G58...Trigonometry - The Cosine Rule

OCR

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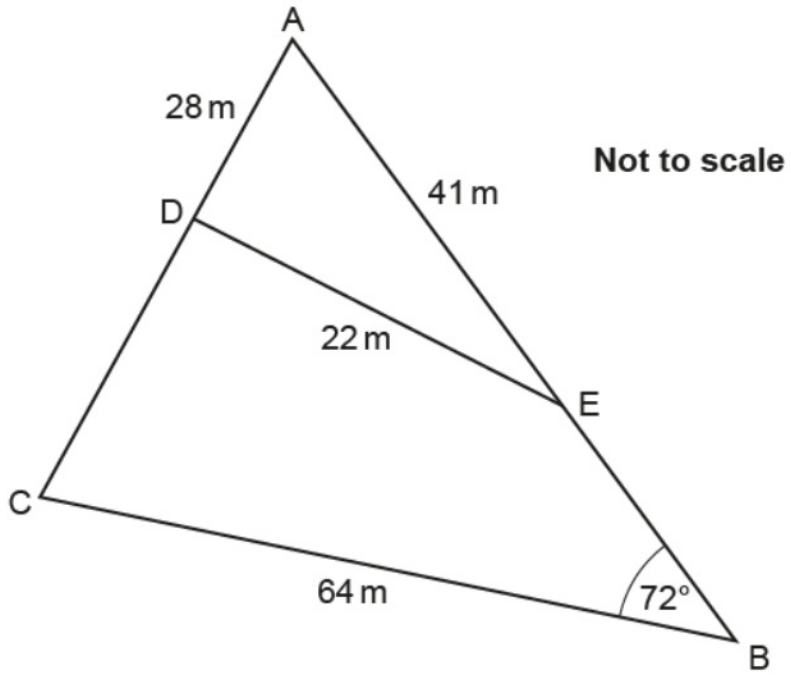
14 The diagram shows triangle ABC with D on AC and E on AB.
DE is a straight line.



AD = 28 m, AE = 41 m, DE = 22 m and BC = 64 m.

Calculate the length CD.

..... m **[6]**

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DE is a straight line.

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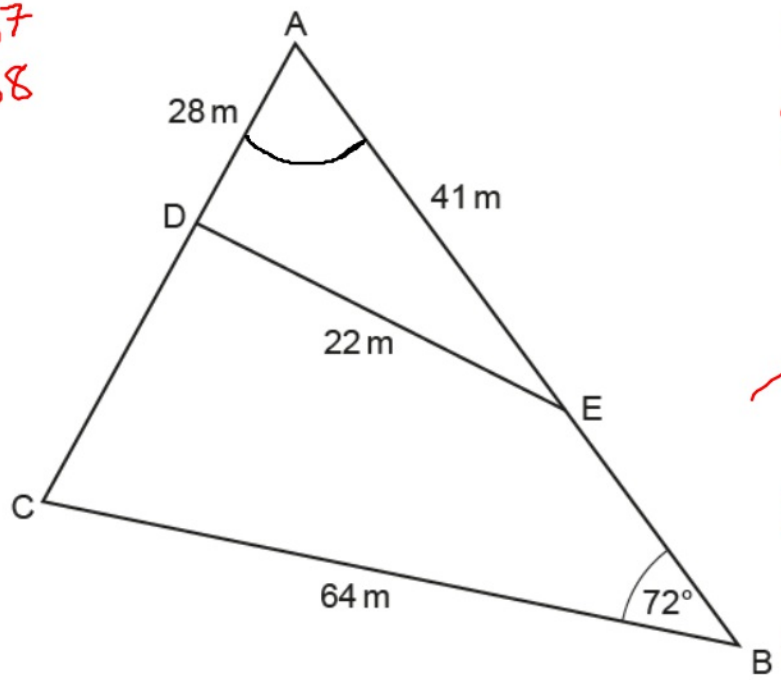
G57
G58



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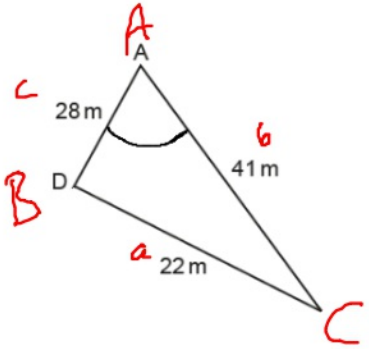
Calculate the length CD.



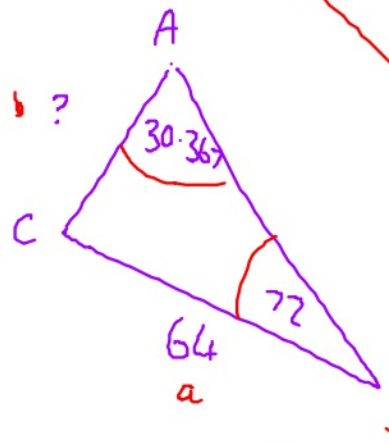
$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos A = \frac{41^2 + 28^2 - 22^2}{2(41)(28)}$$

$$\cos A = 0.862\ldots$$

$$A = \cos^{-1} 0.862$$

$$A = 30.367^\circ$$



$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{64}{\sin 30.367} = \frac{b}{\sin 72}$$

$$b = 120.4\text{cm} = AC$$

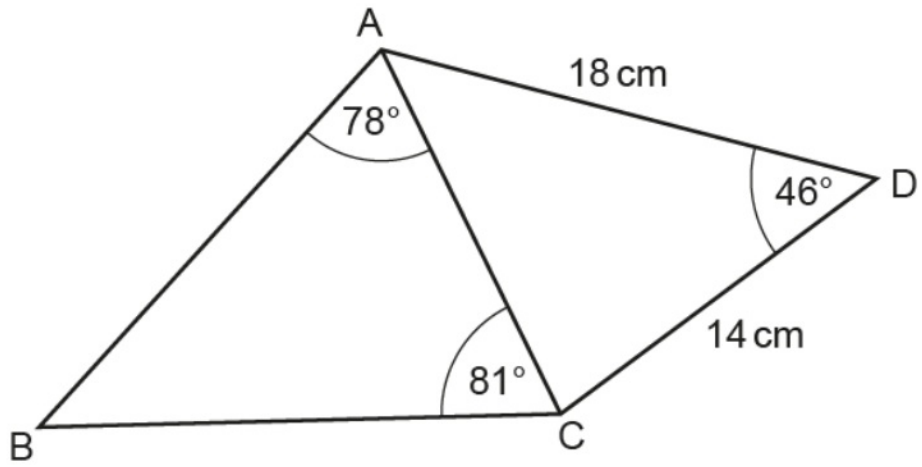
$$CD = \frac{120.4}{28}$$

92.28 → 92.6m ✓ ✓

$$CD = 92.4\text{m}$$

..... m **[6]**

17 ABC and ACD are triangles.

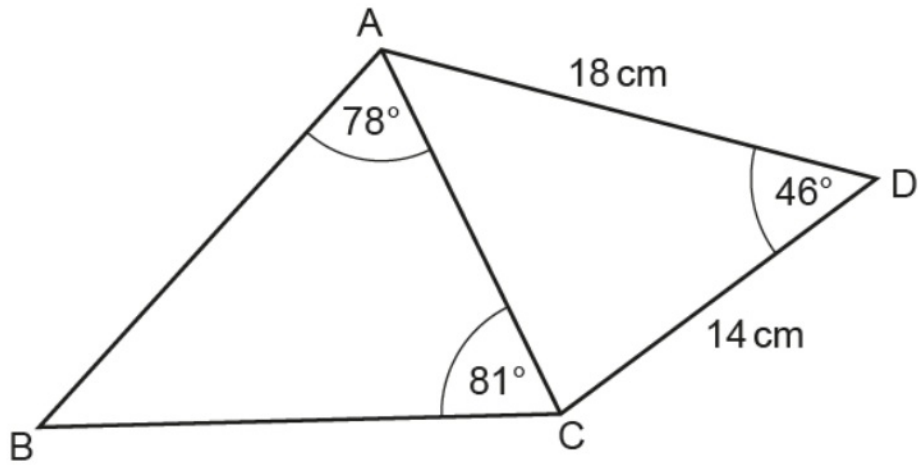


Not to scale

(a) Show that AC = 13.0 cm, correct to 3 significant figures. **[4]**

F58

17 ABC and ACD are triangles.



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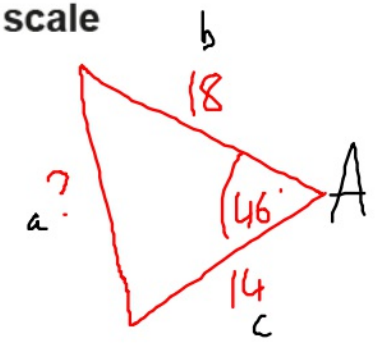

(a) Show that AC = 13.0 cm, correct to 3 significant figures.

GCSE

$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 18^2 + 14^2 - (2)(18)(14)\cos 46$

$a^2 = 169.89\ldots$

$a = \sqrt{169.89\ldots}$

$a = 13.03\ldots$ 13.0 ✓

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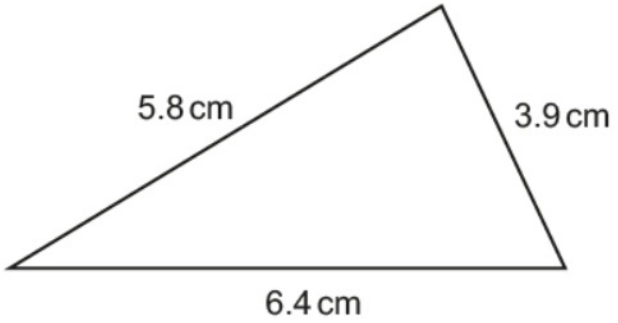
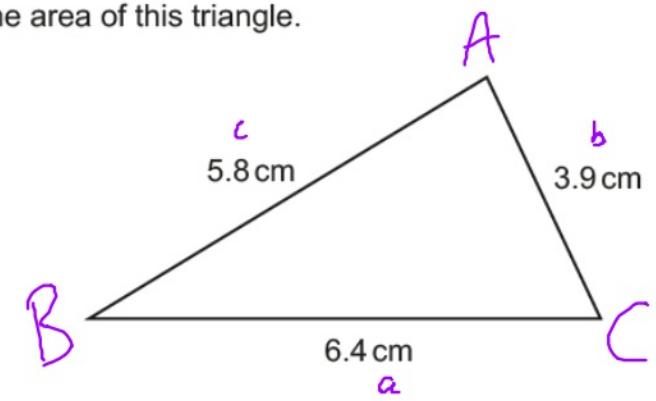
18 Calculate the area of this triangle.



Not to scale

..... cm^2 **[6]**

18 Calculate the area of this triangle.



Not to scale

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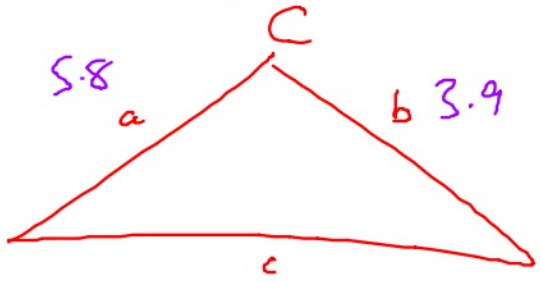
$$\text{Cos}A = \frac{b^2 + c^2 - a^2}{2bc} = \frac{3.9^2 + 5.8^2 - 6.4^2}{2(3.9)(5.8)}$$

$$\text{Cos}A = 0.1746$$

$$A = \text{Cos}^{-1} 0.1746$$

$$A = 79.95607107^\circ$$

$$\text{Area} = \tfrac{1}{2}ab\sin C$$



$$\text{Area} = \tfrac{1}{2}(5.8)(3.9)\sin 79.95$$

$$= 11.14\text{ cm}^2$$

✓

..... cm^2 **[6]**

Edexcel

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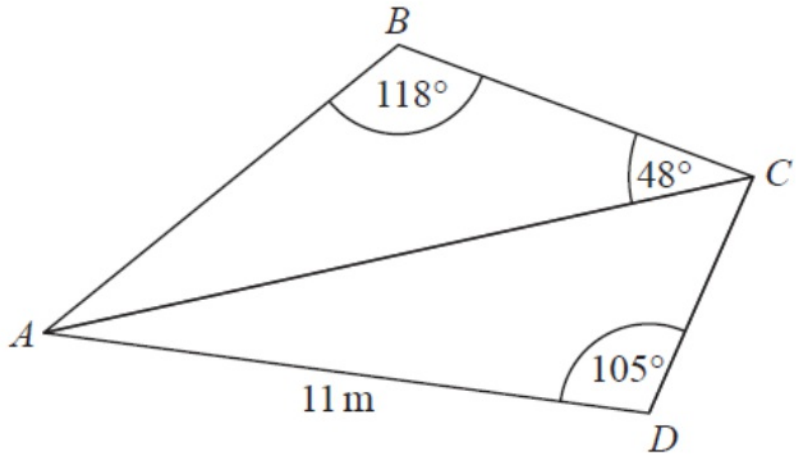
17 ABC and ADC are triangles.



The area of triangle ADC is $56\,m^2$

Work out the length of AB.
Give your answer correct to 1 decimal place.

..... m

(Total for Question 17 is 5 marks)

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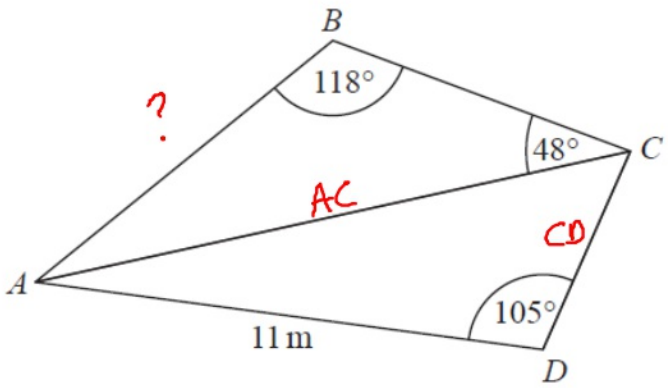
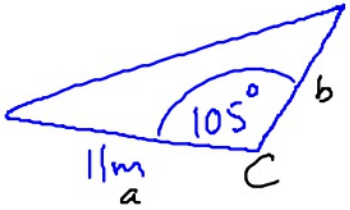
17 *ABC* and *ADC* are triangles.



Angle → opposite Side
Sine Rule

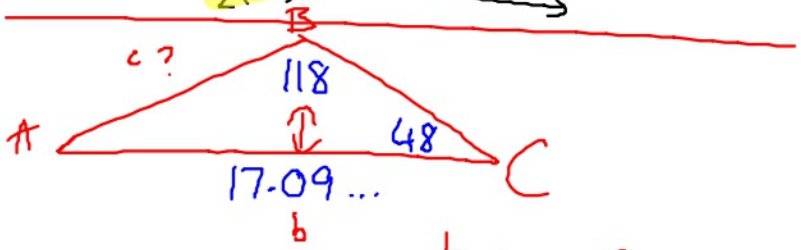
The area of triangle *ADC* is 56 m²

Work out the length of *AB*.
Give your answer correct to 1 decimal place.



$\frac{1}{2}ab\sin C = 56m^2$

$\frac{1}{2}(11)\,b\,\sin 105 = 56$

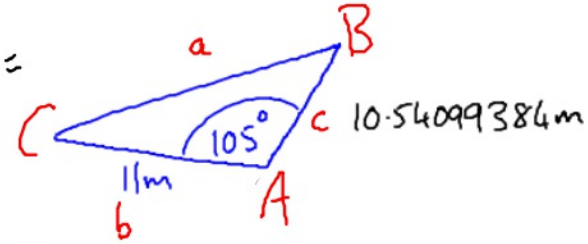


$\frac{b}{\sin B} = \frac{c}{\sin C}$

$\frac{17.09}{\sin 118} = \frac{c}{\sin 48}$

14·4 ✓ m

AC =



$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 232.1125511 - -60.020...$

$a^2 = 292.133$

$\Rightarrow a = \sqrt{}$

$a = 17.09190365$

(Total for Question 17 is 5 marks)

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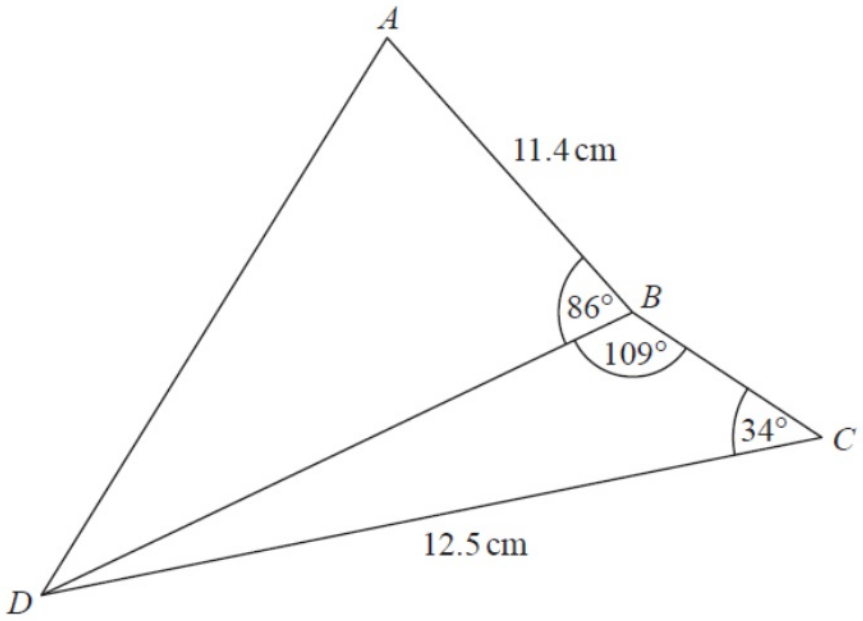
17

G57
G58



Work out the length of AD.
Give your answer correct to 3 significant figures.

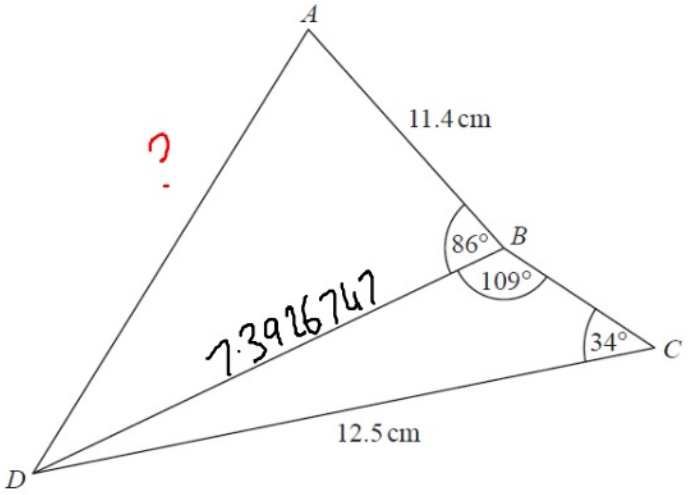
..... cm

(Total for Question 17 is 5 marks)

Video created by W Neill

17

G57
G58



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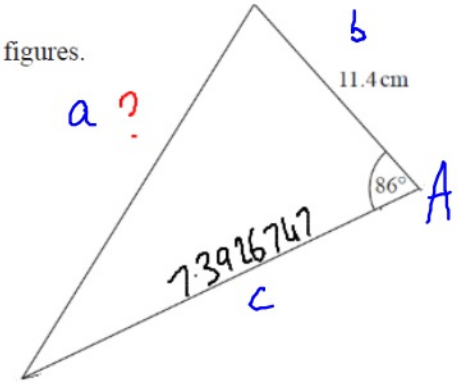
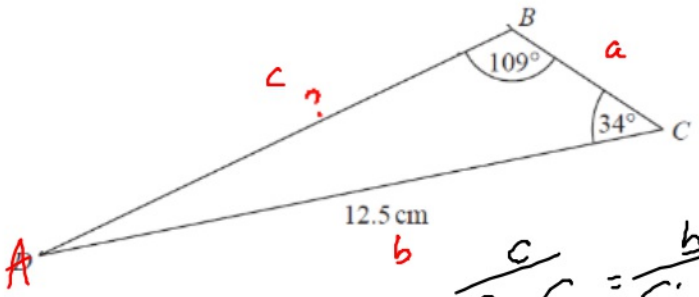




$$\frac{c}{\sin C} = \frac{b}{\sin B}$$

$$\frac{c}{\sin 34} = \frac{12.5}{\sin 109}$$

7·3926747 cm

$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 11.4^2 + 7.39^2 - [2 \times 11.4 \times 7.39 \times \cos 86$

$a^2 = 184.61 - [11.75766181]$

$a^2 = 172.85\ldots$ $a = 13.1$ cm ✓

(Total for Question 17 is 5 marks)

AQA

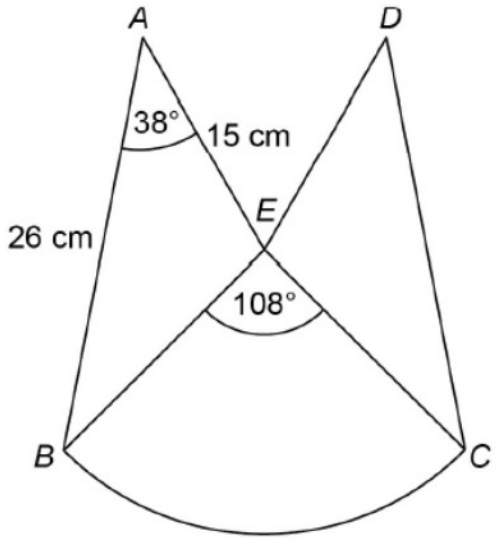
Video created by W Neill

25 The diagram shows a logo.

ABE and *DCE* are congruent triangles.

BCE is a sector of a circle, centre *E*.

G58
G59
G25



Not drawn accurately

Show that the area of the logo is 510 cm^2 to 2 significant figures.

[5 marks]

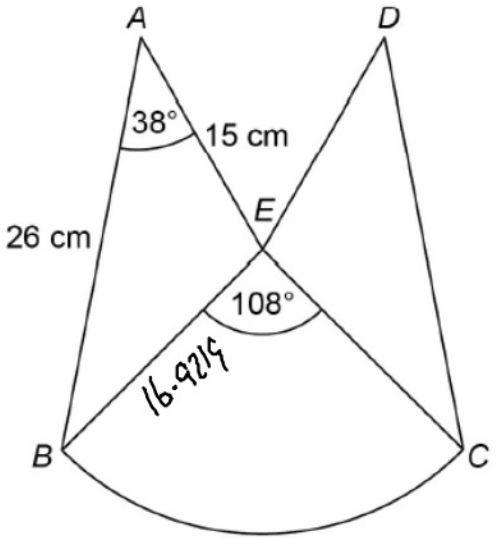
Video created by W Neill

25 The diagram shows a logo.

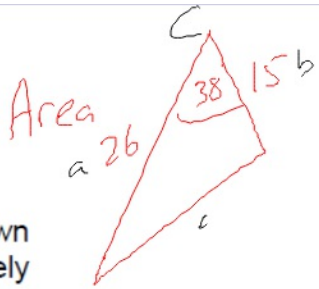
ABE and *DCE* are congruent triangles.

BCE is a sector of a circle, centre *E*.

G58
G59
G25



Not drawn accurately

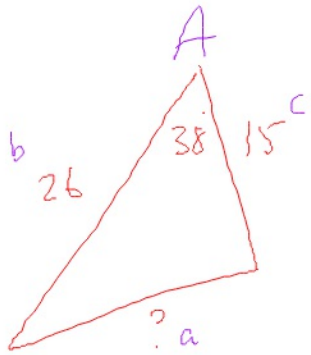


$= \frac{1}{2}ab\sin C = \frac{1}{2}(26)(15)\sin 38$

$120.05\ cm^2$

2 triangles $= 120.05 \times 2$

$= 240.1079754\ cm^2$



$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 26^2 + 15^2 - 2(26)(15)\cos 38$

$a^2 = 901 - 614.66$

$a^2 = 286\ldots$

$a = \sqrt{286}$

$a = 16.9219\ cm$

Show that the area of the logo is 510 cm^2 to 2 significant figures.

Area of sector $= R^2 \times \pi \div 360 \times 108$

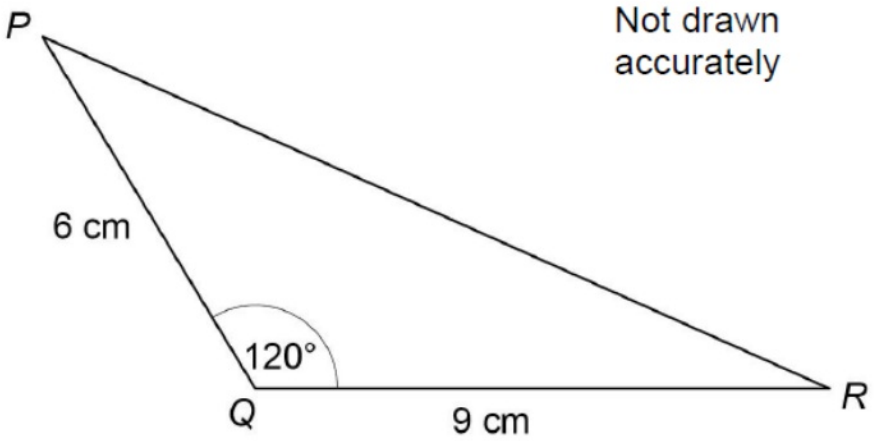
$= 269.879\ cm^2$

Total $= 240\ldots + 269\ldots$

$= 509.9\ cm^2 = 510\ cm^2$

22 Here is a triangle.

G58



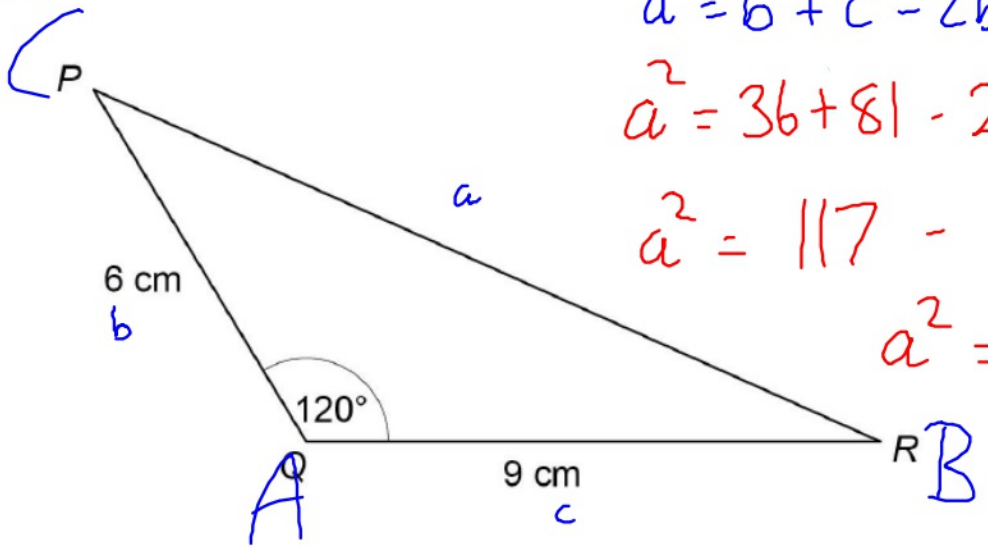
Work out the length *PR*.

[3 marks]

Answer _____ cm

22 Here is a triangle.

G58



$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 36 + 81 - 2(6)(9)\cos 120$

$a^2 = 117 - -54$

$a^2 = 171$

$a = \sqrt{171}$

$a = 13.08$

Work out the length *PR*.

Answer 13.08 ✓ cm

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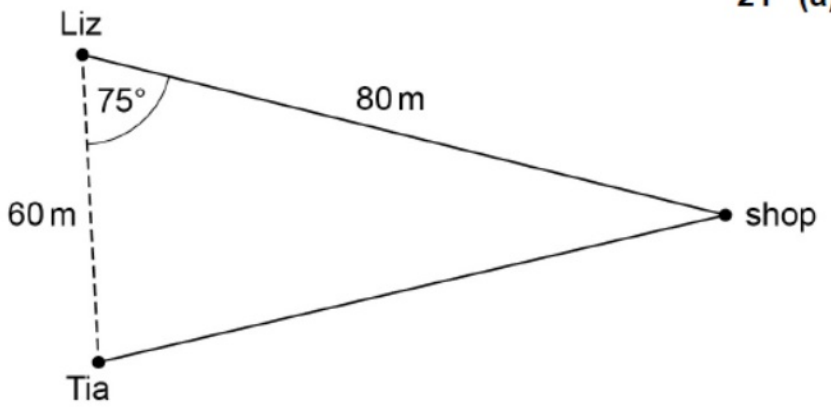
21 Liz and Tia are walking towards a shop along different straight paths.

The diagram shows their positions at 2 pm

G58



21 (a) Assume they walk at the same speed.

Who will arrive at the shop first?

You **must** show your working. **[3 marks]**

Answer _____

21 (b) In fact, Liz walks at a faster speed than Tia.

How does this affect the answer to part (a)?

[1 mark]

_____

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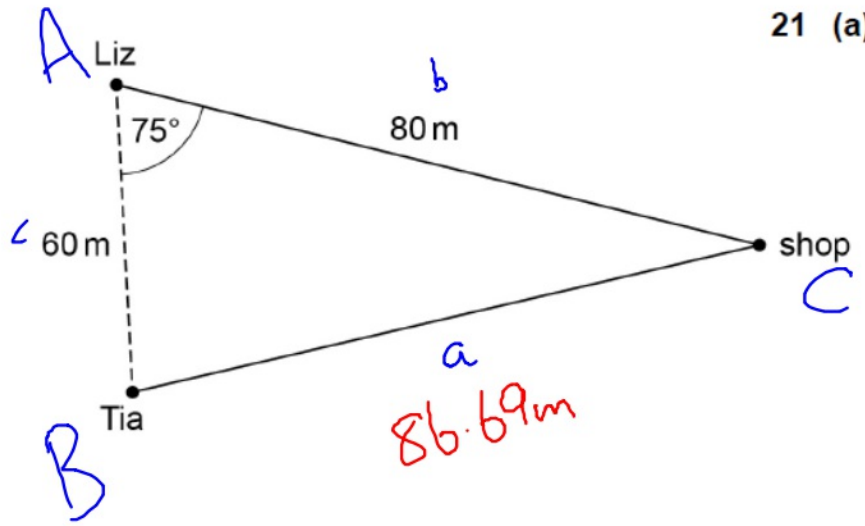
21 Liz and Tia are walking towards a shop along different straight paths.

The diagram shows their positions at 2 pm

G58



21 (a) Assume they walk at the same speed.

Who will arrive at the shop first?

You **must** show your working. **[3 marks]**

$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 80^2 + 60^2 - 2(80)(60)\cos 75$

$a^2 = 10000 - 2484\ldots$

$a^2 = 7515$

$a = 86.69\text{m}$

Answer Liz because $80\text{m} < 86.69\text{m}$

21 (b) In fact, Liz walks at a faster speed than Tia.

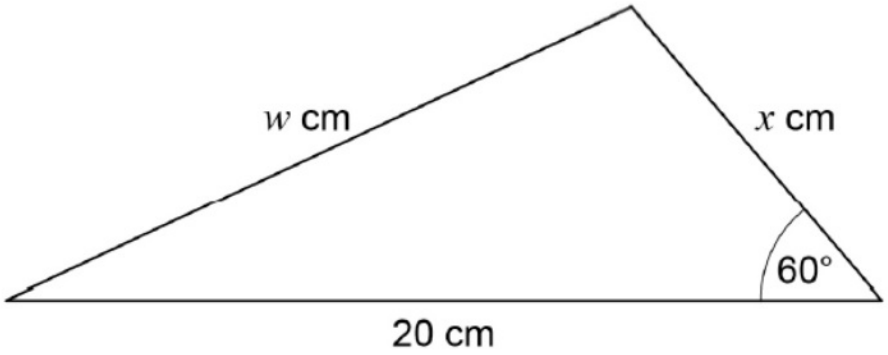
How does this affect the answer to part (a)?

She will still arrive first (no change) **[1 mark]**

26 The area of this triangle is $25\sqrt{3}$ cm^2

G48
G58
G59

Not drawn accurately



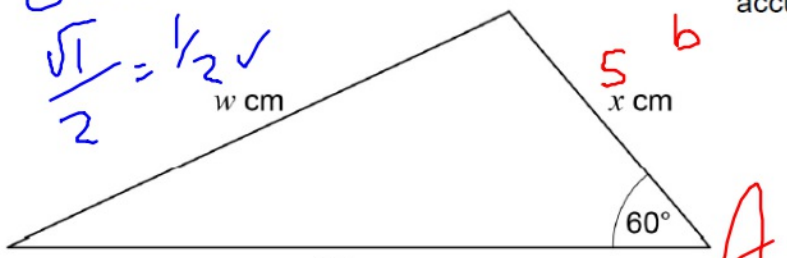
Work out the value of w.
Give your answer in the form $a\sqrt{b}$ where a and b are integers greater than 1

[5 marks]

Answer _____

26 The area of this triangle is $25\sqrt{3}$ cm^2

G48
G58
G59



Not drawn accurately

Work out the value of w.

Give your answer in the form $a\sqrt{b}$ where a and b are integers greater than 1

Answer _____