

9. Two identical clay balls (density 2.0 g/cm³) are dropped into water. One is rolled flat into a dish shape. Which has greater density, and which is more likely to float? _____