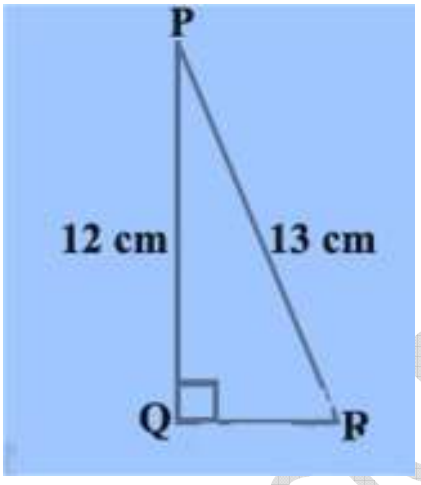
Trigonometry Exercise 1

Question 1
In Δ ABC, right-angled at B, AB = 24 cm, BC = 7 cm. Determine:
(i) sin A, cos A
(ii) sin C, cos C

Question 2
In below find tan P – cot R



Question 3
If sin A =3/4
Calculate cos A and tan A.

Question 4
Given 15 cot A = 8, find sin A and sec A.

Question 5
Given sec θ =13/12

Calculate all other trigonometric ratios.

Question 6
If ∠ A and ∠ B are acute angles such that cos A = cos B, then show that ∠ A = ∠ B.

Question 7

If cot θ =7/8

evaluate :

(i) $\frac{(1+sin\theta)(1-sin\theta)}{(1+cos\theta)(1-cos\theta)}$

(ii) $cot^2\ \theta$

Question 8

If 3 cot A = 4, check whether below is true or not

$$\frac{1-tan^2A}{1+tan^2A} = cos^2A - sin^2A$$

Question 9

In triangle ABC, right-angled at B, if tan A =$\frac{1}{\sqrt{3}}$

Find the value of:

(i) sin A cos C + cos A sin C

(ii) cos A cos C – sin A sin C

Question 10

In Δ PQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the values of sin P, cos P and tan P.

Question 11

State whether the following are true or false. Justify your answer.

(i) The value of tan A is always less than 1.

(ii) sec A =12/5 for some value of angle A.

(iii) cos A is the abbreviation used for the cosecant of angle A.

(iv) cot A is the product of cot and A.

(v) sin θ =4/3 for some angle

Solution 1

In Δ ABC, right-angled at B ,using Pythagoras theorem we have

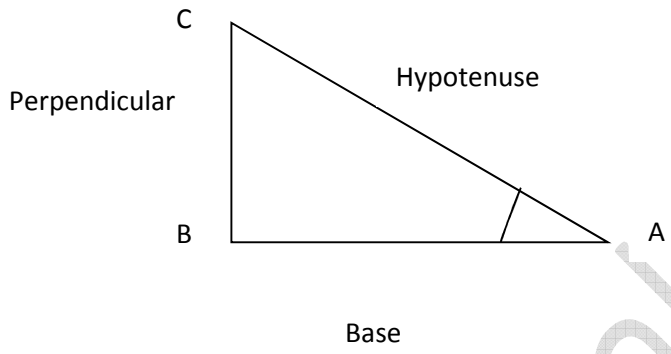
$AC^2 = AB^2 + BC^2$

$= 576 + 49 = 625$

Or AC=25 (taking positive value only)

Now

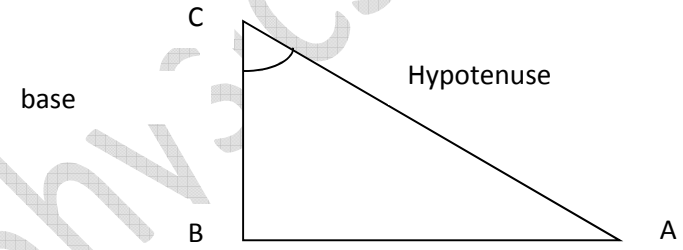
In a right angle triangle ABC where B=90° ,



Sin A =BC/AC= 7/25

CosA =AB/AC=24/25

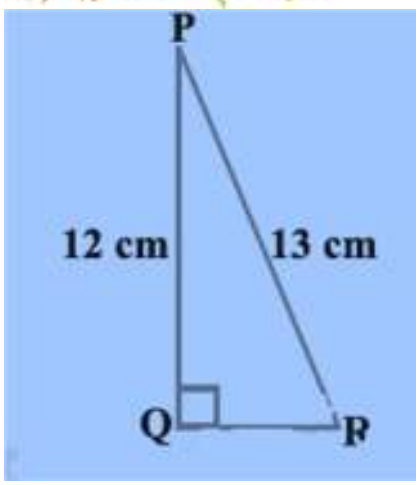
ii)



Sin C=AB/AC=24/25

Cos C=BC/AC=7/25

Solution 2



Now by Pythagoras theorem
$PQ^2 + QR^2 = PR^2$
QR=5

Now
tan P=Perpendicular/Base=5/12
Cot R=Base/Perm=5/12

So tan P – cot R=0

Solution 3

Given sin A= ¾
Or P/H=3/4
Let P=3k and H=4k

Now By Pythagoras theorem
$P^2 + B^2 = H^2$
$9k^2 + B^2 = 16k^2$
Or $B=+k\sqrt{7}$

Now Cos A=B/H=$\frac{\sqrt{7}}{4}$

Now tan A= sin A/cosA= $\frac{3}{\sqrt{7}}$

Solution 4

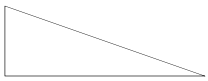
Cot A= 8/15
Or
B/P=8/15
Let B=8K and P=15k

A

So in a right angle triangle with angle A
$P^2 + B^2 = H^2$
Or H=17K

Sin A= P/H=15/17
Sec A= H/B=17/8

Solution 5
Given sec θ=13/12
Or
H/B=13/12
let H=13K ,B=12K

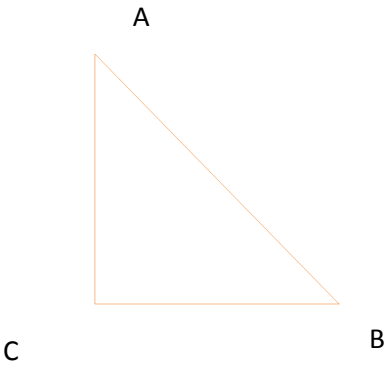


θ

So in a right angle triangle with angle A
$P^2 + B^2 = H^2$

P=5k
sin θ=P/H=5/13
Cos θ=B/H=12/13
Tan θ=P/B=5/12
Cosec θ= 1/sin θ=13/5
cot θ=1/tan θ= 12/5

Solution 6
In a triangle
Cos A =cos B



AC/AB= BC/AB

- ⇨ AC=BC
- ⇨ Angle A and Angle B

Solution 7

Given

Given cot θ=7/8
Or
B/P=7/8
let B=7K ,P=8K

So in a right angle triangle with angle θ
$P^2 + B^2 = H^2$

$H=k\sqrt{113}$
Sin θ=P/H=$\frac{8}{\sqrt{113}}$

cos θ=B/H=$\frac{7}{\sqrt{113}}$

(i) $\frac{(1+sin\theta)(1-sin\theta)}{(1+cos\theta)(1-cos\theta)}$

$=\frac{1-sin^2\theta}{1-cos^2\theta}$

$=\frac{1-\frac{64}{113}}{1-\frac{49}{113}} = 49/64$

i) $Cot^2\ \theta=(cot\ \theta)^2= 49/64$

Solution 8

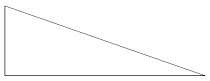
Given

Cot A=4/3

Or

B/P=4/3

Let B=4k and P=3k



A

So in a right angle triangle with angle A
$P^2 + B^2 = H^2$
H=5k

Now tan A=1/cot A=3/4
Cos A=B/H=4/5
Sin A=P/H=3/5

Let us take the LHS

$$\frac{1-tan^2A}{1+tan^2A}$$

$=\frac{1-(\frac{3}{4})^2}{1+(\frac{3}{4})^2}=\frac{7}{25}$

RHS=$\cos^2 A - \sin^2 A = 7/25$

So LHS=RHS, so the statement is true

Solution 9

tan A =$\frac{1}{\sqrt{3}}$

P/B=$\frac{1}{\sqrt{3}}$
Let

P=k and B=k$\sqrt{3}$

Now by Pythagoras theorem

$P^2 + B^2 = H^2$
H=2k

i) Sin A cos C + cos A sin C= (P/H)(B/H) + (B/H)(P/H)
=(BC/AC)(BC/AC) + (AB/AC)(AB/AC)
$=k^2/4k^2 + 3k^2/4k^2 = 1$

ii) Cos A cos C- sinA sin C
=(P/H)(P/H)-(B/H)(B/H)
=(BC/AC)(AB/AC) –(AB/AC)(BC/AC)
=0

Solution 10

Let QR=x and PR=y

Then x+y=25

y=25-x

Now by Pythagoras theorem

$x^2 + 25 = y^2$

$x^2 + 25 == (25-x)^2$

Solving it ,we get

X=12 cm

Then y=25-12=13 cm

Now Sin P= 12/13

Cos P=5/13

Tan P=12/5

Solution 11

i) False . The value of tan A increase from 0 to ∞.
ii) True . The value of sec A increase from 1 to ∞.
iii) False .Cos A is the abbreviation used for the cosine of angle A
iv) False .cot A is one symbol. We cannot separate it
v) False. The value of sin θ always lies between 0 and 0 and 4/3 > 1