ANSWERS

Trigonometry – Sine/Cosine Rule

15. The diagram shows triangle ABC.

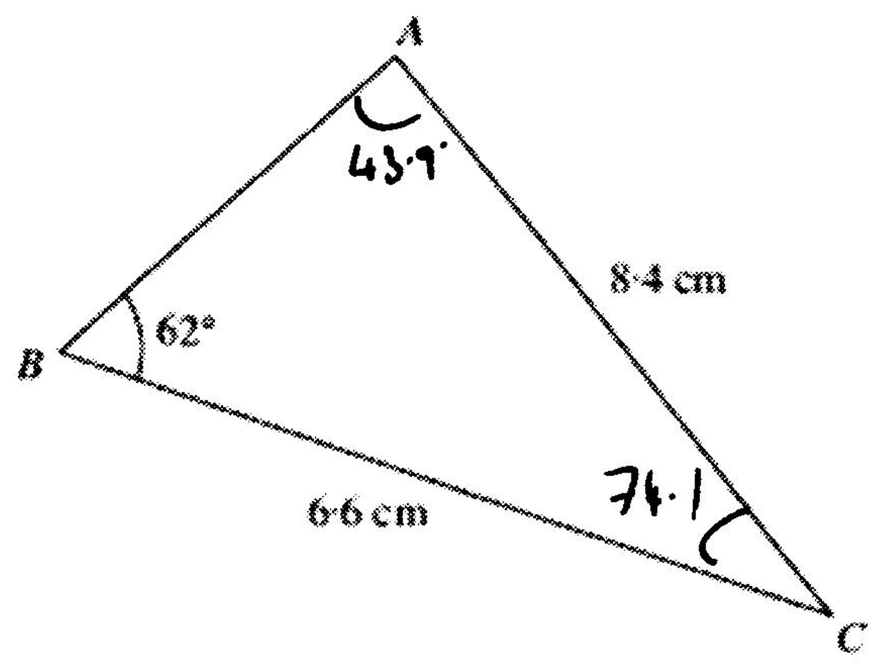

Diagram not drawn to scale.

You are given that $BC = 6{\cdot}6$ cm, $AC = 8{\cdot}4$ cm and $A\hat{B}C = 62°$.

(a) Calculate the size of the acute angle BAC.

$$\frac{8.4}{\sin 62^\circ} = \frac{6.6}{\sin B\hat{A}C} \quad (1)$$

$$\therefore \sin B\hat{A}C = \frac{6.6 \times \sin 62^\circ}{8.4} \quad (1)$$

$$\sin^{-1}(0.693744537) = 43.9^\circ \quad (1)$$

[3]

(b) Calculate the area of the triangle ABC.

$$\text{Area} = \frac{1}{2}ab\sin\theta \quad (1)$$

$$= \frac{1}{2} \times 6.6 \times 8.4 \times \sin 74.1 \quad (1)$$

$$= 26.7\text{ cm}^2 \quad (1)$$

[3]

16.

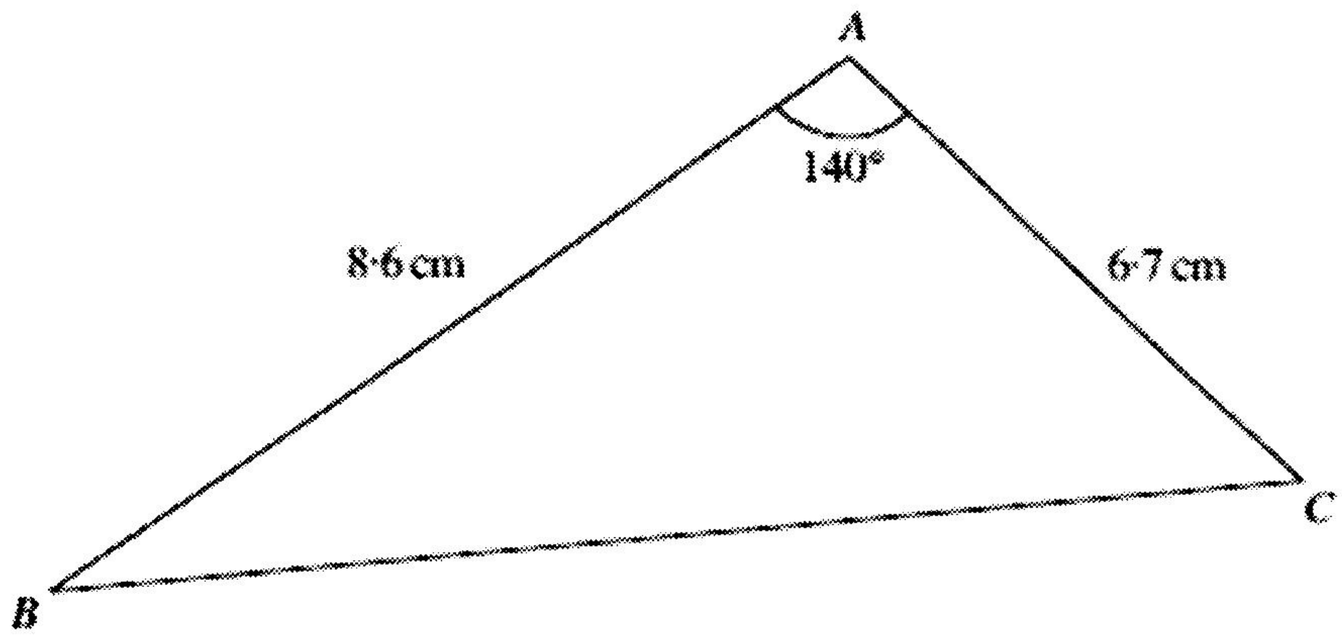

Diagram not drawn to scale.

(a) Find BC.

$BC^2 = 8.6^2 + 6.7^2 - 2 \times 8.6 \times 6.7 \times \cos 140°$ (1)

$BC^2 = 73.96 + 44.89 + 86.23$ (1)

$BC^2 = 205.08$

$\therefore BC = 14.3$ cm (1)

[3]

(b) Calculate the area of triangle ABC.

$\text{Area} = \frac{1}{2} ab \sin \theta$

(1)

$= \frac{1}{2} \times 8.6 \times 6.7 \times \sin 140° = 18.5 \text{ cm}^2$ (1)

[2]

(c) Hence, find the perpendicular distance between A and BC.

$\text{Area} = \frac{1}{2} bh$

$18.5 = 0.5 \times 14.3 \times h \quad \therefore h = 2.6$ cm (1)

[2]

(1)

13.

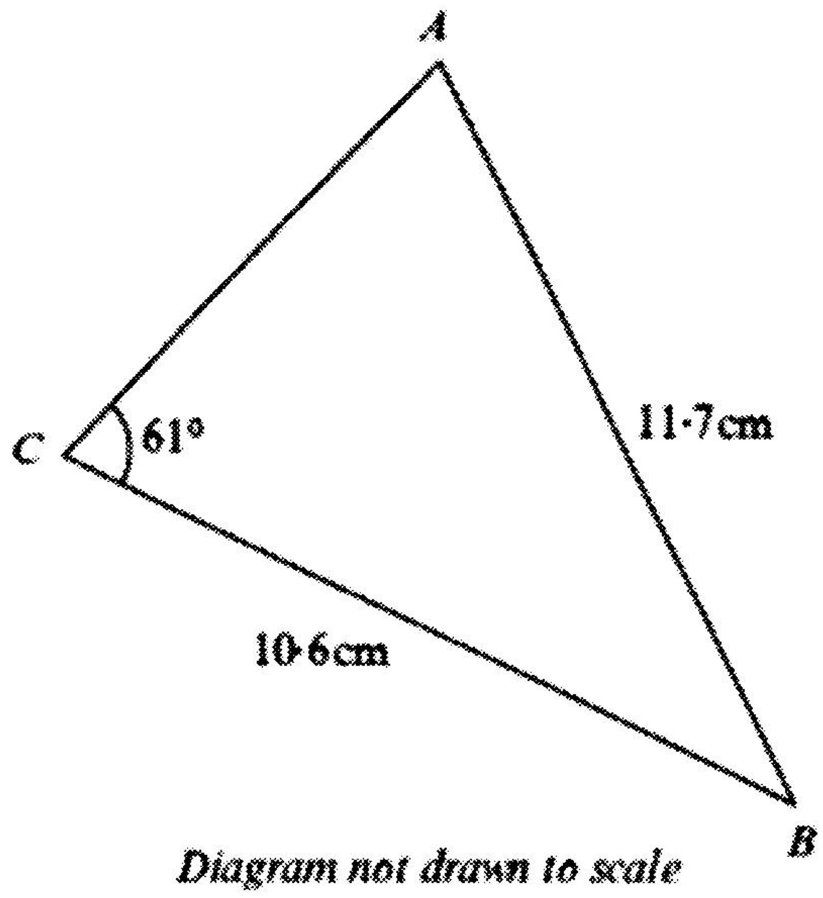

Diagram not drawn to scale

Calculate the size of $C\hat{A}B$.

$$\frac{\sin 61^\circ}{11.7} = \frac{\sin C\hat{A}B}{10.6} \quad (1)$$

$$\frac{10.6 \times \sin 61^\circ}{11.7} = \sin C\hat{A}B \quad (1)$$

$$\sin^{-1}(0.792390503) = C\hat{A}B$$

$$C\hat{A}B = 52.4^\circ \quad (1)$$

[3]

19. A triangular flowerbed in a park is being prepared for planting bulbs.
The gardener is going to lay compost over all the flowerbed to a depth of 12cm.

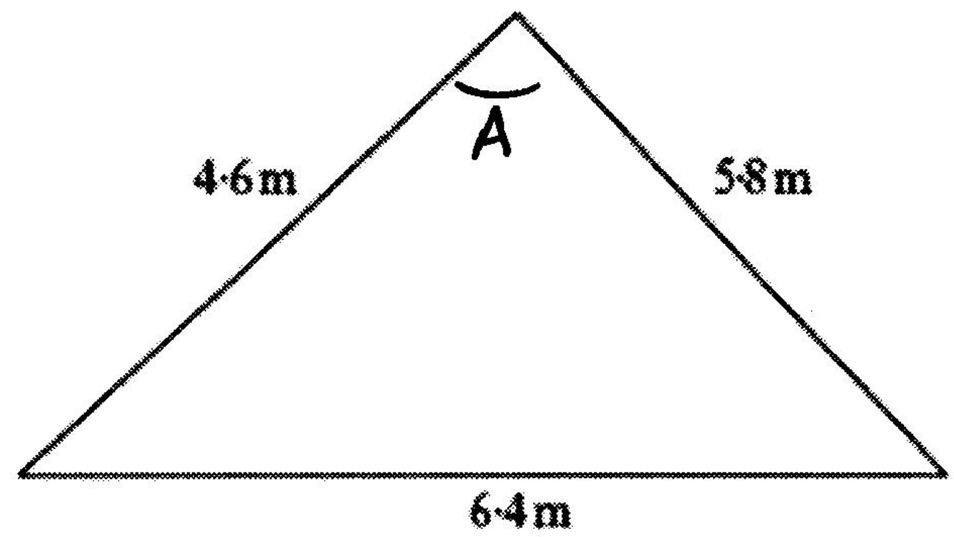

Diagram not drawn to scale

Calculate the volume of compost required.

Find A. $6.4^2 = 4.6^2 + 5.8^2 - 2 \times 4.6 \times 5.8 \times \cos A$ (1)

$\frac{6.4^2 - 4.6^2 - 5.8^2}{-2 \times 4.6 \times 5.8} = \cos A$ (1)

$\therefore \cos^{-1}(0.257370314) = 74.96°$ (1)

Area of triangle $= \frac{1}{2} \times 4.6 \times 5.8 \times \sin 74.96$ (1)

$= 12.88 \text{ m}^2$ (1)

Volume $= 12.88 \times 0.12$ (1)

$= 1.5456 \text{ m}^3$ (1)

(1) for clarity of method.

[8]

15. The diagram shows triangle ABC.

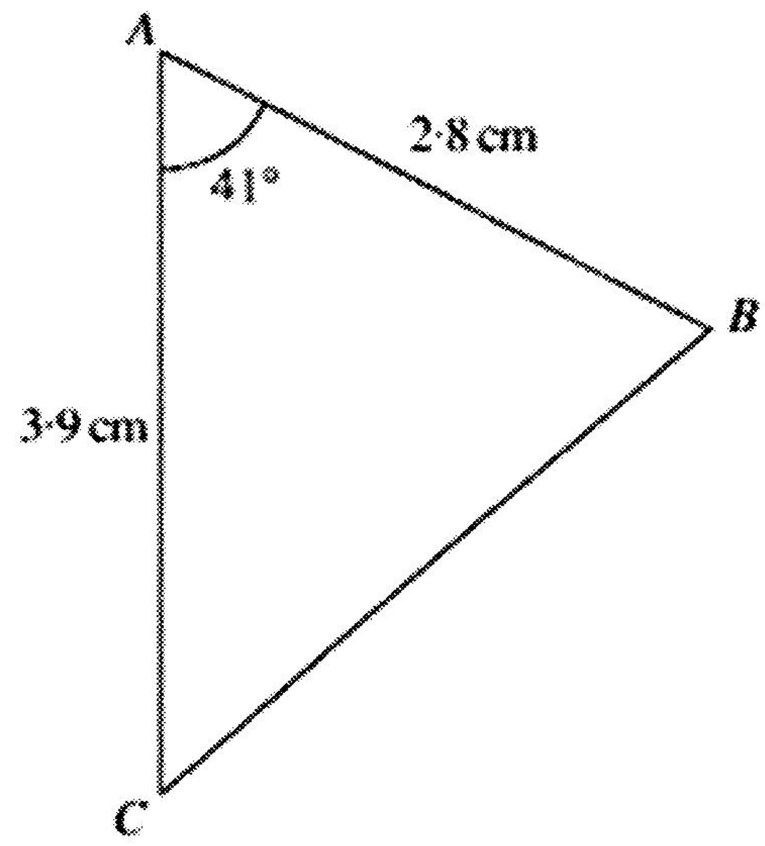

Diagram not drawn to scale.

Given that $B\hat{A}C = 41°$, $AB = 2{\cdot}8$ cm and $AC = 3{\cdot}9$ cm calculate

(a) the area of the triangle,

$$\text{Area} = \frac{1}{2} \times 3{\cdot}9 \times 2{\cdot}8 \times \sin 41° \quad (1)$$

$$= 3{\cdot}58 \text{ cm}^2 \quad (1)$$

[2]

(b) the length BC.

$$BC^2 = 3{\cdot}9^2 + 2{\cdot}8^2 - 2 \times 3{\cdot}9 \times 2{\cdot}8 \times \cos 41° \quad (1)$$

$$BC^2 = 23{\cdot}05 - 16{\cdot}48 \quad (1)$$

$$BC = 2{\cdot}56 \text{ cm} \quad (1)$$

[3]

(b)

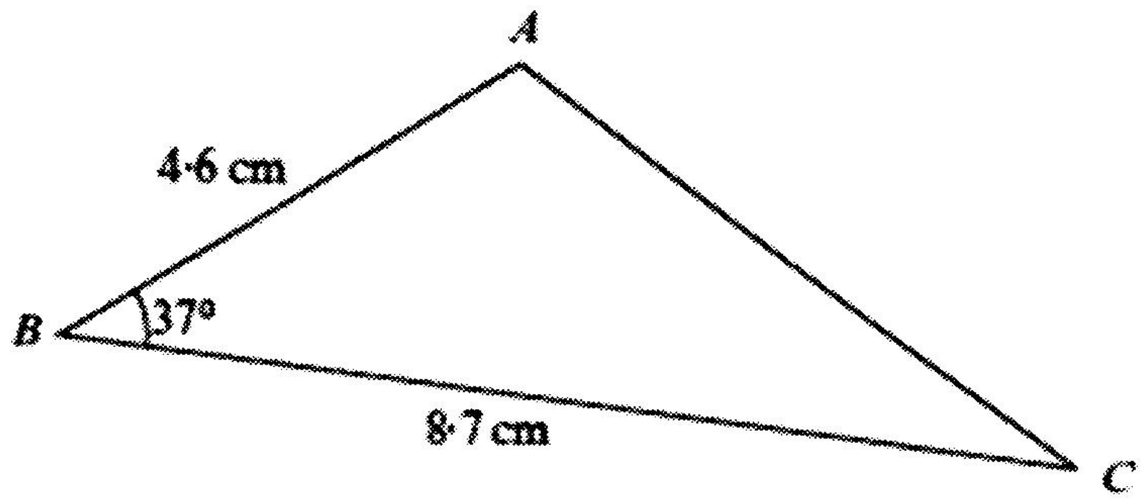

Diagram not drawn to scale

Find the length of AC.

$AC^2 = 4.6^2 + 8.7^2 - 2 \times 4.6 \times 8.7 \times \cos 37°$ (1)

$AC^2 = 96.85 - 63.92$ (1)

$AC^2 = 32.93$

$AC = 5.74$ cm (1)

[3]

15.

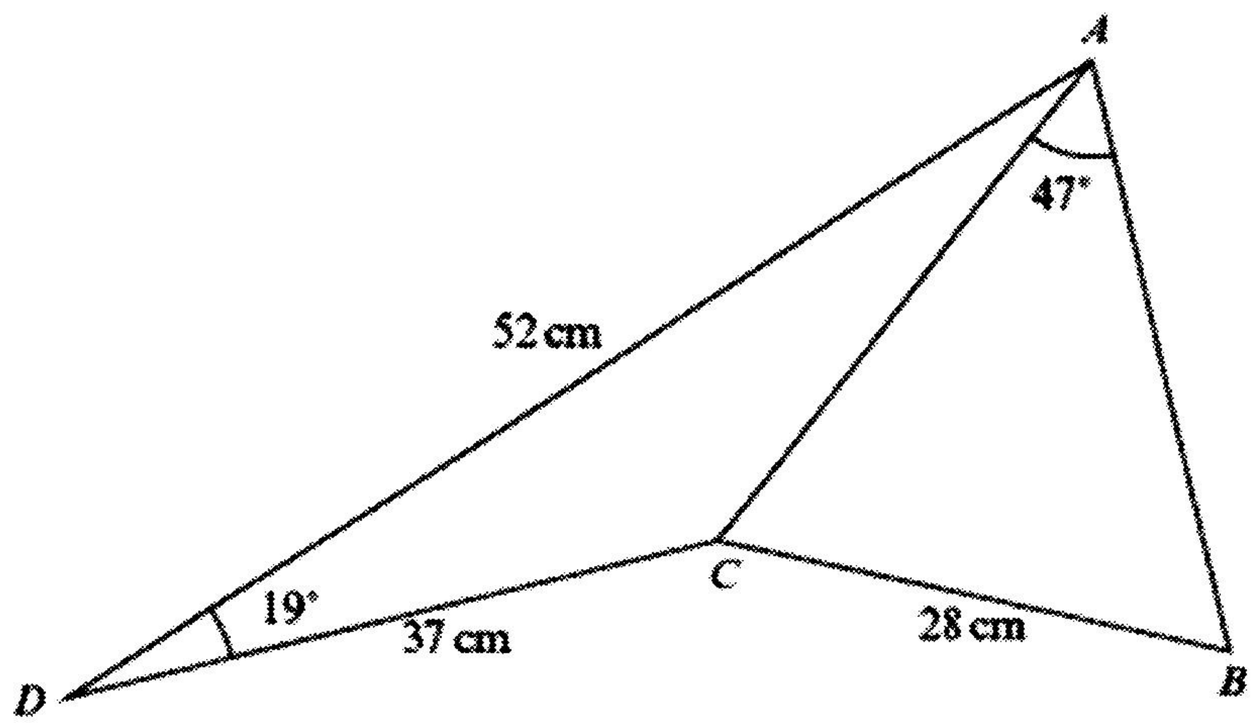

Diagram not drawn to scale

Calculate the size of $A\hat{B}C$.

$AC^2 = 37^2 + 52^2 - 2 \times 37 \times 52 \times \cos 19°$ (1)

$AC^2 = 4073 - 3638$ (1)

$AC^2 = 435$

$AC = 20.86$ cm. (1)

$\therefore \quad \dfrac{\sin A\hat{B}C}{20.86} = \dfrac{\sin 47°}{28}$ (1)

$\sin A\hat{B}C = \dfrac{20.86 \times \sin 47°}{28}$ (1)

$\sin^{-1}(0.544858507) = A\hat{B}C$ (1)

$A\hat{B}C = 33°$ (1)

[7]

17. The diagram shows triangle *ABC*.

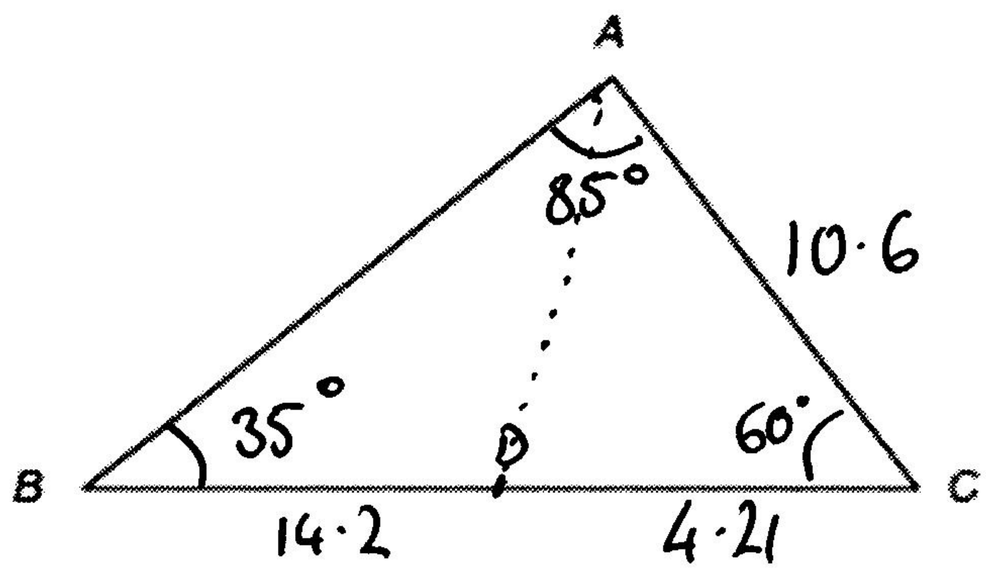

Diagram not drawn to scale

You are given the following information:

- *D* is a point on the side *BC*
- $A\hat{B}C = 35°$ and $A\hat{C}B = 60°$
- $AC = 10{\cdot}6$ cm and $BD = 14{\cdot}2$ cm

Calculate the length of *AD*. **[7]**

Find BC. $\frac{10\cdot6}{\sin 35°} = \frac{BC}{\sin 85°}$ (1)

$\therefore BC = \frac{10\cdot6 \times \sin 85°}{\sin 35°}$ (1)

$BC = 18\cdot41$ (1)

$\therefore DC = 18\cdot41 - 14\cdot2 = 4\cdot21$ (1)

$\therefore AD^2 = 4\cdot2^2 + 10\cdot6^2 - 2 \times 4\cdot2 \times 10\cdot6 \times \cos 60°$ (1)

$AD^2 = 130 - 44\cdot52$ (1)

$AD^2 = 85\cdot48$

$AD = 9\cdot25$ cm (1)