

TRIGONOMETRY 8: QUIZ SOLUTIONS

Question 1

A vertical flagpole stands in the corner of a horizontal rectangular courtyard ABCD. The foot of the flagpole is at A and the angle of elevation of the top of the flagpole, T, from point B is 30° . If $AB = 12\text{m}$ and $BC = 5\text{m}$, calculate the angle of elevation of T from C, correct to 1 decimal place.

A. $22,6^\circ$

B. $25,2^\circ$

C. $27,8^\circ$

D. $28,1^\circ$

Solution

Draw a diagram.

Let $\angle TCA = \alpha$

$$(i) \text{ In } \triangle TBA, \frac{TA}{AB} = \tan 30^\circ$$

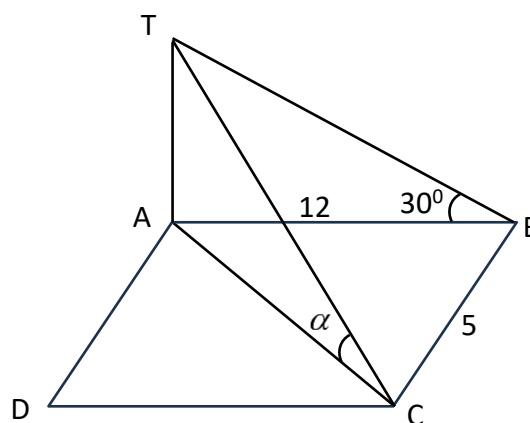
$$\therefore TA = 12 \tan 30^\circ = 12 \cdot \frac{1}{\sqrt{3}} = 4\sqrt{3}$$

$$(ii) \text{ In } \triangle ABC,$$

$$AC = 13 \quad (5, 12, 13 \triangle) \text{ (Pythagoras)}$$

$$(iii) \text{ In } \triangle TCA, \tan \alpha = \frac{TA}{AC} = \frac{4\sqrt{3}}{13} = 0,533114$$

$$\therefore \alpha = 28,1^\circ$$



So, the correct answer is D.

Question 2

Points P, Q and R lie in the same horizontal plane. Q is due south of P and R is on a bearing of 120° from P. The distance from P to Q is 40m and from P to R is 30m. A drone hovers vertically above point P at a height of 25m. Calculate (i) the distance from the drone to point R and (ii) the distance from Q to R, to the nearest m.

A. 39m; 33m

B. 39m; 36m

C. 43m; 36m

D. 55; 50

Solution

Draw a diagram.

$$(i) DR^2 = 25^2 + 30^2 = 625 + 900 = 1525$$

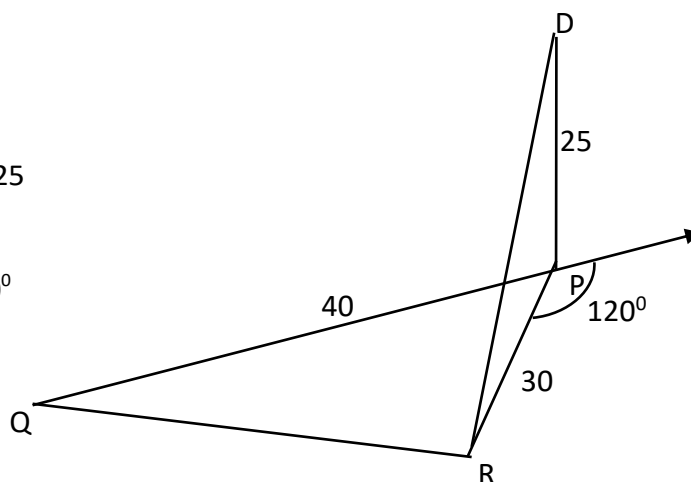
$$\therefore DR = 39$$

$$(ii) QR^2 = 30^2 + 40^2 - 2 \cdot 30 \cdot 40 \cdot \cos 60^\circ$$

$$= 900 + 1600 - 1200$$

$$= 1300$$

$$\therefore QR = 36$$



So, the correct answer is B.

Question 3

A vertical mast XY stands with its base on a horizontal plane. Two points, A and B, are on the plane such that A is due west of Y and B is due south of Y. The angle of elevation of the top of the mast, X, from A is 45° and from B it is 60° . If the distance between A and B is 20m, what is the height of the mast (correct to 1 decimal place)?

A. 14,1m

B. 15,5m

C. 17,3m

D. 18,6m

Solution

Draw a diagram.

In $\triangle XYB$, let $XY = h$

But $\triangle XYA$ is isosceles, so $AY = h$

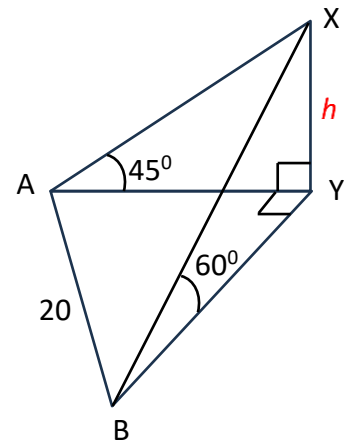
$$\text{In } \triangle XYB, \quad \frac{h}{YB} = \tan 60^\circ$$

$$\therefore YB = \frac{h}{\sqrt{3}}$$

$$\text{In } \triangle AYB \quad 20^2 = h^2 + \left(\frac{h}{\sqrt{3}}\right)^2 = \frac{4h^2}{3}$$

$$\therefore h^2 = 400 \times \frac{3}{4} = 300$$

$$\therefore h = \sqrt{300} = 10\sqrt{3} = 17,3$$



So, the correct answer is C.

Question 4

A, B and C are three points on a horizontal playing field such that B is 15m from A on a bearing of 060° . C is situated such that $AC = 20\text{m}$ and $BC = 18\text{m}$. A vertical camera mast is erected at A. The angle of elevation of the top of the mast from C is 40° .

(i) What is the height, h , of the mast, correct to 1 decimal places?

(ii) What is the size of $\angle BAC$, to the nearest degree?

A. 12,9m; 59°

B. 16,8m; 56°

C. 16,8m; 60°

D. 23,8m; 61°

Solution

Draw a diagram.

$$\begin{aligned} \text{(i) In } \triangle TCA, \quad \frac{h}{AC} &= \tan 40^\circ \\ h &= 20 \tan 40^\circ \\ &= 16,8 \end{aligned}$$

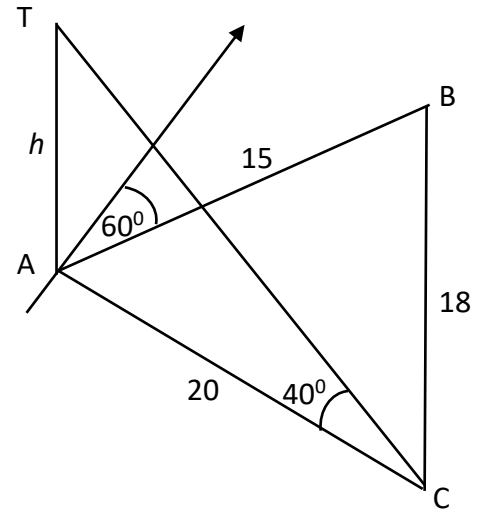
$$\begin{aligned} \text{(ii)} \quad 18^2 &= 15^2 + 20^2 - 2 \cdot 15 \cdot 20 \cdot \cos A \\ \therefore \cos A &= \frac{15^2 + 20^2 - 18^2}{2 \cdot 15 \cdot 20} \end{aligned}$$

$$\therefore \cos A = \frac{225 + 400 - 324}{600}$$

$$\therefore \cos A = \frac{301}{600} = 0,501666$$

$$\therefore A = 60^\circ$$

So, the correct answer is C.



Question 5

A vertical monument, TQ, stands on a horizontal plane. Points A and B lie in the plane and are 100m apart. The angles of elevation of the top of the monument, T, from A and B are 45° and 30° respectively. In the horizontal plane, $\angle AQB = 120^\circ$. Find the height, h , of the monument to the nearest metre.

A. 42m

B. 48m

C. 53m

D. 58m

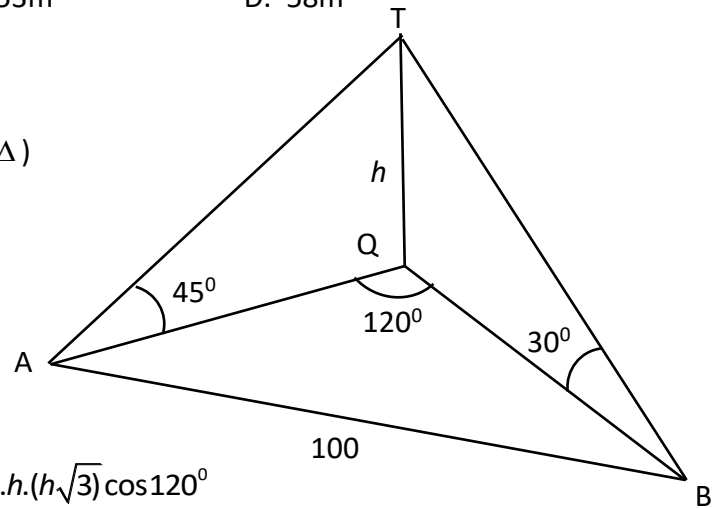
Solution

Draw a diagram.

In $\triangle TQA$, $AQ = h$ (isosceles $\triangle$)

$$\text{In } \triangle TQB, \frac{h}{BQ} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\therefore BQ = h\sqrt{3}$$



$$\text{In } \triangle AQB, 100^2 = h^2 + (h\sqrt{3})^2 - 2 \cdot h \cdot (h\sqrt{3}) \cos 120^\circ$$

$$\therefore 10\,000 = 4h^2 + \sqrt{3}h^2 = h^2(4 + \sqrt{3})$$

$$\therefore h^2 = \frac{10\,000}{(4 + \sqrt{3})}$$

$$\therefore h = 42$$

So, the correct answer is A.