

Density of Solids Worksheet



Exam questions

1. Different states of matter have different densities.

Which of the following shows the states of matter in density order, starting with the lowest density?

A Solid – liquid – gas

B Solid – gas – liquid

C Gas – liquid – solid

D Liquid – gas – solid

OCR, Gateway Physics A, Paper J249/01, June 2019.



Exam questions

2. An object has a volume of 1.5 m^3 and a mass of 3.0 kg .

What is the density of the object?

Use the equation: $\text{density} = \text{mass} \div \text{volume}$

A 0.5 kg/m^3

B 2.0 kg/m^3

C 4.5 kg/m^3

D 6.0 kg/m^3

OCR, Gateway Physics A, Paper J249/01, June 2019.



Exam questions

A piece of metal has a volume of $2.0 \times 10^{-5} \text{ m}^3$.

The density of the metal is $8.0 \times 10^3 \text{ kg/m}^3$.

What is its mass?

A. $2.5 \times 10^{-3} \text{ kg}$

B. $4.0 \times 10^{-2} \text{ kg}$

C. $1.6 \times 10^{-1} \text{ kg}$

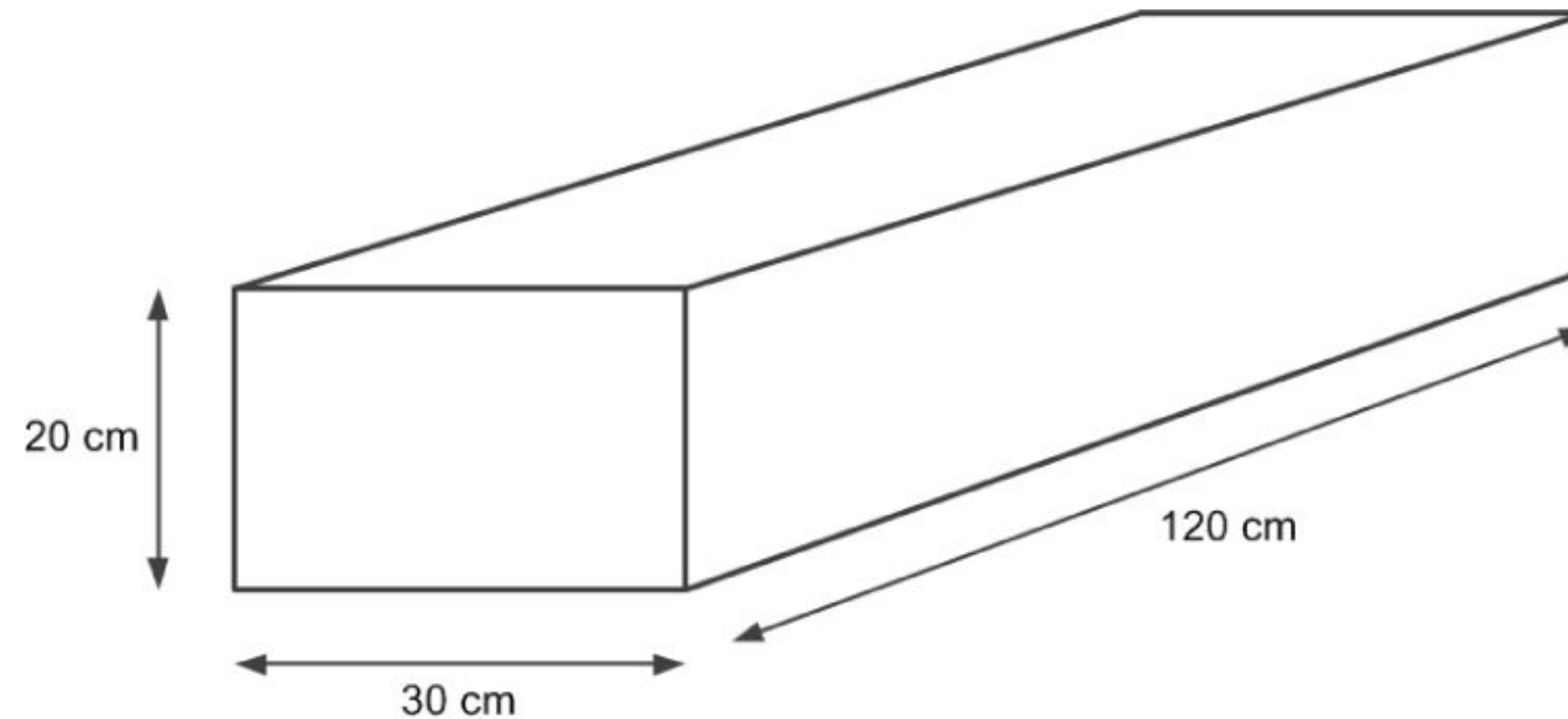
D. $1.6 \times 10^5 \text{ kg}$

OCR, Gateway Physics A, Paper J249/03, Specimen.



Exam questions

Wood has a density of 180 kg/m^3 .



Calculate the mass of this piece of wood.
Show your working and give the units.

OCR, Gateway Physics A,
Paper J249/01, Specimen.



Answers



Answers

1. C

2. B

3. C



Answers

- Conversion of cm to m (1)
- Calculation of volume: $0.2 \times 0.3 \times 1.2 = 0.072 \text{ m}^3$ (1)
- Re-arrangement of formula for mass (1)
- Substitution: 180×0.072 (1)
- Answer: 13 (1)
- Units: kg (1)



In lesson questions



Independent practice

1. Calculate the density ρ (in kg/m^3) for each of the following:
 - a. $m = 10 \text{ kg}$ and $V = 10 \text{ m}^3$
 - b. $m = 160 \text{ kg}$ and $V = 0.1 \text{ m}^3$
 - c. $m = 220 \text{ kg}$ and $V = 0.02 \text{ m}^3$
2. A wooden post has a volume of 0.025 m^3 and a mass of 20 kg . Calculate its density in kg/m^3 .
3. **Challenge:** A rectangular concrete slab is 0.80 m long, 0.60 m wide and 0.04 m thick.
 - a. Calculate its volume in m^3 .
 - b. The mass of the concrete slab is 180 kg . Calculate its density in kg/m^3 .



Independent practice

1. Calculate the mass m (in kg) for each of the following:
 - a. $\rho = 10 \text{ kg/m}^3$ and $V = 15 \text{ m}^3$
 - b. $\rho = 0.15 \text{ kg/m}^3$ and $V = 12.20 \text{ m}^3$
 - c. $\rho = 0.006 \text{ kg/m}^3$ and $V = 1.005 \text{ m}^3$
2. **Challenge:** What is the mass of the water contained in a typical olympic swimming pool? (length 50 m, width 25 m, depth 3 m, $\rho = 1000 \text{ kg/m}^3$)



Independent practice

1. Calculate the volume V (in m^3) for each of the following:
 - a. $m = 20 \text{ kg}$ and $\rho = 10 \text{ kg/m}^3$
 - b. $m = 0.44 \text{ kg}$ and $\rho = 0.05 \text{ kg/m}^3$
 - c. $m = 12.20 \text{ kg}$ and $\rho = 0.004 \text{ kg/m}^3$
2. An object has a mass of $20\,000 \text{ kg}$ and a density of $5\,000 \text{ kg/m}^3$. Calculate its volume in m^3 .
3. **Challenge:** How many bathtubs of water would be needed to hold the same mass as in the previous question? (bath tubs are typically $2 \text{ m} \times 1 \text{ m} \times 0.5 \text{ m}$ and water has density of 1000 kg/m^3)



3. Challenge: How many bathtubs of water would be needed to hold the same mass as in the previous question? (bath tubs are typically 2 m x 1 m x 0.5 m and water has density of 1000 kg/m^3)



Independent practice

1. Calculate the density ρ (in kg/m^3) for each of the following:
 - a. $m = 10 \text{ g}$ and $V = 10 \text{ cm}^3$
 - b. $m = 25 \text{ g}$ and $V = 200 \text{ cm}^3$
2. Calculate the density ρ (in g/cm^3) for each of the following:
 - a. $m = 10 \text{ kg}$ and $V = 5 \text{ m}^3$
 - b. $m = 0.015 \text{ kg}$ and $V = 0.0050 \text{ m}^3$

