Foundation

UDAAN 2025

MATHS

SOME APPLICATIONS OF TRIGONOMETRY

DHA : 03

Q1 A boy observed the top of an electric pole at an angle of elevation of 60° when the observation point is 8 meters away from the foot of the pole. Find the height of the pole.

(A) $8\ m$ (B) $8\sqrt{3}m$

(C) $\frac{8}{\sqrt{3}}m$ (D) $\frac{8}{3}m$

Q2 From a helicopter, Rajender observes a person standing on the ground at an angle of depression 45°. If the helicopter is flying at a height of 500 m from the ground, what is the distance of the person from Rajender?

(A) $500m$ (B) $\frac{500}{\sqrt{2}}m$

(C) $500\sqrt{2}m$ (D) $250m$

Q3 An electrician wants to repair an electric connection on a pole of height 9 m. He needs to reach 1.8 m below the top of the pole to do repair work. What should be the length of the ladder he should use, when it makes an angle of 60° with the ground? What will be the distance between foot of the ladder and foot of the pole?

(A) $2.4\sqrt{3}m$ (B) $2.4m$

(C) $7.2\sqrt{3}m$ (D) $7.2m$

Q4 An observer of height 1.8 m is13.2 m away from a palm tree. The angle of elevation of the top of the tree from his eye is 45°. What is the height of the palm tree?

(A) $13.2m$ (B) $11.4m$

(C) $15m$ (D) $16.8m$

Q5 Two men on either side of a temple of 30m height observe its top at the angles of elevation 30° and 60° respectively. Find the distance between the two men.

(A) $40\sqrt{2}m$ (B) $\frac{40}{\sqrt{3}}m$

(C) $40m$ (D) $40\sqrt{3}m$

Q6 A straight highway leads to the foot of a tower. Ramaiah standing at the top of the tower observes a car at an angle of depression of 30°. The car is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point.

(A) 3 sec (B) 6 sec

(C) 4.5 sec (D) 8 sec

Q7 A statue stands on the top of a 2m tall pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60°and from the same point, the angle of elevation of the top of the pedestal is 45°. Find the height of the statue.

(A) $2\sqrt{3}m$ (B) 2.464m

(C) 1.464m (D) $2\left(\sqrt{3}+1\right)m$

Q8 The angle of elevation of the top of a tower from the foot of a building is 30° and the angle of elevation of the top of the building from the foot of the tower is 60°. What is the ratio of heights of tower and building?

(A) 2:1 (B) 1:2

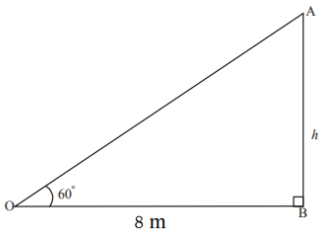
(C) 3:1 (D) 1:3

Answer Key

Q1	(B)
Q2	(C)
Q3	(A)
Q4	(C)
Q5	(D)
Q6	(A)
Q7	(C)
Q8	(D)

Hints & Solutions

Q1 Text Solution:



From the figure,
in triangle $\triangle OAB$, $OB = 8$ *meters*
and $\angle AOB = 60°$.
Let height of the pole $= AB = h$ *meters*
Apply the trigonometric ratio " tan *gent " to the angle to get,*

$\tan 60^\circ = \frac{AB}{OB}$

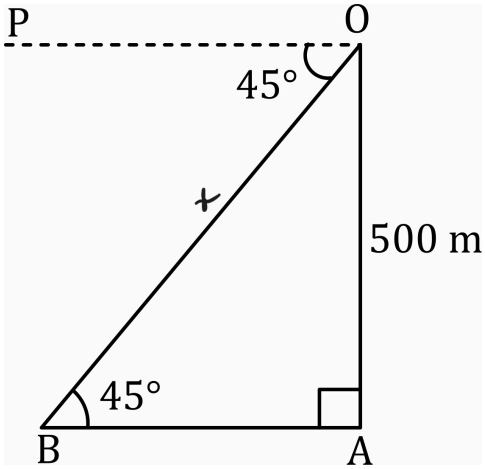
$\Rightarrow \sqrt{3} = \frac{h}{8}$

$h = 8\sqrt{3}m.$

$\therefore$ *Height of the pole is* $8\sqrt{3}m.$

Video Solution:

Q2 Text Solution:



From the figure,
In $\triangle OAB$,
$OA = 500\ m$ *and* $\angle POB = \angle ABO = 45°$ *(Angle of elevation = Angle of depression)*

$OB = dis\tan ce\ of\ the\ person\ from\ Rajender = x$

$Sin\ 45^\circ = \frac{OA}{OB}$

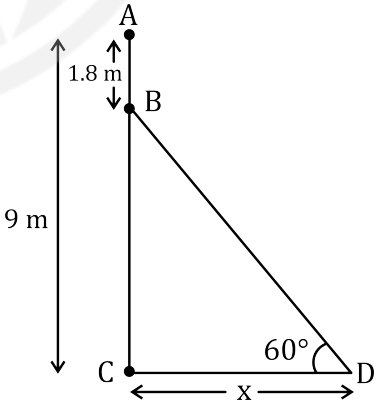
$\Rightarrow \frac{1}{\sqrt{2}} = \frac{500}{x}$

$\Rightarrow x = 500\sqrt{2}m$

The dis tan *ce from the person to Rajendar is* $500\sqrt{2}m.$

Video Solution:

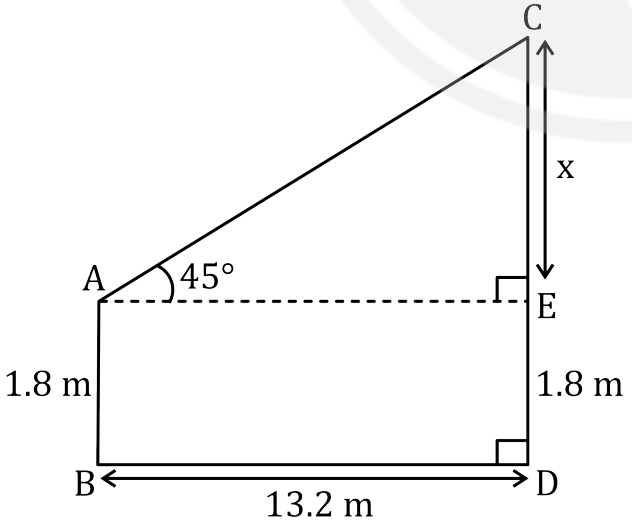
Q3 Text Solution:



Given height of the pole $= 9m$
From the figure,
$AC =$ *height of the pole* $= 9m$
The electrician needs to reach $1.8m$ *below the top of the pole to do repair work.*
Remaining length of the pole he can climb $= BC = AC - AB = 9 - 1.8 = 7.2m$
Angle of elevation made by the ladder with the ground $= 60^\circ$
In $\triangle BCD$,
$\tan 60^\circ = \frac{BC}{CD}$
$\Rightarrow \sqrt{3} = \frac{7.2}{x}$
$\Rightarrow x = \frac{7.2}{\sqrt{3}} = 2.4\sqrt{3}m$
Distance between the foot of the ladder and the foot of the pole is $2.4\sqrt{3}m$.

Video Solution:

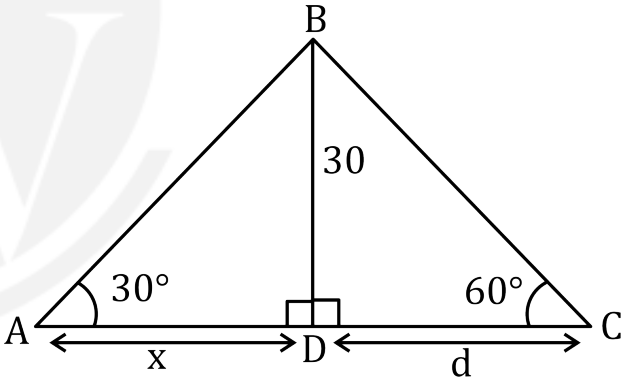
Q4 Text Solution:



Given height of the observer $(AB) = 1.8m$
Distance from the observer to the palm tree $(BD) = 13.2m$
From the figure,
In $\triangle ACE$,
$\tan 45^\circ = \frac{CE}{AE}$
$\Rightarrow 1 = \frac{x}{13.2}$
$\Rightarrow x = 13.2\ m$
Height of the palm tree $(CD) = CE + ED = x + 1.8 = 13.2 + 1.8 = 15m$
$\therefore$ *The height of the palm tree* $= 15m$

Video Solution:

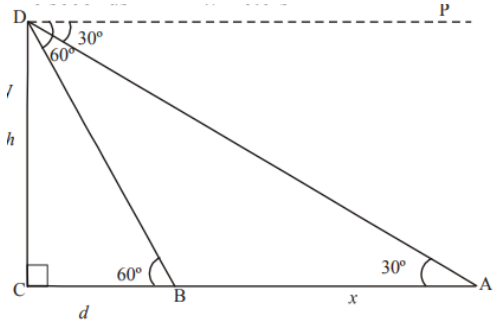
Q5 Text Solution:



Height of the temple $BD = 30\ m$
Angle of elevation of first person
$\angle DAB = 30^\circ$
Angle of elevation of second person
$\angle BCD = 60^\circ$
Let the distance between the first person and the temple, $AD = x$ *and distance between the second person and the temple,* $CD = d$
From $\triangle BAD$
$\tan 30^\circ = \frac{BD}{AD}$
$\Rightarrow \frac{1}{\sqrt{3}} = \frac{30}{x}$
$\Rightarrow x = 30\sqrt{3}m$
From $\triangle BCD$
$\tan 60^\circ = \frac{BD}{CD}$
$\Rightarrow \sqrt{3} = \frac{30}{d}$
$\Rightarrow d = \frac{30}{\sqrt{3}} = 10\sqrt{3}m$
Distance between the two persons $= x + d = 30\sqrt{3}m + 10\sqrt{3}m = 40\sqrt{3}m$
The required distance is $40\sqrt{3}m$

Video Solution:

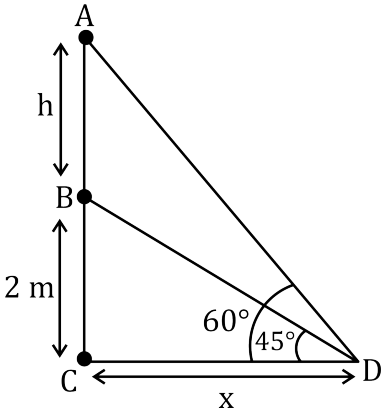
Q6 **Text Solution:**



Let the distance travelled by the car in 6 *seconds* $= AB = x$ *meters*
Heights of the tower $CD = h$ *meters*
The remaining distance to be travelled by the car $BC = d$ *meters*
and $AC = AB + BC = (x + d)$ *meters*
Angle of elevation and angle of depression are equal.
$\angle ADP = \angle DAB = 30^\circ$
$\angle BDP = \angle DBC = 60^\circ$
From $\triangle BCD$,
$\tan 60^\circ = \frac{CD}{BC}$
$\Rightarrow \sqrt{3} = \frac{h}{d}$
$\Rightarrow h = \sqrt{3}d \ldots\ldots\ldots (i)$
From $\triangle ACD$
$\tan 30^\circ = \frac{CD}{AC}$
$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x+d}$
$\Rightarrow x + d = h\sqrt{3} \ldots\ldots\ldots (ii)$
From (i) *and* (ii), *we get*
$\Rightarrow x + d = \sqrt{3}d \times \sqrt{3}$
$\Rightarrow x + d = 3d$
$\Rightarrow x = 2d$
$\Rightarrow d = \frac{x}{2}$
Time taken to travel 'x' meters $= 6$ *seconds.*
Time taken to travel 'd' meters $= \frac{6}{2} = 3$ *seconds.*

Video Solution:

Q7 Text Solution:



Given the height of the pedestral $BC = 2m$

Angle of elevations to the top of pedestral and the top of the statue are 45° *and* 60° *respectively.*

From the figure,

In $\triangle BCD$,

$\tan 45^\circ = \frac{BC}{CD}$

$\Rightarrow 1 = \frac{2}{x}$

$\Rightarrow x = 2m$

In $\triangle ACD$,

$\tan 60^\circ = \frac{AC}{CD}$

$\Rightarrow \sqrt{3} = \frac{h+2}{x}$

$\Rightarrow 2\sqrt{3} = h + 2$

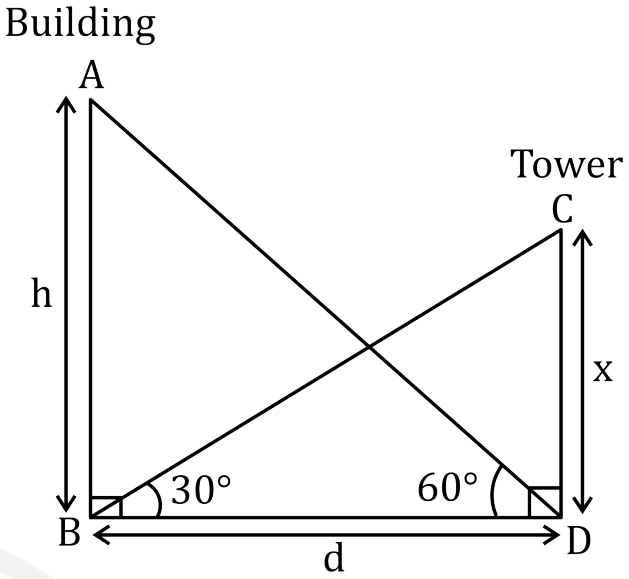
$\Rightarrow h = 2\sqrt{3} - 2 = 2\left(\sqrt{3} - 1\right)$

$= 2\left(1.732 - 1\right) = 2\left(0.732\right) = 1.464m$

Height of the statue $= 1.464m$

Video Solution:

Q8 Text Solution:



Height of the building $AB =$ 'h' m
Height of the tower $CD =$ 'x' m
Distance between the tower and the building $BD =$ 'd' m
Angle of elevation from foot of building to top of the tower $= 30^\circ$
Angle of elevation from foot of tower to top of the building $= 60^\circ$
From the figure,
In $\triangle ABD$,
$\tan 60^\circ = \frac{AB}{BD}$
$\Rightarrow \sqrt{3} = \frac{h}{d}$
$\Rightarrow d = \frac{h}{\sqrt{3}} \ldots\ldots\ldots\ldots\ldots (i)$
In $\triangle BCD$,
$\tan 30^\circ = \frac{CD}{BD}$
$\Rightarrow \frac{1}{\sqrt{3}} = \frac{x}{d}$
$\Rightarrow d = x\sqrt{3} \ldots\ldots\ldots\ldots (ii)$
From (i) *and* (ii), *we get*
$\Rightarrow x\sqrt{3} = \frac{h}{\sqrt{3}}$
$\Rightarrow x = \frac{h}{3}$
$\Rightarrow \frac{x}{h} = \frac{1}{3}$
$\therefore x : h = 1 : 3$
$\therefore$ *the ratio of heights of tower and building is* $1 : 3$.

Video Solution: