

Density Design Lab

Model mass with area and volume density.

HIGH SCHOOL • GEO-G.MG.2

GEO-G.MG.2 "Apply concepts of density based on area and volume of geometric figures in modeling situations."

NAME _____

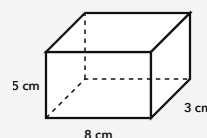
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MASS FROM DENSITY

Volume density tells how much mass fills each cubic unit. Multiply density by volume to find mass. For flat materials, multiply area density by area instead.

WORKED EXAMPLE

The rectangular prism shown is made of material with density 4 g/cm^3 . Find its mass.



1. $V = l \times w \times h$

2. $V = 8 \times 3 \times 5 = 120 \text{ cm}^3$

3. $\text{mass} = 4 \times 120 = 480 \text{ g}$

Answer: 480 g

PRACTICE 4 problems

- 1** A metal part has volume 9 cm^3 and density 7 g/cm^3 . Find its mass.

ANSWER _____

- 2** A sample has mass 91 g and volume 13 cm^3 . Find its density.

ANSWER _____

- 3** A fabric patch has area 17 cm^2 and area density 2 g/cm^2 . Find its mass.

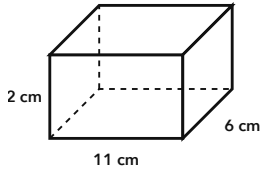
ANSWER _____

- 4** A sheet has mass 78 g and area 13 cm^2 . Find its area density.

ANSWER _____

APPLY IT Show your work

- 1** At a gaming-club event, a 3-D printer makes the solid rectangular prize block shown. The plastic density is 2 g/cm^3 . What is its mass?



ANSWER _____

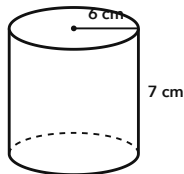
- 2** A concert-club banner is 12 ft by 7 ft. Its fabric has an area density of 6 oz/ft^2 . What is the banner's mass?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The cylinder shown is made of material with density 9 g/cm^3 . A student says its volume is $42\pi \text{ cm}^3$. Explain what is missing from that calculation, then find the cylinder's mass.



WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A metal part has volume 9 cm^3 and density 7 g/cm^3 . Find its mass.	63 g
2	A sample has mass 91 g and volume 13 cm^3 . Find its density.	7 g/cm³
3	A fabric patch has area 17 cm^2 and area density 2 g/cm^2 . Find its mass.	34 g
4	A sheet has mass 78 g and area 13 cm^2 . Find its area density.	6 g/cm²

PART 2 • APPLY IT

- 264 g** The volume is $11 \times 6 \times 2 = 132 \text{ cm}^3$. Multiply by 2 g/cm^3 to get 264 g.
- 504 oz** Its area is $12 \times 7 = 84 \text{ ft}^2$. Multiply 84 by 6 oz/ft^2 .

CHALLENGE

The radius must be squared. $V = \pi(6)(6)(7) = 252\pi \text{ cm}^3$, so the mass is $2268\pi \text{ g}$.

Accept equivalent multiplication expressions and correctly simplified units. For the challenge, accept an explanation that identifies the missing second factor of the radius.