

Edexcel GCSE maths November 2014, Calculator paper

16 The diagram represents a metal frame.

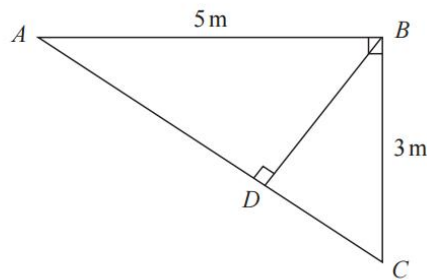


Diagram **NOT**  
accurately drawn

The frame is made from four metal bars,  $AB$ ,  $AC$ ,  $BC$  and  $BD$ .

Angle  $ABC = \text{angle } ADB = 90^\circ$

$AB = 5 \text{ m}$

$BC = 3 \text{ m}$

Work out the total length of the four metal bars of the frame.

Give your answer correct to 3 significant figures.

By Pythagoras' theorem

$$AC^2 = 5^2 + 3^2$$

$$AC^2 = 25 + 9$$

$$AC^2 = 34$$

$$AC = \sqrt{34}$$

The area of triangle  $ABC$  may be calculated as  $\frac{AB \times BC}{2}$  or  $\frac{AC \times BD}{2}$ .

This gives the equation  $\frac{5 \times 3}{2} = \frac{\sqrt{34}BD}{2}$  so  $\sqrt{34}BD = 15$  and  $BD = \frac{15}{\sqrt{34}}$

The total length of the four metal bars is therefore

$$5 + 3 + \sqrt{34} + \frac{15}{\sqrt{34}} = 16.4034..$$

Correct to 3 significant figures this is 16.4 metres.

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Alternatively, if you realise that the three triangles are similar then you can calculate the length of

$BD$  using the equation  $\frac{BD}{3} = \frac{5}{\sqrt{34}}$  to obtain  $BD = \frac{15}{\sqrt{34}}$