Density

Name: _____ **Date:** _____

Quick Review

Density describes how much mass is packed into a certain volume.

Density = mass ÷ volume

$\rho = m / V$

Common units include **g/cm³** and **kg/m³**.

You can rearrange the equation:

Mass: $m = \rho \times V$

Volume: $V = m / \rho$

A substance will generally **float on another substance if it is less dense** and **sink if it is more dense**.

Part A — Multiple Choice

1. Density is defined as:

A. Mass × volume
B. Mass per unit volume
C. Volume per unit mass
D. Weight × volume

2. Which equation calculates density?

A. $\rho = m / V$
B. $\rho = m \times V$
C. $\rho = V / m$
D. $\rho = m + V$

3. Two objects have the same volume. Object X has more mass. Which is denser?

A. Object X
B. Object Y
C. They have equal density
D. Cannot be determined

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4. An object has a density of 0.8 g/cm³. It is placed in water with a density of 1.0 g/cm³. What will it most likely do?

A. Sink
B. Float
C. Disappear
D. Increase in mass

5. Which object has the greatest density?

A. 10 g in 10 cm³
B. 20 g in 10 cm³
C. 30 g in 10 cm³
D. 5 g in 10 cm³

Part B — Calculate Density

Show your working.

1. A block has a mass of 60 g and a volume of 20 cm³. Density = _____

2. A rock has a mass of 150 g and a volume of 50 cm³. Density = _____

3. A liquid has a mass of 80 g and occupies 100 cm³. Density = _____

4. A cube has a mass of 270 g and a volume of 30 cm³. Density = _____

Part C — Find the Missing Value

1. A material has a density of 4 g/cm³ and a volume of 20 cm³.

Mass = _____

2. A liquid has a density of 0.8 g/cm³ and a volume of 200 cm³.

Mass = _____

3. An object has a mass of 120 g and a density of 3 g/cm³.

Volume = _____

4. A metal has a mass of 540 g and a density of 9 g/cm³.

Volume = _____

Part D — Compare the Materials

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The table shows four materials.

Material	Mass	Volume
A	100 g	100 cm³
B	200 g	100 cm³
C	150 g	50 cm³
D	80 g	100 cm³

Calculate the density of each.

Material A: _____ g/cm³

Material B: _____ g/cm³

Material C: _____ g/cm³

Material D: _____ g/cm³

Which material is the most dense? _____

Which material is the least dense? _____

Part E — Float or Sink?

Water has a density of approximately **1.0 g/cm³**.

Predict whether each material will **float** or **sink** in water.

Material	Density	Float or Sink?
Cork	0.24 g/cm³	_____
Ice	0.92 g/cm³	_____
Plastic	1.20 g/cm³	_____
Aluminium	2.70 g/cm³	_____

Explain the rule you used:

Part F — Apply Your Knowledge

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1. Two blocks are exactly the same size. Block X has a mass of 50 g and Block Y has a mass of 100 g.

Which block is denser? _____

Explain:

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2. A liquid with a density of 0.7 g/cm³ is poured on top of water.

Where will the liquid most likely be found?

Why?

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3. Liquid A has a density of 1.2 g/cm³ and Liquid B has a density of 0.9 g/cm³.

If the liquids do not mix, which liquid will form the top layer?

Explain:

Exit Ticket

1. Define density.

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2. Write the density equation.

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3. An object has a mass of 40 g and a volume of 20 cm³. What is its density?

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4. An object is less dense than the liquid surrounding it. Will it generally float or sink?

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Density Worksheet — Answer Key

Part A — Multiple Choice

1. **B** — Mass per unit volume
2. **A** — ρ = m / V
3. **A** — Object X
4. **B** — Float
5. **C** — 30 g in 10 cm³

Part B — Calculate Density

1.	ρ = m / V	ρ = 60 g / 20 cm³	**ρ = 3 g/cm³**
2.		ρ = 150 g / 50 cm³	**ρ = 3 g/cm³**
3.		ρ = 80 g / 100 cm³	**ρ = 0.8 g/cm³**
4.		ρ = 270 g / 30 cm³	**ρ = 9 g/cm³**

Part C — Find the Missing Value

1.	m = ρ × V	m = 4 × 20	**Mass = 80 g**
2.		m = 0.8 × 200	**Mass = 160 g**
3.	V = m / ρ	V = 120 / 3	**Volume = 40 cm³**
4.		V = 540 / 9	**Volume = 60 cm³**

Part D — Compare the Materials

Material	Calculation	Density
A	100 ÷ 100	**1 g/cm³**
B	200 ÷ 100	**2 g/cm³**
C	150 ÷ 50	**3 g/cm³**
D	80 ÷ 100	**0.8 g/cm³**

Most dense: Material **C** **Least dense:** Material **D**

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Part E — Float or Sink?

Material	Density	Answer
Cork	0.24 g/cm³	**Float**
Ice	0.92 g/cm³	**Float**
Plastic	1.20 g/cm³	**Sink**
Aluminium	2.70 g/cm³	**Sink**

Explanation: A material that is **less dense than water** will generally float. A material that is **more dense than water** will generally sink.

Part F — Apply Your Knowledge

1. Block Y

The blocks have the same volume, but Block Y has more mass. Therefore, Block Y has a greater density.

2. The liquid will form a layer on top of the water.

The liquid has a density of 0.7 g/cm³, which is less than the density of water (1.0 g/cm³).

3. Liquid B will form the top layer.

Liquid B has a density of 0.9 g/cm³, while Liquid A has a density of 1.2 g/cm³. The less dense liquid floats on the denser liquid.

Exit Ticket

1. Define density.
Density is **mass per unit volume**.

2. Write the density equation.
ρ = m / V

3. Calculate the density.

ρ = 40 g / 20 cm³
ρ = 2 g/cm³

4. An object is less dense than the liquid surrounding it. Will it generally float or sink?

Float

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