RAVI TEST PAPERS WHATSAPP 8056206308

Trigonometric Functions

10th Standard

Maths

1) if cos + sin = B̅cos , then prove that cos - sin = B̅sin

Answer : Now,cos + sin = B̅cos

Squaring both sides,

(cos + sin)^2 =(B̅cos)^2

cos^2 + sin^2 + 2sin cos = 2cos^2

2cos^2 - cos^2 - sin^2 = 2sin cos

cos^2 - sin^2 = 2sin cos

(cos + sin) (cos + sin) = 2sin cos

cos - sin = B/5 = B/B̅ [since cos + sin = B̅cos]

= B̅cos

Therefore cos - sin = B̅cos

2) prove that (cosec - sin) (sec - cos) (tan + cot) = 1

Answer : (cosec - sin) (sec - cos) (tan + cot)

) A) A) 5

T A B A B B 5 B

T B B A T A

3) prove that C / A5 C 5 C / A C T B C8

Answer : C / A5 C 5 C / A C

T C2A C35 C2A5 C3 / 2A5 C32A C3

T C C C5 C5 C C / A BC

T B C / A BC T B C / BC = 2cosecA

4) prove the following identities.

sec^4 (1- sin^4) - 2tan^2 = 1

Answer : LHS = sec^4 (1- sin^4) - 2tan^2

T D)A D B B

T D)AB) B B[B B

T D)A5 B)A B B B

T D)A5 B B B B

T A/D)A5 B B B B

T A/B)A5 B B B/B

T A5 B/B B B/B

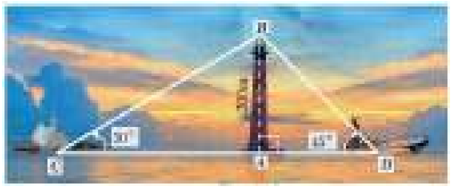
T AB5 B B B / B

T A B/B

T) B/B T AT v i w

5) Two ships are sailing in the sea on either sides of a lighthouse as observed from the ships are C= and DE respectively. if the lighthouse is 200 m high,find the distance between the two ships.) C̄T A8GCB

Answer :



Let AB the lighthouse. Let C and D be the positions of the two ships.

Then, AB = 200m.

CED T C= 6 CMD T DE

In right triangles BAC, tan30°= $\frac{CD}{C}$

$\frac{A}{\bar{C}}$ T $\frac{B=}{CE}$ CE T B= C̄ ...(1)

In the right triangle BAD,tan45°= $\frac{CD}{CM}$

A T $\frac{B=}{CM}$ gives AD = 200 ...(2)

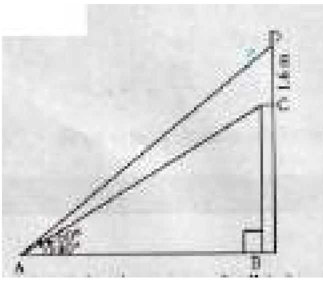
Now, CD = AC + AD = B= C̄5 B=[by(1) and (2)]

CD = 2002 C̄5 A3 = 200 x 2.732 = 546.4

Distance between two ships is 546.4m

6) A statue 1.6 m tall stands on the top of a 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 40°. Find the height of the pedestal.(tan 40° = 0.8391, C̄= 1.732)

Answer :



Let CD be the statue of tall 1.6 m.

BC be the pedestal.

From the right triangle ABC

D= T $\frac{DE}{CD}$

=8HCI A T $\frac{DE}{CD}$

CD T $\frac{DE}{=8HCI A}$ ....(1)

From the right triangle ABD

F= T $\frac{DM}{CD}$

C̄T $\frac{DE5\ EM}{CD}$

A8GCB T $\frac{DE5\ A8F}{CD}$

CD T $\frac{DE5\ A8F}{A8GCB}$ ....(2)

From (1) and (2)

$\frac{DE}{=8HCI A}$ T $\frac{DE5\ A8F}{A8GCB}$

1.732 BC = 0.8391 (BC + 1.6)

1.732 BC = 0.8391 BC + (0.8391) (1.6)

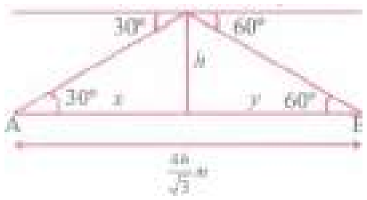
1.732 BC - 0.8391 BC = 1.34256

0.8929 BC = 1.34256

c d T $\frac{A8CDBEF}{=8HBI}$ T $\frac{ACDBE8F}{HBI}$ T A8E

Height of the pedestal = 1.5 m

7) From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be 30° and 60°. If the height of the lighthouse is h meters and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ships is $\frac{D}{\bar{C}}$m.

Answer : 

Let D and C be the positions of two ships AB be the light house of height 'h'm.

o

o

In right triangle BAC

F= T $\frac{CD}{CE}$

C̄T $\frac{}{CE}$

b d T $\frac{}{\bar{C}}$

In right triangle BAD

C= T $\frac{CD}{CM}$

$\frac{A}{\bar{C}}$ T $\frac{}{CM}$

b e T C̄

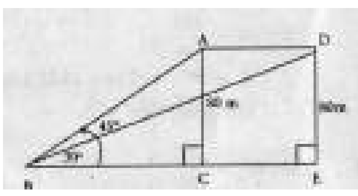
2A35 2B3 b d 5 b e T $\frac{}{\bar{C}}$ 5 C̄

e d T $\frac{5 \quad \bar{C} \ \bar{C}}{\bar{C}}$

e d T $\frac{5\ C}{\bar{C}}$ T $\frac{D}{\bar{C}}$

Distance between the ships is $\frac{D}{\bar{C}}$

8) A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45°. The bird flies away horizontally in such away that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30°. Determine the speed at which the bird flies.(C̄= 1.732)

Answer : 

Let the initial position of the bird be A and after two seconds its position is at D.

AC = DE = 80m

∠ABC = 45°

∠DBC = 30°

In right ABC

DE T $\frac{CE}{DE}$

A T $\frac{H=}{DE}$

BC = 80 m

In right triangle DBE

C= T $\frac{Ma}{Da}$

$\frac{A}{\bar{C}}$ T $\frac{H=}{DE5\ Ea}$

$\frac{A}{\bar{C}}$ T $\frac{H=}{H=5\ Ea}$

H=5 d f T H= C̄

d f T 2H= C̄ H=3

T H=2 C̄ A3

= 80 (1.732 - 1)

= 80 x 0.732

CE = 58.56 m

The bird travelled 58.56 m in 2 seconds.

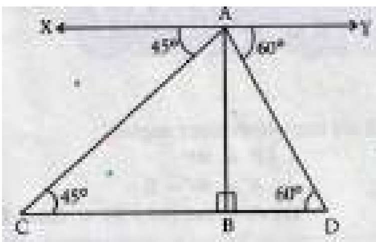
Speed of the bird T $\frac{e}{}$

T $\frac{EHSEF}{B}$

= 29.28 m/s

Speed of flying bird = 29.28 m/s.

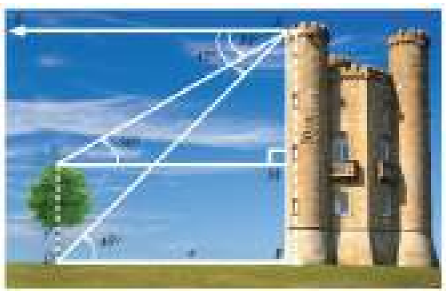
9) Two ships are sailing in the sea on either side of the lighthouse. The angles of depression of two ships as observed from the top of the lighthouse are 60° and 45° respectively. If the distance between the ships is 200 $\left)\frac{\bar{C}5\ A}{\bar{C}}\right[$ metres, find the height of the lighthouse.

Answer : 

Let C and D are two ships.
Let AB be the height of the light house.
d e T B═ $\left)\frac{\bar{C}5\ A}{\bar{C}}\right[$
In the right ABD
F═ T $\frac{CD}{DM}$
$\bar{C}$T $\frac{CD}{DM}$
c e T $\frac{CD}{\bar{C}}$
In the right triangle ABC
DE T $\frac{CD}{DE}$
A T $\frac{CD}{DE}$
DE T CD
2A3 5 2B3 DM 5 DE T $\frac{CD}{\bar{C}}$ 5 CD
d e T CD $\left)\frac{A}{\bar{C}} 5\ A\right[$ ∠ d c 5 c e T d e
$\frac{EM}{\left)\frac{A}{\bar{C}}5\ A\right[}$ T b c
CD T $\frac{B═\left)\frac{\bar{C}5\ A}{\bar{C}}\right[}{\left)\frac{\bar{C}5\ A}{\bar{C}}\right[}$
AB = 200 m
Height of the light house is 200 m.

10) From the top of a tower 50 m high, the angles of depression of the top and bottom of a tree are observed to be 30° and 45° respectively. Find the height of the tree.($\bar{C}$= 1.732)

Answer : The height of the tower AB = 50 m
Let the height of the tree CD = y and BD = x
From the diagram, XAC = 30° = ACM and = XAD = 45° = ADB
In right triangle ABD,
tan45° = $\frac{CD}{DM}$
1 = $\frac{E═}{}$ gives x = 50 m
In right triangle AMC,
tan30° = $\frac{Cn}{En}$
$\frac{A}{\bar{C}}$ T $\frac{Cn}{E═}$[since DB = CM]
AM = $\frac{E═}{\bar{C}}$ T $\frac{E═\ \bar{C}}{C}$ T $\frac{E═\ A8GCB}{C}$ = 28.87 m.
Therefore, height of the tree = CD = MB = AB − AM = 50 – 28.87 = 21.13 m



11) prove the following identities.
$\frac{}{5}$ T $\frac{A}{5\ A}$

Answer : 5 T A / 5 A

ni w T 5

T 5

5

T 2 3 2 5 3

T 2A 3 / 2A5 3

ni w T A / A5 ....(1)

v i w T A / 5 A

T A A / A 5 A T A / A5 T A A5

v i w T A / A5

From (1) and (2)

LHS = RHS

12) prove the following identities.

C C5 C C / C5 C 5 C C C C / C C T B

Answer : C C5 C C / C5 C 5 C C C C / C C T B

ni w T C C5 C C / C5 C 5 C C C C / C C

T 2 C5 C3 C C C C2 C5 C3 / C5 C 5 2 C C3 C5 C C C2 C C3 / C C

T 2 C5 C3 2 C5 C3 B C C C / 2 C5 C3 5 2 C C3 2 C C3 B 5 C C C / C C

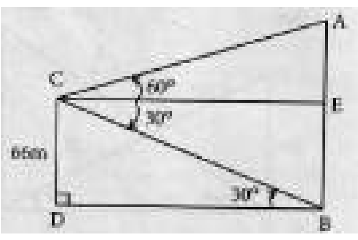
= $\sin^2$ A + $\cos^2$ A + 2sin A cos A - 3 sin A cos A + $\sin^2$ A + $\cos^2$ A - 2 sin A cos A+ 3 sin A cos A

= 2 $\sin^2$ A + 2$\cos^2$ A

= 2 ($\sin^2$ A + $\cos^2$ A) = 2 = RHS

13) The angles of elevation and depression of the top and bottom of a lamp post from the top of a 66 m high apartment are 60° and 30° respectively. Find the distance between the lamp post and the apartment.(C = 1.732)

Answer :



Let AB be the lamp post and CD be the apartment given CD = 66 m = EB.

CEa T F

a ED T EDM T C

In the right triangle BDC

C T EM / DM

A / C T FF / DM

DM T FF C

= 66 x 1.732 = 114.312 m

The distance between the lamp post and the apartment = 114.31 m

Now BD = EC = 114.31 m

In the right triangle ACE

F T Ca / Ea

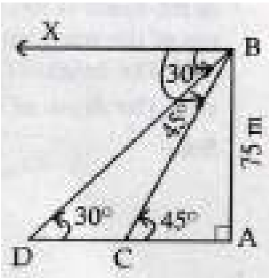
C T Ca / FF C

Ca T FF C C g 2A3

= 66 x 3 = 198m

The distance between the lamp post and apartment = 114.31 m.

14) As observed from the top of a 75 m high lighthouse from the sea level, the angles of depression of two ships iue 30° and 45°. If one ship is exactly behind the other on the same side of the light house tind the distance between the two ships

Answer : 

Let C and D be the ships.

k CDE

$\frac{CD}{CE}$ T DE

$\frac{GE}{CE}$ T A

CE T GE

k CDM

C= T $\frac{CD}{CM}$

$\frac{A}{\bar{C}}$ T $\frac{GE}{CM}$

CM T GE $\bar{C}$

EM T CM CE

T GE $\bar{C}$ GE T GE2 $\bar{C}$ A3

T GEA8GCB A

T GE =8GCB T EDI

e EDI 8

15) k 5 T T 8 B 5 B T B 5 B

Answer : h 5 T

T

v i w T B 5 B

T 2 5 3B 5 2 3B

T B B 5 B B 5 5 B B 5 B B

T B) B 5 B 5 B) B 5 B

T B 5 B T ni w