

TRIGONOMETRY 6: QUIZ SOLUTIONS

Question 1

In $\triangle ABC$, $\angle BAC = 62^\circ$, $\angle ABC = 45^\circ$ and $AC = 12\text{cm}$. What is the length of BC (correct to 2 decimal places).

A. 9,61cm

B. 10,59cm

C. 14,98cm

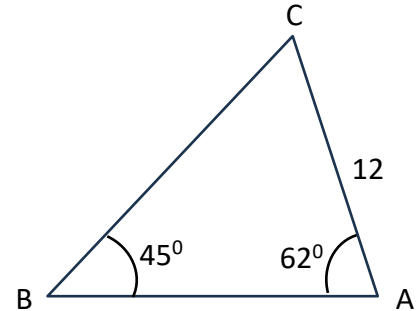
D. 16,53cm

Solution

Using the sine rule

$$\frac{BC}{\sin 62^\circ} = \frac{12}{\sin 45^\circ}$$

$$\begin{aligned}\therefore BC &= \frac{12 \sin 62^\circ}{\sin 45^\circ} \\ &= 14,98\text{cm}\end{aligned}$$



So, the correct answer is C.

Question 2

A triangular plot of land, $\triangle XYZ$, has $XY = 7\text{m}$, $YZ = 9\text{m}$ and $XZ = 13\text{m}$. Calculate the size of the largest (internal) angle of this triangle (to 1 decimal place).

A. $32,2^\circ$

B. $72,0^\circ$

C. $108,0^\circ$

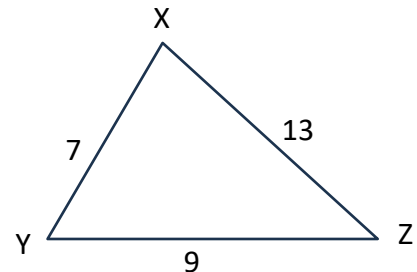
D. $139,8^\circ$

Solution

The largest angle (Y) is opposite the largest side (XZ)

Using the cosine rule

$$\begin{aligned}13^2 &= 9^2 + 7^2 - 2 \times 9 \times 7 \times \cos Y \\ 169 &= 81 + 49 - 126 \cos Y \\ 169 &= 130 - 126 \cos Y \\ \therefore \cos Y &= -\frac{39}{126} = -\frac{13}{42} \\ \therefore \angle Y &= 108,0^\circ\end{aligned}$$



So, the correct answer is C.

Question 3

The area of a triangular sail, PQR , is 24m^2 . If $PQ=8\text{m}$ and $QR=11\text{m}$, calculate the two possible values of $\angle PQR$ (to the nearest degree).

A. 16° or 164°

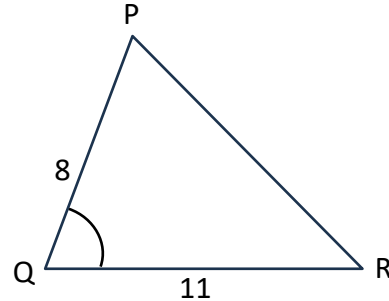
B. 27° or 153°

C. 33° or 57°

D. 33° or 147°

Solution

$$\begin{aligned}\text{Area} &= \frac{1}{2}PQ \cdot QR \cdot \sin Q \\ \therefore 24 &= \frac{1}{2} \times 8 \times 11 \times \sin Q \\ \therefore \sin Q &= \frac{24}{44} = \frac{6}{11} \\ \therefore \angle Q &= 33^\circ \text{ or } 147^\circ\end{aligned}$$



So, the correct answer is D.

Question 4

Two Fire Observers, Andile and Lesedi, are working 15km apart in a national forest area in Limpopo. Lesedi is directly east of Andile. Andile and Lesedi both spot a plume of smoke from a fire to the north. The bearing of the smoke from Andile is 035° and from Lesedi is 310° . There is a Rapid Response Ground Crew stationed at a base camp which is 10km due south of Andile.

Calculate (i) the direct distance from Andile to the fire (correct to 2 decimal places);
(ii) the direct distance from the base camp to the fire (correct to 2 decimal places).

A. (i) 9,68km; (ii) 11,46km

B. (i) 9,68km; (ii) 18,77km

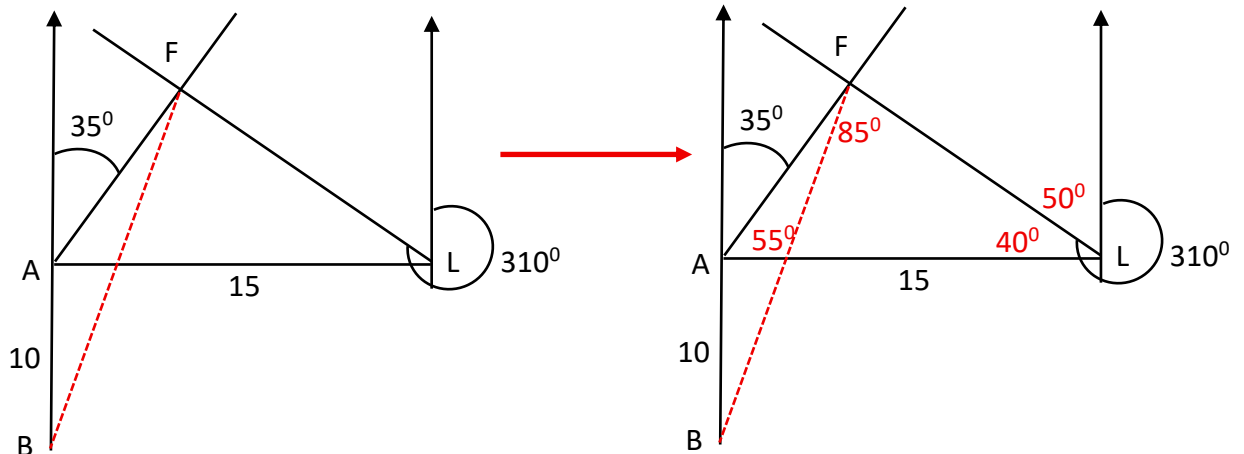
C. (i) 11,54km; (ii) 20,49km

D. (i) 14,94km; (ii) 23,89km

Solution

Andile is at A, Lesedi is at L, the fire is at F and the base camp is at B.

Use the bearings to calculate the angles of $\triangle ALF$.



$$\begin{aligned}
 \text{(i)} \quad \text{In } \triangle ALF \quad \frac{AF}{\sin L} &= \frac{AL}{\sin F} \\
 \therefore \frac{AF}{\sin 40^\circ} &= \frac{15}{\sin 85^\circ} \\
 \therefore AF &= \frac{15 \sin 40^\circ}{\sin 85^\circ} = 9,68 \text{ km}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad \text{In } \triangle ABF \quad BF^2 &= 10^2 + 9,68^2 - 2 \times 10 \times 9,68 \times \cos 145^\circ \\
 &= 100 + 93,7024 - 193,6 \times \cos 145^\circ \\
 &= 193,7024 + 158,5878 \\
 &= 352,2902 \\
 \therefore BF &= 18,77 \text{ km}
 \end{aligned}$$

So, the correct answer is B.

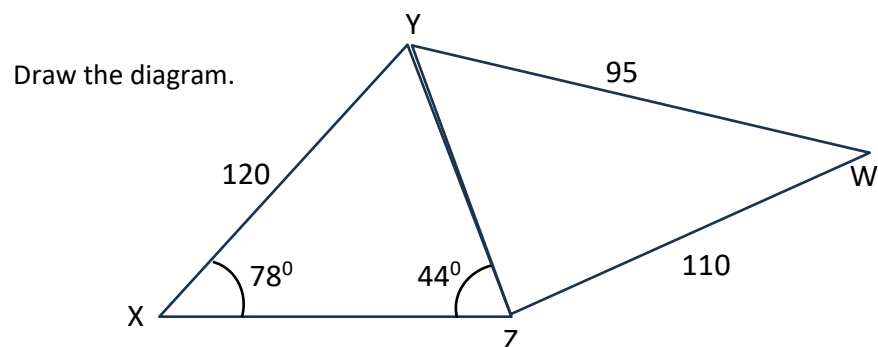
Question 5

A surveyor is mapping out a new park layout consisting of two adjacent triangular fields, $\triangle XYZ$ and $\triangle YWZ$, that share a common boundary path YZ . In the first field, $XY = 120\text{m}$, $\angle YXZ = 78^\circ$ and $\angle YZX = 44^\circ$, while in the second field, $YW = 95\text{m}$ and $WZ = 110\text{m}$.

- What is the length of the shared boundary path YZ ?
- Calculate the size of $\angle YWZ$ in the second field.
- Calculate the area of the new park.

- (i) 84,48m; (ii) 48,3°; (iii) 7 455,12m²
- (i) 168,96m; (ii) 69,2°; (iii) 13 490,39m²
- (i) 168,96m; (ii) 110,8°; (iii) 13 490,39m²
- (i) 168,96m; (ii) 110,8°; (iii) 18 320,80m²

Solution



(i) In $\triangle XYZ$, $\frac{YZ}{\sin 78^\circ} = \frac{120}{\sin 44^\circ}$ sine rule

$$\therefore YZ = \frac{120 \sin 78^\circ}{\sin 44^\circ} = 168,96 \text{ m}$$

(ii) In $\triangle XYZ$, $168,96^2 = 95^2 + 110^2 - 2.95.110.\cos W$ cosine rule

$$\cos W = \frac{95^2 + 110^2 - 168,96^2}{2.95.110}$$

$$\cos W = -0,35514$$

$$\angle W = 110,8^\circ$$

(iii) Area $\triangle XYZ = \frac{1}{2} \cdot 120 \cdot 168,96 \cdot \sin 58^\circ = 8\,605,37 \text{ m}^2$ area rule

$$\text{Area } \triangle YWZ = \frac{1}{2} \cdot 95 \cdot 110 \cdot \sin 110,8^\circ = 4\,885,02 \text{ m}^2$$

$$\therefore \text{Total area} = 8\,605,37 \text{ m}^2 + 4\,885,02 \text{ m}^2 = 13\,490,39 \text{ m}^2$$

So, the correct answer is C.