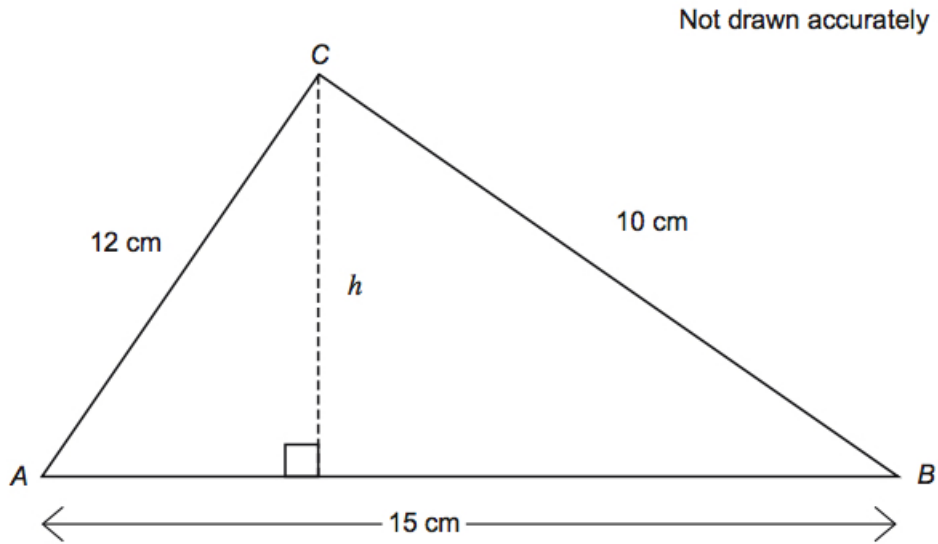


Dr Oliver Mathematics
Worked Examples
Length 2

From: AQA GCSE Mathematics 2016 November Paper 2 Q22

1. Work out the height h of the triangle ABC .

(5)

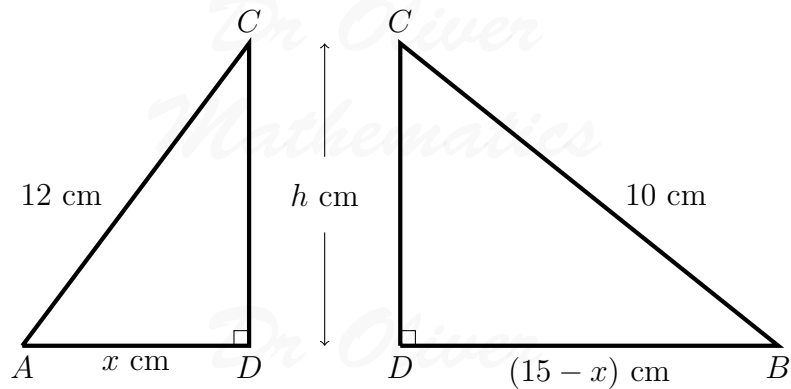


Solution

Well: we will almost prove the cosine rule!

Let D be the point takes $\angle ADC$ be a right-angle.

Let $AD = x$ cm and $DB = (15 - x)$ cm, as shown below



Then

$$h^2 + x^2 = 12^2 \Rightarrow h^2 = 144 - x^2 \quad (1)$$

and

$$h^2 + (15 - x)^2 = 10^2 \Rightarrow h^2 = 100 - (15 - x)^2$$

$$\begin{array}{r|rr} \times & 15 & -x \\ \hline 15 & 225 & -15x \\ -x & -15x & +x^2 \\ \hline \end{array}$$

$$\Rightarrow h^2 = 100 - (225 - 30x + x^2)$$

$$\Rightarrow h^2 = -125 + 30x - x^2 \quad (2).$$

Do (1) = (2):

$$144 - x^2 = -125 + 30x - x^2 \Rightarrow 269 = 30x$$

$$\Rightarrow x = 8\frac{29}{30}$$

$$\Rightarrow x^2 = 80\frac{361}{900}$$

Finally, we apply Pythagoras' theorem:

$$h^2 = 144 - 80\frac{361}{900} \Rightarrow h^2 = 63\frac{539}{900}$$

$$\Rightarrow h = 7.974\,891\,152 \text{ (FCD)}$$

$$\Rightarrow h = \underline{\underline{7.97 \text{ cm (3 sf)}}}.$$