

Density: why things float or sink

Grade 6 science (Year 7 · Class 6) · Lab answers

These model answers use the sample readings in the table. Your own measurements will vary a little, but the densities should stay close to 1.00 g/cm³ for water and 0.92 g/cm³ for sunflower oil.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS1-2

Question 1 Density of oil

$\rho = m \div V$: $18.4 \div 20 = \mathbf{0.920}$; $36.6 \div 40 = \mathbf{0.915}$; $55.1 \div 60 = \mathbf{0.918}$; $73.5 \div 80 = \mathbf{0.919}$ g/cm³.

Question 2 Mean density

$(0.920 + 0.915 + 0.918 + 0.919) \div 4 = 3.672 \div 4 = 0.918$, so **0.92 g/cm³**.

Question 3 Density of water

$20.1 \div 20 = 1.005$; $39.8 \div 40 = 0.995$; $60.2 \div 60 = 1.003$; $80.1 \div 80 = 1.001$. Mean = $4.004 \div 4 = 1.001$, so **1.00 g/cm³**.

Question 4 Graph gradient

The points lie close to a straight line through the origin, so mass is proportional to volume. Gradient = $(73.5 - 18.4) \div (80 - 20) = 55.1 \div 60 = \mathbf{0.918 \text{ g/cm}^3}$, which is the density.

Question 5 Prediction for oil

The oil's density (0.92) is less than that of water (1.00), so it **floats on top of the water**.

Question 6 Wooden block

$V = 8.0 \times 4.0 \times 2.0 = 64 \text{ cm}^3$. $\rho = 38.4 \div 64 = \mathbf{0.60 \text{ g/cm}^3}$. This is less than 1.00 so the block floats, with about **60 %** of its volume under water.

Question 7 Sources of error

Oil clinging to the cylinder walls means that less oil is weighed than was measured; leave it to drain, and use the same cylinder throughout. Misreading the meniscus gives a wrong volume; read at eye level. **Any two** valid errors are accepted.