

Dr Oliver Mathematics
Worked Examples
Length, Area, and Volume 1

From: Edexcel 2018 November Paper 1H (Non-Calculator)

1. Three solid shapes **A**, **B**, and **C** are similar. (4)

The surface area of shape **A** is 4 cm^2 .

The surface area of shape **B** is 25 cm^2 .

The ratio of the volume of shape **B** to the volume of shape **C** is $27 : 64$.

Work out the ratio of the height of shape **A** to the height of shape **C**.

Give your answer in its simplest form.

Solution

Going from **A** to **B**, the area scale factor (ASF) is

$$4 : 25 = 2^2 : 5^2$$

which means the length scale factor (LSF) is

$$2 : 5$$

and the volume scale factor (VSF) is

$$2^3 : 5^3 = 8 : 125.$$

Now, the volume of shape **C** is

$$\begin{aligned} 125 \times \frac{64}{27} &= 5^3 \times \frac{4^3}{3^3} \\ &= \left(5 \times \frac{4}{3}\right)^3 \\ &= \left(\frac{20}{3}\right)^3 \end{aligned}$$

and the length of **C** is $\frac{20}{3}$.

Hence, the ratio of the height of shape **A** to the height of shape **C** is

$$2 : \frac{20}{3} = 6 : 20 = \underline{\underline{3 : 10}}.$$