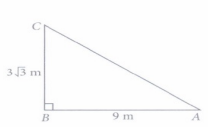
QB365 QUESTION BANK SOFTWARE

10th Maths Important Case Study Questions for Introduction To Trigonometry 2024

SECTION A

2 x 4 = 8

1) Three friends - Anshu, Vijay and Vishal are playing hide and seek in a park. Anshu and Vijay hide in the shrubs and Vishal have to find both of them. If the positions of three friends are at A, Band C respectively as shown in the figure and forms a right angled triangle such that AB = 9 m, BC = 3 $\sqrt{3}$ m and ∠B = 90°, then answer the following questions.



(i) The measure of ∠A is

(a) 30° (b) 45° (c) 60° (d) None of these

(ii) The measure of ∠C is

(a) 30° (b) 45° (c) 60° (d) None of these

(iii) The length of AC is

$(a) 2\sqrt{3}\ \text{m} (b) \sqrt{3}\ \text{m} (c) 4\sqrt{3}\ \text{m} (d) 6\sqrt{3}\ \text{m}$

(iv) cos2A =

(a) 0 $(b) \frac{1}{2}$ $(c) \frac{1}{\sqrt{2}}$ $(d) \frac{\sqrt{3}}{2}$

(v) $\sin\left(\frac{C}{2}\right)$ =

(a) 0 $(b) \frac{1}{2}$ $(c) \frac{1}{\sqrt{2}}$ $(d) \frac{\sqrt{3}}{2}$

Answer : **(i) (a):** We have, AB = 9 m, BC = $3\sqrt{3}$ m

In ΔABC, we have

$$\tan A = \frac{BC}{AB} = \frac{3\sqrt{3}}{9} = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \tan A = \tan 30^\circ \Rightarrow \angle A = 30^\circ$$

(ii) (c): Similarly, $\tan C = \frac{AB}{BC} = \frac{9}{3\sqrt{3}} = \sqrt{3}$

$$\Rightarrow \tan C = \tan 60^\circ \Rightarrow \angle C = 60^\circ$$

(iii) (d): Since $\sin A = \frac{BC}{AC} \Rightarrow \sin 30^\circ = \frac{BC}{AC}$

$$\Rightarrow \frac{1}{2} = \frac{3\sqrt{3}}{AC} \Rightarrow AC = 6\sqrt{3}\ \text{m}$$

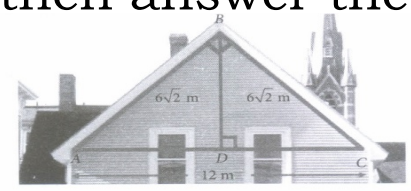
(iv) (b) : $\because \angle A = 30^\circ$ [From (1)]

$$\therefore \quad \cos 2A = \cos(2 \times 30^\circ) = \cos 60^\circ = \frac{1}{2}$$

(v) (b): $\because \angle C = 60^\circ$ [Using (2)]

$$\therefore \quad \sin\left(\frac{C}{2}\right) = \sin\left(\frac{60^\circ}{2}\right) = \sin 30^\circ = \frac{1}{2}$$

2) Aanya and her father go to meet her friend Juhi for a party. When they reached to [uhi's place, Aanya saw the roof of the house, which is triangular in shape. If she imagined the dimensions of the roof as given in the figure, then answer the following questions.



(i) If D is the mid point of AC, then BD =
(a) 2m (b) 3m (c) 4m (d) 6m

(ii) Measure of $\angle A$ =

(a)	**(b)**	**(c)**	**(d) None of**
30°	**60°**	**45°**	**these**

(iii) Measure of $\angle C$ =

(a)	**(b)**	**(c)**	**(d) None of**
30°	**60°**	**45°**	**these**

(iv) Find the value of sinA + cosC.
(a) 0 (b) 1 (c) $\frac{1}{2}$ **(d)** $\sqrt{2}$

(v) Find the value of $\tan^2 C + \tan^2 A$.
(a) 0 (b) 1 (c) 2 (d) $\frac{1}{2}$

Answer : We have, AB = BC = $6\sqrt{2}$ m and AC=12m .
(i) (d):∵ Dis mid point of AC.
∴ AD=DC=6m
Now, $AB^2 = BD^2 + AD^2$ (∵ ΔABD is a right triangle)
$\Rightarrow BD^2 = (6\sqrt{2})^2 - 6^2 = 72 - 36 = 36$
$\Rightarrow BD = 6 \text{ m}$
(ii) (c) : $\text{In } \Delta ABD, \sin A = \frac{BD}{AB} = \frac{6}{6\sqrt{2}} = \frac{1}{\sqrt{2}}$
$\Rightarrow \sin A = \sin 45^\circ \Rightarrow \angle A = 45^\circ$
(iii) (c) : $\text{In } \Delta BDC, \tan C = \frac{BD}{DC} = \frac{6}{6}$
$\Rightarrow \tan C = 1 = \tan 45^\circ \Rightarrow \angle C = 45^\circ$
(iv) (d) : $\sin A = \frac{1}{\sqrt{2}}, \cos C = \cos 45^\circ = \frac{1}{\sqrt{2}}$
$\therefore \quad \sin A + \cos C = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$
(v) (c): $(v) \quad (c) : \tan C = 1, \tan A = \tan 45^\circ = 1$
$\Rightarrow \tan^2 C + \tan^2 A = 1 + 1 = 2$