

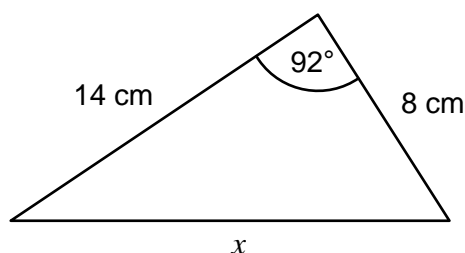


The Cosine Rule



REVISE THIS
TOPIC

- 1 Work out the length of side x .



Not drawn
accurately

[3 marks]

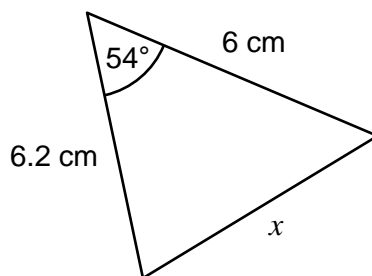
$$x^2 = 14^2 + 8^2 - 2 \times 14 \times 8 \times \cos(92)$$

$$x^2 = 267.8174873$$

$$x = \sqrt{267.8174873}$$

$$x = 16.4 \text{ cm}$$

- 2 Work out the length of side x .



Not drawn
accurately

[3 marks]

$$x^2 = 6.2^2 + 6^2 - 2 \times 6.2 \times 6 \times \cos(54)$$

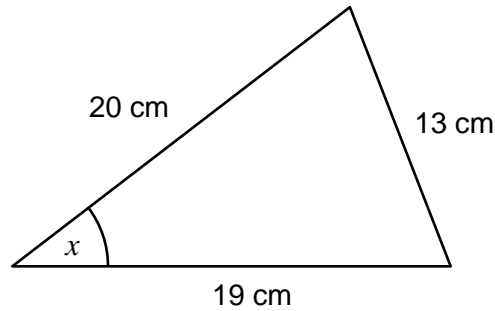
$$x^2 = 30.7087723$$

$$x = \sqrt{30.7087723}$$

$$x = 5.5 \text{ cm}$$



3

Work out the size of angle x .


Not drawn accurately

[3 marks]

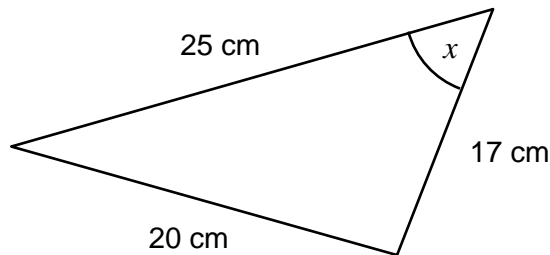
$$\cos(x) = \frac{20^2 + 19^2 - 13^2}{2 \times 20 \times 19}$$

$$\cos(x) = 0.7789473684$$

$$x = \cos^{-1}(0.7789473684)$$

$$x = 38.8^\circ$$

4

Work out the size of angle x .


Not drawn accurately

[3 marks]

$$\cos(x) = \frac{25^2 + 17^2 - 20^2}{2 \times 25 \times 17}$$

$$\cos(x) = 0.6047058824$$

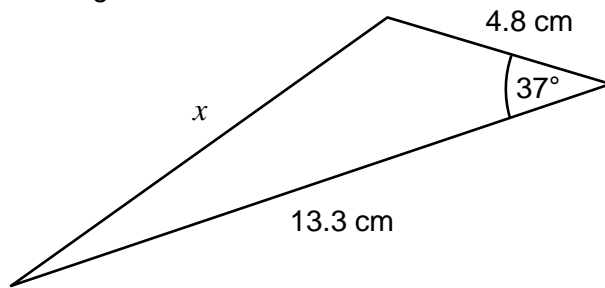
$$x = \cos^{-1}(0.6047058824)$$

$$x = 52.8^\circ$$





5

Work out the length of side x .

Not drawn accurately

[3 marks]

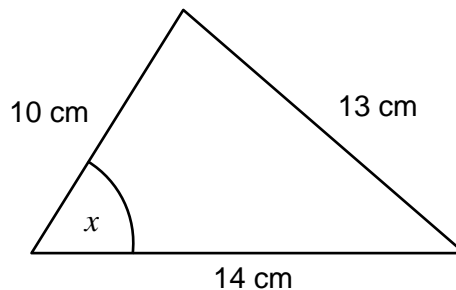
$$x^2 = 4.8^2 + 13.3^2 - 2 \times 4.8 \times 13.3 \times \cos(37)$$

$$x^2 = 97.96021808$$

$$x = \sqrt{97.96021808}$$

$$x = 9.9 \text{ cm}$$

6

Work out the size of angle x .

Not drawn accurately

[3 marks]

$$\cos(x) = \frac{10^2 + 14^2 - 13^2}{2 \times 10 \times 14}$$

$$\cos(x) = 0.4535714286$$

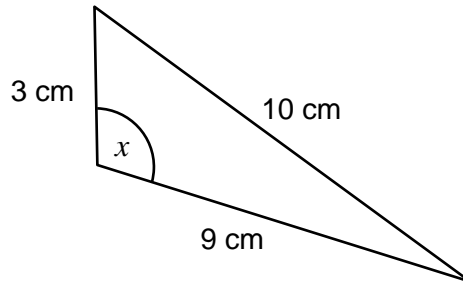
$$x = \cos^{-1}(0.4535714286)$$

$$x = 63.0^\circ$$



Turn over ►

7

Work out the size of angle x .


Not drawn accurately

[3 marks]

$$\cos(x) = \frac{3^2 + 9^2 - 10^2}{2 \times 3 \times 9}$$

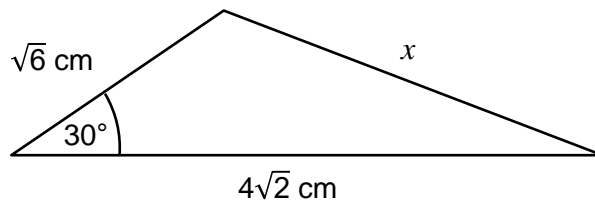
$$\cos(x) = -0.185185185...$$

$$x = \cos^{-1}(-0.185185185...)$$

$$x = 100.7^\circ$$

8

Work out the length of side x .

Give your answer in the form \sqrt{k} , where k is an integer.


Not drawn accurately

[4 marks]

$$x^2 = (\sqrt{6})^2 + (4\sqrt{2})^2 - 2 \times \sqrt{6} \times 4\sqrt{2} \times \cos(30)$$

$$x^2 = 6 + 32 - 8\sqrt{12} \times \frac{\sqrt{3}}{2}$$

$$x^2 = 38 - 4\sqrt{36}$$

$$x^2 = 14$$

$$x^2 = 38 - 24$$

$$x = \sqrt{14}$$

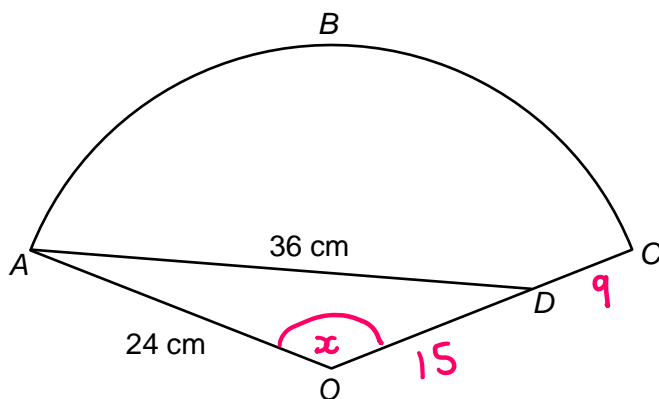
$$x = \sqrt{14} \text{ cm}$$





9

ABCO is a sector with centre O.

D is the point on OC so that $OD : DC = 5 : 3$ $AO = 24$ cm $AD = 36$ cm

Work out the area of the sector.

[5 marks]

$$OC = 24$$

$$24 \div (5 + 3) = 3$$

$$5 \times 3 = 15 \text{ (OD)}$$

$$3 \times 3 = 9 \text{ (DC)}$$

$$\cos(x) = \frac{24^2 + 15^2 - 36^2}{2 \times 24 \times 15}$$

$$\cos(x) = -0.6875$$

$$x = \cos^{-1}(-0.6875)$$

$$x = 133.4325366 \quad \text{Area} = \frac{133.4325366}{360} \times \pi \times 24^2$$

Answer

670.7

cm²

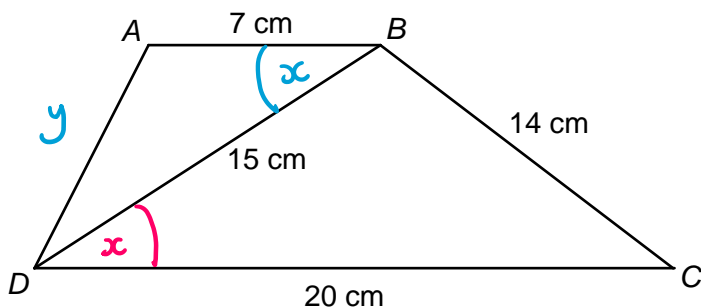
12

Turn over ►



10

$ABCD$ is a trapezium with AB parallel to CD .



Work out the length of line AD .

[5 marks]

$$\cos(x) = \frac{15^2 + 20^2 - 14^2}{2 \times 15 \times 20}$$

$$\cos(x) = 0.715$$

$$x = \cos^{-1}(0.715)$$

$$x = 44.35680084$$

Angle BDC = Angle ABD as they are alternate angles

$$y^2 = 7^2 + 15^2 - 2 \times 7 \times 15 \times \cos(44.3\dots)$$

$$y^2 = 123.85$$

$$y = \sqrt{123.85}$$

$$y = 11.12879149$$

Answer

11.1

cm



11

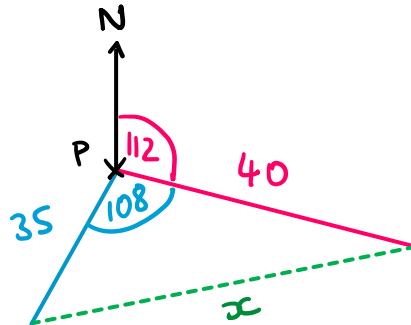
Boat A and Boat B both leave the Port P at 12pm.

Boat A travels on a bearing of 112° and travels at a constant speed of 16 mph.

Boat B travels on a bearing of 220° and travels at a constant speed of 14 mph.

At 2:30 pm, what is the direct distance between the two boats.

[5 marks]



$$220 - 112 = 108^\circ$$

$$16 \times 2.5 = 40 \text{ miles}$$

$$14 \times 2.5 = 35 \text{ miles}$$

$$x^2 = 40^2 + 35^2 - 2 \times 40 \times 35 \times \cos(108)$$

$$x^2 = 3690.247584$$

$$x = \sqrt{3690.247584}$$

Answer

60.7

miles

