## Heights and Distance Questions Pdf

1. The angle of elevation of the sun, when the length of the shadow of a tree is $\sqrt{ } 3$ times the height of the tree is
a. $30^{\circ}$
b. $45^{\circ}$
c. $50^{\circ}$
d. $60^{\circ}$

Ans: A


Let $A B$ be the tree and $A C$ be its shadow.
Let $\angle \mathrm{ACB}=\theta$.
Then, $\frac{\mathrm{AC}}{\mathrm{AB}}=\sqrt{3}$
$\Rightarrow \quad \cot \theta=\sqrt{3} \Rightarrow \theta=30^{\circ}$.
2. Two ships are sailing in the sea on the two sides of a lighthouse. The angles of elevation of the top of the lighthouse as observed from the two ships are $30^{\circ}$ and $45^{\circ}$ respectively. If the lighthouse is 100 m high, the distance between the two ships is
a. 173 m
b. 200 m
c. 273 m
d. 300 m

Ans: C


Let $A B$ be the lighthouse and $C$ and $D$ be the Positions of the ships.

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\begin{aligned}
& \text { Then, } A B=100 \mathrm{~m}, \angle \mathrm{ACB}=30^{\circ} \\
& \text { and } \angle A D B=45^{\circ} \\
& \frac{A B}{A C}=\tan 30^{\circ}=\frac{1}{\sqrt{3}} \\
& \Rightarrow A C=A B \times \sqrt{3}=100 \sqrt{3} \mathrm{~m} \\
& \frac{A B}{A D}=\tan 45^{\circ}=1 \\
& \Rightarrow A D=A B=100 \mathrm{~m} \\
& \therefore C D=(A C+A D)=(100 \sqrt{3}+100) \mathrm{m} \\
& =100(\sqrt{3}+1) \mathrm{m}=(100 \times 2.73) \mathrm{m}=273 \mathrm{~m}
\end{aligned}
$$

3. A man standing at a point $P$ is watching the top of a tower, which makes angle of elevation of $30 \& \mathrm{deg}$; with the man's eye. The man walks some distance towards the tower to watch its top and the angle of elevation becomes 60\° What is the distance between the base of the tower and the point P?
a. 4 units
b. 8 units
c. 12 units
d. Data inadequate

Ans: D


One of $A B, A D$ and $C D$ must have been given.
So, the data is inadequate.
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4. On the same side of a tower, two objects are located. Observed from the top of the tower, their angles of depression are 45\° and 60\° If the height of the tower is 150 m , the distance between the objects is
a. 63.5 m
b. 76.9 m
c. 86.7 m
d. 90 m

Ans: A


Let $A B$ be the tower and $C$ and $D$ be the objects Then, $\mathrm{AB}=150 \mathrm{~m}, \angle \mathrm{ACB}=45^{\circ}$ and $\angle \mathrm{ADB}=60^{\circ}$
$\frac{A B}{A D}=\tan 60^{\circ}=\sqrt{3}$
$\Rightarrow A D=\frac{A B}{\sqrt{3}}=\frac{150}{\sqrt{3}} \mathrm{~m}$
$\frac{A B}{A C}=\tan 45^{\circ}=1$
$\Rightarrow A C=A B=150 \mathrm{~m}$
$\therefore C D=(A C-A D)$
$=\left[150-\frac{150}{\sqrt{3}}\right] \mathrm{m}=\left[\frac{150(\sqrt{3}-1)}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}\right] \mathrm{m}$
$=50(3-\sqrt{3}) \mathrm{m}=(50 \times 1.27) \mathrm{m}=63.5 \mathrm{~m}$
5. If a 30 m ladder is placed against 15 m wall such that it just reaches the top of the wall, then the elevation of the wall is equal to
a. $30^{\circ}$
b. $45^{\circ}$
c. $50^{\circ}$
d. $60^{\circ}$

Ans: A

$A C=30$ meter
$A B=15$ meter
$\angle A C B=\theta$
$\therefore \sin \theta=\frac{A B}{A C}=\frac{15}{30}=\frac{1}{2}$

$$
\begin{aligned}
& \Rightarrow>\sin \theta=\sin 30^{\circ} \\
& \Rightarrow \theta=30^{\circ}
\end{aligned}
$$

