

Dr Oliver Mathematics
Worked Examples
Find the Area of the Yellow Region 4

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1. In Figure 1, a semi-circle and a trapezium are shown.

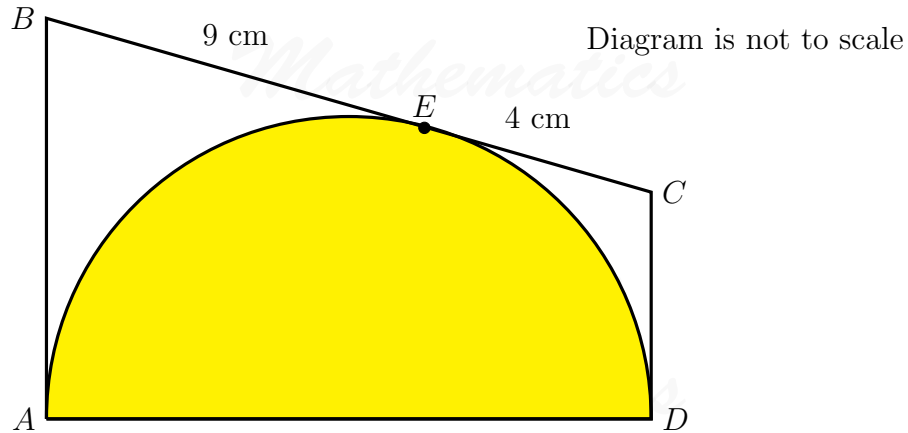


Figure 1: a half-circle and a trapezium

The point of contact between BC and the half-circle is labelled E .

$$BE = 9 \text{ cm.}$$

$$CE = 4 \text{ cm.}$$

Find the shaded area in yellow.

Solution

‘Second angle fact’: the two tangents drawn from an external point to a circle are the same length. So we have $AB = 9 \text{ cm}$ and $CD = 4 \text{ cm}$, as shown in Figure 2.

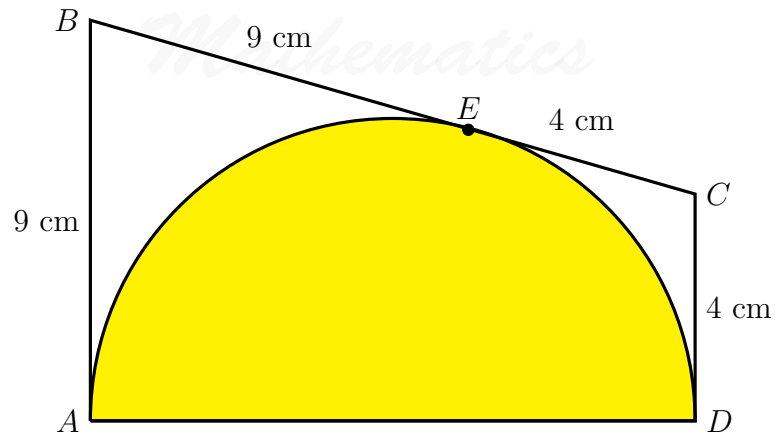


Figure 2: the two tangents are the same length

Construct the line which is perpendicular to AB and which goes through C . Let F be this point, as shown in Figure 3.

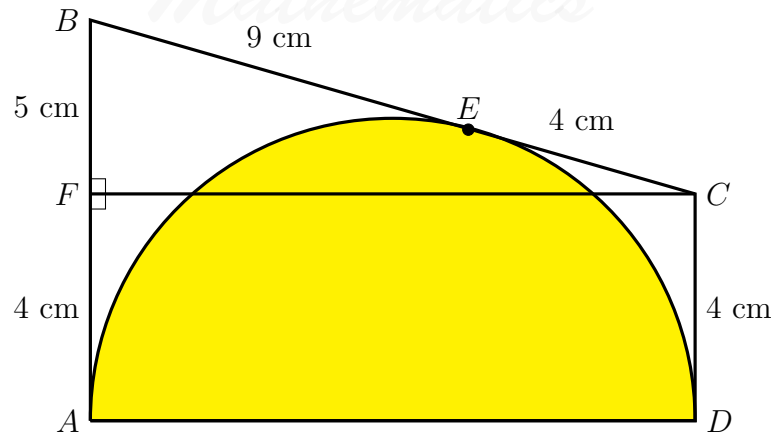


Figure 3: constructing F

Pythagoras' theorem:

$$\begin{aligned}
 5^2 + CF^2 &= (9 + 4)^2 \Rightarrow 25 + CF^2 = 169 \\
 &\Rightarrow CF^2 = 144 \\
 &\Rightarrow CF = 12 \text{ cm,}
 \end{aligned}$$

and radius of the semi-circle is

$$\frac{12}{2} = 6 \text{ cm.}$$

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Finally,

$$\begin{aligned}\text{shaded area} &= \frac{1}{2} \times \pi \times 6^2 \\ &= \underline{\underline{18\pi \text{ cm}^2}}.\end{aligned}$$

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