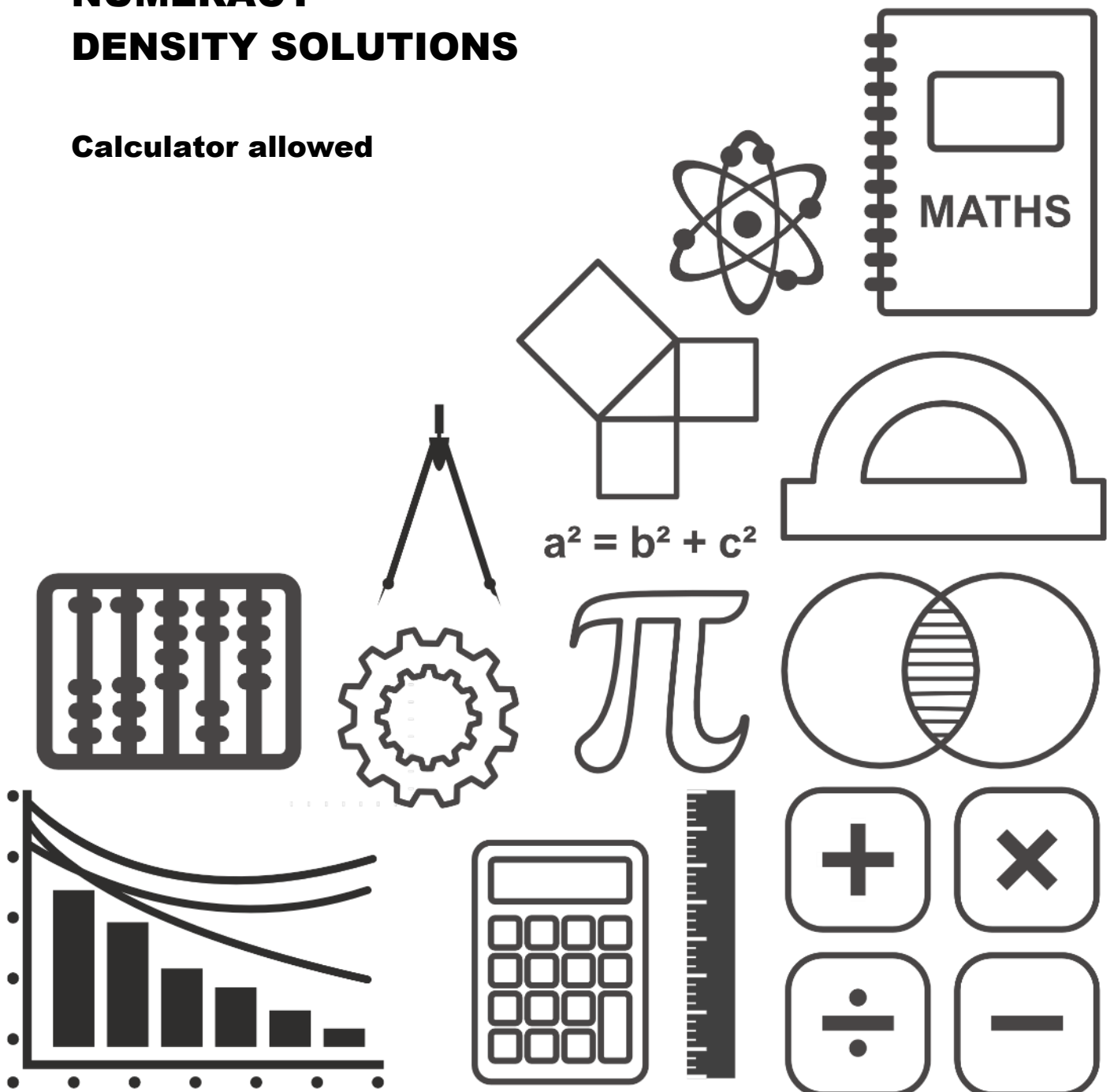


# MATHSDIY

## GCSE TOPIC BOOKLET NUMERACY DENSITY SOLUTIONS

Calculator allowed



1. Finbar's skateboard is shown below.



A skateboard deck is usually made from one of maple wood, fibreglass or plastic. The density of these materials is given in the following table.

$$D = \frac{M}{V}$$

Skateboard deck material	Density (g/cm <sup>3</sup> )
Maple wood	0.7
Fibreglass	2.6
Plastic	1.8

Finbar and Sab compare their skateboards.

so,  $M = D \times V$

	Finbar's skateboard	Sab's skateboard
Area of the skateboard deck	1800 cm <sup>2</sup>	1600 cm <sup>2</sup>
Thickness of the skateboard deck	1.2 cm	1.4 cm
Material used to make the deck	Fibreglass	Maple wood

The wheels and the fittings on both their skateboards are identical.

How much heavier is Finbar's skateboard than Sab's skateboard?  
Give your answer in grams.  
You must show all your working.

[5]

Volume Finbar's =  $1800 \times 1.2 = 2160 \text{ cm}^3$

Mass Finbar's =  $2160 \times 2.6 = 5616 \text{ g}$

Volume Sab's =  $1600 \times 1.4 = 2240 \text{ cm}^3$

Mass Sab's =  $2240 \times 0.7 = 1568 \text{ g}$

$5616 - 1568 = 4048$

Finbar's is heavier by 4048g

2. Cycle frames are made from steel, aluminium or carbon fibre. The table below gives the density of steel, aluminium and carbon fibre.

Material	Density (g/cm <sup>3</sup> )
Steel	7.8
Aluminium	2.7
Carbon fibre	1.6



Owain has a cycle frame made from aluminium. His cycle frame has a mass of 9450g.

$$D = \frac{M}{V}$$

$$V = \frac{M}{D}$$



(a) Calculate the volume of aluminium in Owain's cycle frame. Give your answer in cm<sup>3</sup>.

[3]

$$\begin{aligned} V &= \text{mass} \div \text{density} \\ &= 9450 \div 2.7 \\ &= \underline{\underline{3500 \text{ cm}^3}} \end{aligned}$$

Volume of aluminium in Owain's cycle frame is 3500 cm<sup>3</sup>

(b) Bethan has a cycle frame that is identical to Owain's cycle frame. However, her cycle frame is made from carbon fibre. Calculate the mass of this frame. Give your answer in grams.

[3]

$$\text{Volume} = 3500, \text{ density} = 1.6$$

$$\begin{aligned} \text{Mass} &= \text{density} \times \text{volume} \\ &= 1.6 \times 3500 \\ &= 5600 \end{aligned}$$

Mass of this cycle frame is 5600 g