LESSON MAKER PRO

Density Detectives

Find mass, volume, and density in everyday materials.

HIGH SCHOOL · PHS.1.6

PHS.1.6 "Use mathematical and computational analysis to solve density problems. Manipulate the density formula to determine density, volume, or mass or use dimensional analysis to solve problems."

NAME _____ DATE _____

THE DENSITY RULE

Density tells you how much mass is packed into a unit of volume. To find density, divide mass by volume. To find mass, multiply density by volume; to find volume, divide mass by density.

WORKED EXAMPLE

A sample has a mass of 35 g and a volume of 5 cm^3. Find its density.

1. density = mass / volume
2. density = 35 g / 5 cm^3
3. density = 7 g/cm^3

Answer: 7 g/cm^3

PRACTICE 6 problems

1 A sample has a mass of 48 g and a volume of 12 cm^3. Find its density.

ANSWER _____

2 A material has a density of 2 g/cm^3. Find the mass of an 18 cm^3 piece.

ANSWER _____

3 A sample has a mass of 72 g and a density of 8 g/cm^3. Find its volume.

ANSWER _____

4 A liquid has a mass of 90 g and a volume of 30 mL. Find its density.

ANSWER _____

5 A liquid has a density of 1.2 g/mL. Find the mass of 20 mL.

ANSWER _____

6 A sample has a mass of 81 g and a density of 2.7 g/cm^3. Find its volume.

ANSWER _____

APPLY IT Show your work

1 You are 3D-printing a phone stand. The plastic has a density of 1.25 g/cm^3, and the stand will use 40 cm^3 of plastic. How much plastic, by mass, will you need?

WORK SPACE

ANSWER _____

2 At a jewelry resale shop, you check a metal charm. It has a mass of 96 g. When you place it in a container of water, the water level rises from 40 mL to 52 mL. What is the charm's density?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A metal sample has a mass of 120 g and a volume of 50 cm^3. Find its density in kg/m^3. Use 1 kg = 1000 g and 1 m^3 = 1,000,000 cm^3. Show how you convert the units.

WORK SPACE AND ANSWER

Density Detectives

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A sample has a mass of 48 g and a volume of 12 cm^3. Find its density.	**4 g/cm^3**
2	A material has a density of 2 g/cm^3. Find the mass of an 18 cm^3 piece.	**36 g**
3	A sample has a mass of 72 g and a density of 8 g/cm^3. Find its volume.	**9 cm^3**
4	A liquid has a mass of 90 g and a volume of 30 mL. Find its density.	**3 g/mL**
5	A liquid has a density of 1.2 g/mL. Find the mass of 20 mL.	**24 g**
6	A sample has a mass of 81 g and a density of 2.7 g/cm^3. Find its volume.	**30 cm^3**

PART 2 · APPLY IT

1. **50 g** Multiply density by volume: 1.25 g/cm^3 × 40 cm^3 = 50 g.
2. **8 g/mL** The charm displaces 52 mL − 40 mL = 12 mL of water, so its volume is 12 mL. Divide 96 g by 12 mL to get 8 g/mL.

CHALLENGE

120 g / 50 cm^3 = 2.4 g/cm^3. Convert both units: 2.4 g/cm^3 × (1 kg / 1000 g) × (1,000,000 cm^3 / 1 m^3) = 2400 kg/m^3.

Accept equivalent unit notation, such as g per mL. For the challenge, accept either a direct unit conversion or a correct conversion of the mass and volume before division.