Trigonometry

Extra Questions

Q.1) State True or False

i) The word Trigonometry means three side measurement

A) True B) False

Solution : True

ii) The Subject Trigonometry starts with 90^0 angled triangle

A) True B) False

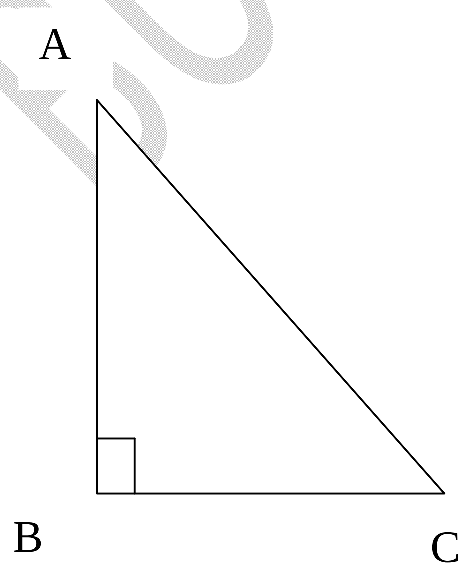
Solution : True

Q. 2) Fill in the blanks

i) In Δ ABC, using pythagoras theorem complete following statement

$(AB)^2 + \cdots = (AC)^2$

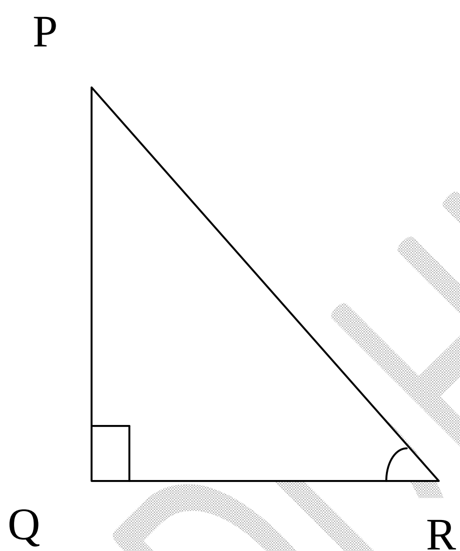
Solution : $(AB)^2 + (BC)^2 + (AC)^2$



ii) In Δ PQR which is right angled triangle write the following:

side opposite to $\angle$ R = ……..

Solution : side opposite to $\angle$ R = PQ



Q. 3 State the following ratios:

i) $\sin$ ratio = ?

Solution : $\sin \text{ratio} = \dfrac{\text{Opposite side}}{\text{hypotenues}}$

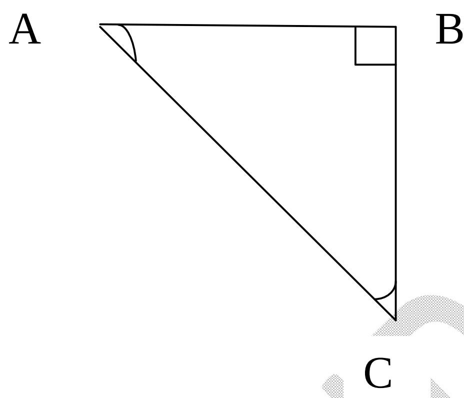
ii) Tan θ = ?

Solution : $\tan\theta = \dfrac{\text{opposite side of} \angle\theta}{\text{adjacent side of} \angle\theta}$

Q. 4) Write the following ratios for Δ ABC where ∠ B is the right angle

i) sin A

ii) tan C



Solution :

i) $\sin A = \dfrac{\text{opposite side of } \angle A}{Hypotenuse}$

$\sin A = \dfrac{BC}{AC}$

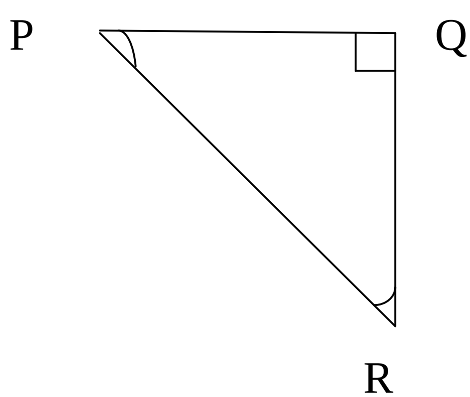
ii) $\tan C = \dfrac{\text{opposite side of } \angle C}{\text{adjacent side of } \angle C}$

$\tan C = \dfrac{AB}{BC}$

Q. 5) write the following ratios for Δ PQR where ∠Q is right Angle.

i) COS P

ii) Tan R



Solution :

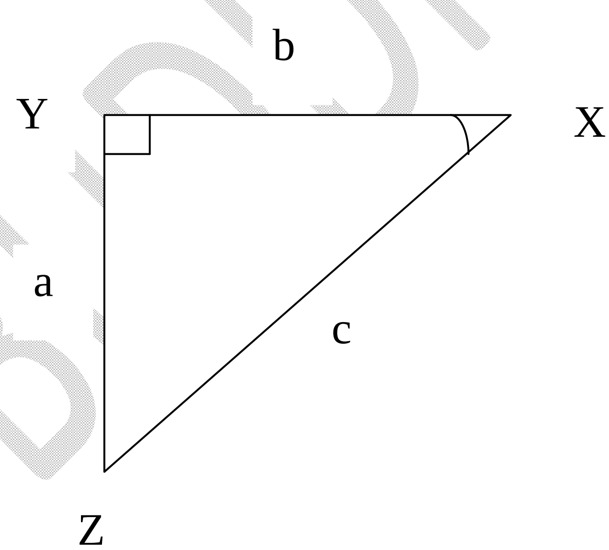
i) $\cos P = \dfrac{\text{Adjacent side} \angle P}{\text{Hypotenues}}$

$= \dfrac{PQ}{PR}$

ii) $\tan R = \dfrac{\text{opposite side of} \angle R}{\text{adjacent side of} \angle R}$

$= \dfrac{PQ}{QR}$

Q. 6) write the following ratios, for the Δ XYZ where $\angle XYZ = 90^0$ and where a, b, c are the lengths of sides are shown in figure



i) $\sin x$

ii) $\cos x$

iii) $\tan x$

Solution : i) $\sin x = \dfrac{\text{opposite side} \angle x}{\text{Hypotenues}}$

$$= \frac{YZ}{XZ}$$

$$= \frac{a}{c}$$

ii) $\cos x = \dfrac{\text{adjacent side} \angle x}{\text{Hypotenues}}$

$$= \frac{XY}{XZ}$$

$$= \frac{b}{c}$$

iii) $\tan x = \dfrac{\text{opposite side of } \angle X}{\text{adjacent side of } \angle X}$

$$= \frac{YZ}{XZ}$$

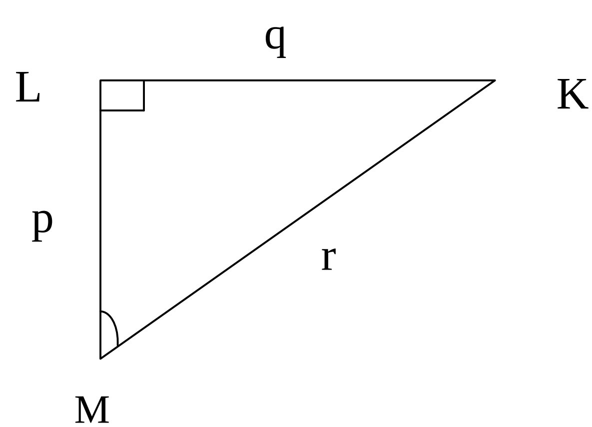
$$= \frac{a}{b}$$

Q. 7) write the following ratios for Δ KLM, $\angle KLM = 90^0$ and P, Q, R are the lengths of side are shown in figure lengths of side are shown in figure

i) $\sin M$

ii) $\tan K$

iii) $\cos M$



Solution : i) $\sin M = \dfrac{\text{opposite side of } \angle M}{\text{hypotenues}}$

$= \dfrac{LK}{MK}$

$= \dfrac{q}{r}$

ii) $\tan K = \dfrac{\text{opposite side of } \angle K}{\text{adjacent side of } \angle K}$

$= \dfrac{LM}{KL}$

$= \dfrac{P}{q}$

iii) $\cos M = \dfrac{\text{adjacent side of } \angle M}{\text{hypotenues}}$

$= \dfrac{ML}{MK}$

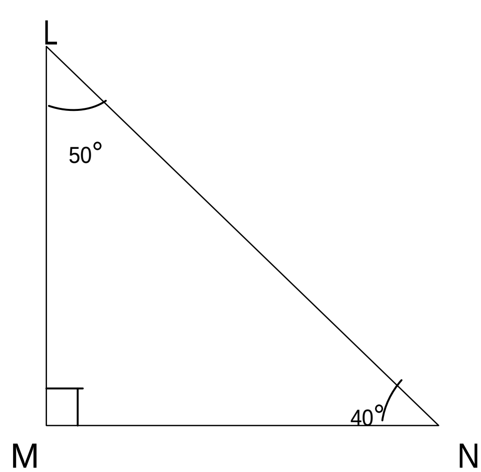
$= \dfrac{P}{r}$

Q. 8) write the following ratios for Δ LMN, $\angle LMN = 90^0$ where $\angle L = 50^0$ and $\angle N = 40^0$

i) $\sin 50^0$

ii) $\cos 50^0$

iii) $\tan 40^0$



Solution : i) $\sin 50^0 = \dfrac{\text{opposite side}}{\text{hypotenues}} = \dfrac{MN}{LN}$

ii) $\cos 50^0 = \dfrac{\text{adjacent side}}{\text{hypotenues}} = \dfrac{LM}{LN}$

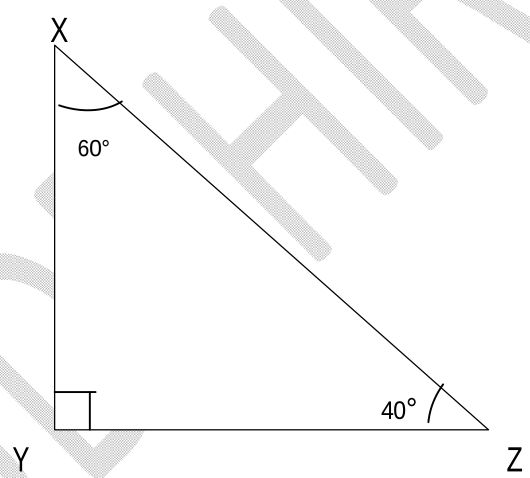
iii) $\tan 40^0 = \dfrac{\text{opposite side}}{\text{adjacent side}} = \dfrac{LM}{MN}$

Q. 9) write the following ratios for $\Delta\, XYZ, \angle XYZ = 90^0$ where $\angle X = 60^0$ and $\angle Z = 30^0$

i) $\sin 60^0$

ii) $\tan 40^0$

iii) $\cos 60^0$



Solution :

i) $\sin 60^0 = \dfrac{\text{opposite side}}{\text{hypotenues}} = \dfrac{YZ}{XZ}$

ii) $\tan 40^0 = \dfrac{\text{opposite side}}{\text{adjacent side}} = \dfrac{XY}{YZ}$

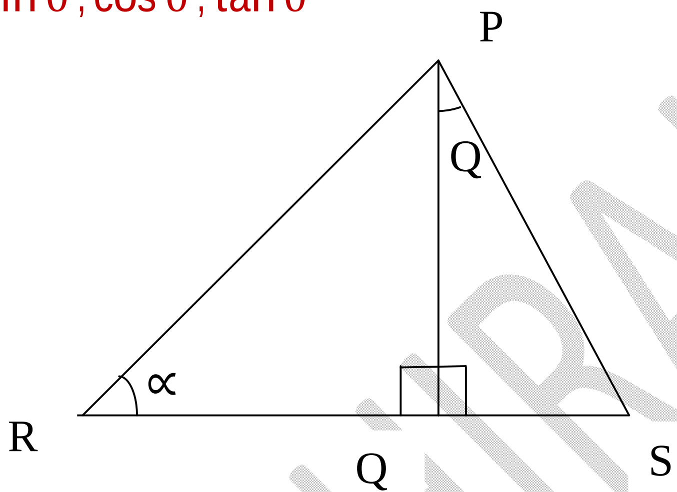
iii) $\cos 60^0 = \dfrac{\text{adjacent side}}{\text{hypotenues}} = \dfrac{XY}{ZX}$

Q.10) Write the following trigonometric ratios

$\angle PQR = 90^0, \angle PQS = 90^0, \angle PRQ = \propto$ and $\angle QPS = \theta$

A) $\sin\alpha, \cos\alpha, \tan\alpha$

B) $\sin\theta, \cos\theta, \tan\theta$



Solution :

A)

i) $\sin\alpha = \dfrac{\text{opposite side}}{\text{hypotenues}} = \dfrac{PQ}{PR}$

ii) $\cos\alpha = \dfrac{\text{adjacent side}}{\text{hypotenues}} = \dfrac{QR}{PR}$

iii) $\tan\alpha = \dfrac{\text{opposite side}}{\text{adjacent side}} = \dfrac{PQ}{QR}$

B)

iv) $\sin\theta = \dfrac{\text{opposite side}}{\text{hypotenues}} = \dfrac{QS}{PS}$

v) $\cos\theta = \dfrac{\text{adjacent side}}{\text{hypotenues}} = \dfrac{PQ}{PS}$

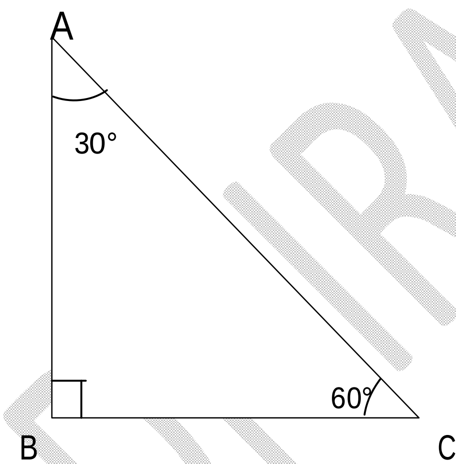
vi) $\tan\theta = \dfrac{\text{opposite side}}{\text{adjacent side}} = \dfrac{QS}{PQ}$

Q. 11) write the following trigonometric ratios for

$\Delta ABC, \angle ABC = 90^0$, where $\angle A = 30^0$ and $\angle C = 60^0$

i) $\sin 30^0$

ii) $\tan 60^0$



Solution : i) $\sin 30^0 = \frac{\text{opposite side}}{\text{hypotenues}} = \frac{BC}{AC}$

ii) $\tan 60^0 = \frac{\text{opposite side}}{\text{adjacent side}} = \frac{AB}{BC}$

Q. 12) Fill in the blanks

i) $\frac{\sin\theta}{\cos\theta} = ?$

ii) $\tan\theta \times \tan(90 - \theta) = ?$

Solution :

i) $\frac{\sin\theta}{\cos\theta} = \tan\theta$

ii) $\tan\theta \times \tan(90 - \theta) = 1$

13) Find the value for following sum ,

$$3\tan 45^0 + \cos 30^0 - \sin 60^0$$

Solution : $3\tan 45^0 + \cos 30^0 - \sin 60^0$

$$= 3 \times 1 + \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2}$$

$$= 3 + 0$$

$$= 3$$

Q. 14) Find the value of $\frac{\cos 58^0}{\sin 32^0}$?

Solution : $58^0 + 32^0 = 90^0$ means 58 and 32 are complementary angles

$$\sin\theta = \cos(90 - \theta)$$

$$\sin 32^0 = \cos(90 - 32) = \cos 58^0$$

$$\frac{\cos 58^0}{\sin 32^0} = \frac{\cos 58^0}{\sin 32^0} = 1$$

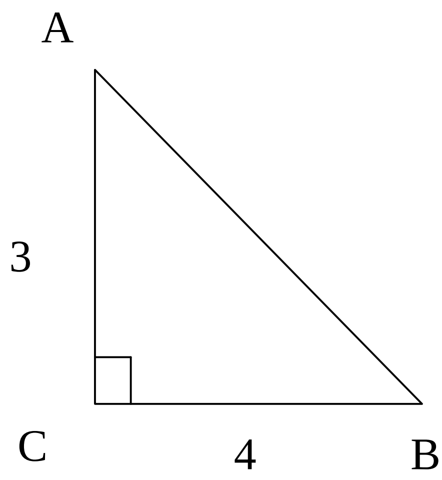
$$\therefore \frac{\cos 58^0}{\sin 32^0} = 1$$

Q. 15) In right angled Δ ACB, if $\angle C = 90^0$ AC = 3, BC = 4

Find the following ratios

i) $\sin B$

ii) $\tan B$



Solution : By using Pythagoras theorem,

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

$$AB^2 = 4^2 + 3^2$$

$$AB^2 = 16 + 9$$

$$AB^2 = 25$$

$$AB = 5$$

i) $\sin B = \frac{\text{opposite side}}{\text{hypotenus}}$

$$\frac{AC}{AB} = \frac{3}{5}$$

$$\sin B = \frac{3}{5}$$

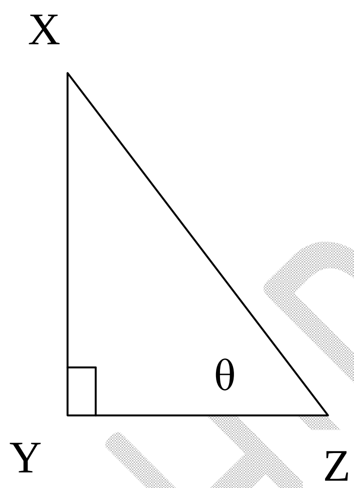
ii) $\tan B = \frac{\text{opposite side}}{\text{adjacent side}}$

$$\frac{AC}{BC} = \frac{3}{4}$$

$$\tan B = \frac{3}{4}$$

Q. 16) In right angled triangle Δ XYZ, if $\angle Y = 90^0$ $\angle Z = \theta$ and if $\sin\theta$ $\frac{5}{13}$ then find the value for $\cos\theta$ and $\sin\theta$

Solution : In right angled triangle Δ XYZ $\angle Z = \theta$ $\sin\theta = \frac{5}{13}$



$\therefore \frac{XY}{XZ} = \frac{5}{13}$

XY = 5k and XZ = 13k

By using Pythagoras theorem, let us find YZ

$(XY)^2 + (YZ)^2 = (XZ)^2$

$(5k)^2 + (YZ)^2 = (13k)^2$

$(25k^2) + (YZ)^2 = (169k)^2$

$YZ^2 = 169k^2 - 25k^2$

$YZ^2 = 144k^2$

$YZ = 12k$

$\therefore$ In right angled triangle, Δ XYZ, XY = 5k,

$YZ = 12k,\ XZ = 13k$

i) $\cos\theta = \dfrac{\text{adjacent side}}{\text{hypotenus}}$

$\dfrac{YZ}{XZ} = \dfrac{QR}{PR} = \dfrac{12k}{13k} = \dfrac{12}{13}$

$\therefore \cos\theta = \dfrac{12}{13}$

ii) $\sin\theta = \dfrac{\text{opposite side}}{\text{hypotenus}}$

$= \dfrac{PQ}{P} = \dfrac{XY}{YZ} = \dfrac{5k}{13k} = \dfrac{5}{13}$

$\therefore \sin\theta = \dfrac{5}{13}$

Q. 17) Find the value of following ,

i) $3\ \sin 30^0 + 5\ \tan 45^0$

ii) $\cos^2 45^0 + \sin^2 45^0$

Solution : i) $3\ \sin 30^0 + 5\ \tan 45^0$

$= 3 \times \frac{1}{2} + 5 \times 1$

$= \frac{3}{2} + 5 = \frac{13}{2}$

$\therefore \sin 30^0 + 5 \tan 45^0 = \frac{13}{2}$

ii) $\cos^2 45^0 + \sin^2 45^0$

$= (\cos^2 45^0)^2 + (\sin^2 45^0)^2$

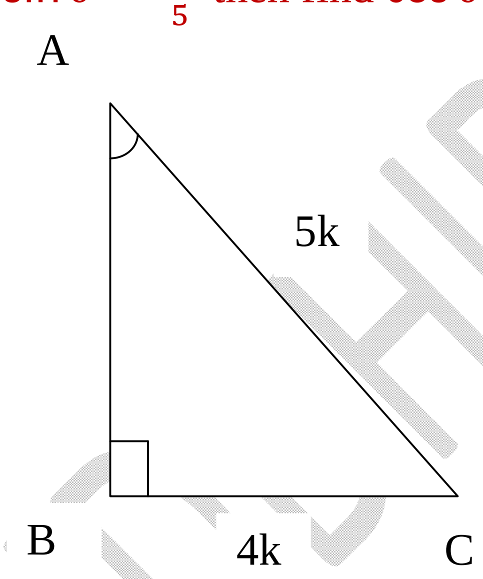
$= \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2$

$= \frac{1}{2} + \frac{1}{2}$

$= \frac{2}{2}$

$= 1$

Q. 18) If $\sin\theta = \frac{4}{5}$ then find $\cos\theta$ (3M)



Solution :

$\sin\theta = \frac{\text{opposite side}}{\text{hypotenues}} = \frac{BC}{AC}$

By using Pythagoras theorem,

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

$AB^2 = AC^2 - BC^2$

$= (5)^2 - (4)^2$

$= 25 - 16$

$= 9$

$AB^2 = \sqrt{9}$

$\therefore AB = 3$

$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}}$

$\cos\theta = \frac{AB}{AC} = \frac{3}{5}$

$\therefore \cos\theta = \frac{3}{5}$

Q. 19) Find $\sin\theta$ if $\cos\theta = \frac{15}{17}$

Solution : $\cos\theta = \frac{15}{17}$

$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}}$

$= \frac{AB}{AC} = \frac{15}{17}$

here, AB = 15k, AC = 17k

By using Pythagoras theorem;

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

$15k^2 + BCk^2 = 17k^2$

$BC^2 = 17k^2 - 15k^2$

$BC^2 = 64k^2$

$BC = \sqrt{64k}$

$$BC = 8k$$

$$\sin\theta = \frac{\text{opposite side}}{\text{hypotenues}}$$

$$= \frac{BC}{AC} = \frac{8k}{17k} = \frac{8}{17}$$

$$\sin\theta = \frac{8}{17}$$

Q. 20) Find the value of following ,

1) $\frac{\tan 45^0}{\cos 90^0 + \sin 90^0}$

Solution : $\frac{\tan 45^0}{\cos 90^0 + \sin 90^0}$

$$= \frac{1}{0 + 1}$$

$$= \frac{1}{1}$$

$$= 1$$

$$\therefore \frac{\tan 45^0}{\cos 90^0 + \sin 90^0} = 1$$

2) $\cos 60^0 \times \sin 30^0 + \sin 90^0 \times \cos 0^0$

Solution : $\cos 60^0 \times \sin 30^0 + \sin 90^0 \times \cos 0^0$

$$= \frac{1}{2} \times \frac{1}{2} + 1 \times 1$$

$$= \frac{1}{4} + 1$$

$$= \frac{5}{4}$$

Q. 21) choose the correct alternative answer for the following,

i) which of the following is correct statement?

A) $\sin\theta = \tan(90 - \theta)$ B) $\cos\theta = \tan(90 - \theta)$

C) $\sin\theta = \cos(90 - \theta)$ D) $\tan\theta = \tan(90 - \theta)$

Solution : $\sin\theta = \cos(90 - \theta)$

ii) which of the following value of $\sin 90^0$?

A) 0 B) $\frac{1}{2}$ C) 1 D) $\frac{\sqrt{3}}{2}$

Solution : $\sin 90^0 = 1$

Q. 22) find the value of following ,

1) $2\tan 45^0 + \cos 45^0 - \sin 45^0$ 2) $\frac{\cos 28^0}{\sin 62^0}$

Solution :

1) $2\tan 45^0 + \cos 45^0 - \sin 45^0$

$= 2 \times 1 + \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}$

$= 2 + 0 = 2$

$2\tan 45^0 + \cos 45^0 - \sin 45^0 = 2$

2) $\frac{\cos 28^0}{\sin 62^0}$

$\sin\theta = \cos(90 - \theta)$

$\sin\theta = \cos(90 - 62^0)$

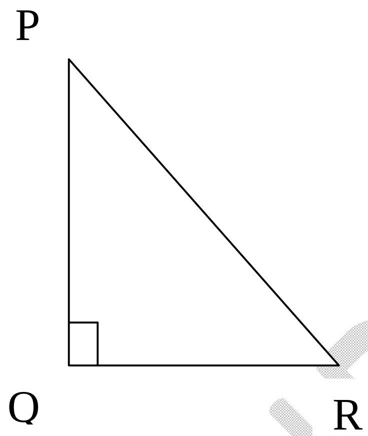
$\sin\theta = \cos 28^0$

$\sin\theta = 1$

Q. 23) Find the given ratios for the ΔPQR where $PQ = 5$

$\angle Q = 90^0, QR = 12$

i) $\sin p$ ii) $\cos p$ iii) $\tan p$



Solution :

Given : PQ = 5, QR = 12, PR = 2

By using Pythagoras theorem ,

$PQ^2 + QR^2 = PR^2$

$(5)^2 + (12)^2 = PR^2$

$25 + 244 = PR^2$

$169 = PR^2$

$PR = 13$

Ratios for following :

1) $\sin p = \dfrac{\text{opposite side}}{\text{hypotenues}} = \dfrac{QR}{PR} = \dfrac{12}{13}$

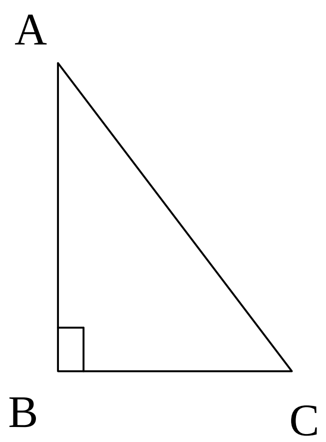
2) $\cos p = \dfrac{\text{adjacent side}}{\text{hypotenuse}} = \dfrac{PQ}{PR} = \dfrac{5}{13}$

3) $\tan p = \dfrac{\text{opposite side}}{\text{adjacent side}} = \dfrac{QR}{PQ} = \dfrac{12}{5}$

Q. 24) Find the ratios for following, where ΔABC is right angled triangle and $\angle B = 90^0$, $AB = 8$ cm, $AC = 17$ cm find,

i) sin A ii) cos sin B iii) tan A

Solution :



Given: $\angle B = 90^0$, $AB = 8$ cm , $AC = 17$cm to find BC

By using Pythagoras theorem

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

$(8)^2 + (BC)^2 = (17)^2$

$64 + (BC)^2 = 289$

$(BC)^2 = 289 - 64$

$BC^2 = \sqrt{225}$

$BC = 15$

1) $\sin A = \frac{\text{opposite side}}{\text{hypotenues}} = \frac{BC}{AC} = \frac{15}{17}$

2) $\cos A = \frac{\text{adjacent side}}{\text{hypotenues}} = \frac{AB}{AC} = \frac{8}{17}$

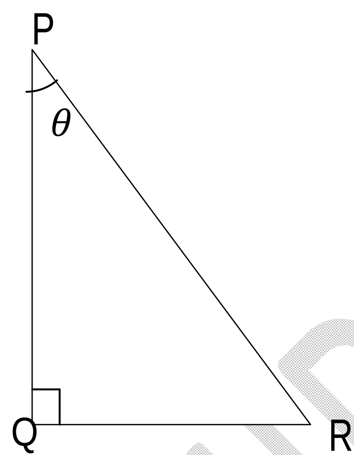
3) $\tan A = \frac{\text{opposite side}}{\text{adjacent side}} = \frac{BC}{AB} = \frac{15}{8}$

Q.25) Δ PQR is right angled triangle, where $\angle Q = 90^0$,

$\angle P = \theta, \cos\theta = \frac{24}{25}$ then find the value for the $\sin\theta$

and $\tan\theta$

Solution :



$$\cos\theta = \frac{24}{25} = \frac{\text{adjacent side}}{\text{hypotenues}}$$

$$\frac{PQ}{PR} = \frac{24}{25}$$

Let,s consider PQ = 24k & PR = 25k to find QR

By Pythagoras theorem ,

$$(PQ)^2 + (QR)^2 = (PR)^2$$

$$(4k)^2 + (QR)^2 = (PR)^2$$

$$(24k)^2 + (QR)^2 = (25)^2$$

$$(QR)^2 = 625k^2\ 576k^2$$

$$(QR)^2 = 49k^2$$

QR = 7k

1) $\sin\theta = \frac{\text{opposite side}}{\text{hypotenues}} = \frac{QR}{PR} = \frac{7k}{25k} = \frac{7}{25}$

2) $\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}} = \frac{QR}{PQ} = \frac{7k}{24k} = \frac{7}{24}$

$\therefore \sin\theta = \frac{7}{25}$

$\therefore \tan\theta = \frac{7}{24}$

Q. 26) Fill in the blanks

i) $\sin 20^0 = \cos$

Solution : $\sin 20^0 = \cos 70^0$

$\therefore$ (70^0 and 28 are complementry angle)

ii) $\tan 30^0 = \tan \qquad = 1$

Solution : $\tan 30^0 = \tan \qquad = 1$

$\tan\frac{1}{\sqrt{3}} \times \tan 60^0 = 1$

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

$\tan 30^0 \times \tan 60^0 = 1$

iii) $\cos 40^0 = \sin$

Solution : $\cos 40^0 = \sin 50^0$

(40^0 & 50^0 are complementry angle)

Q. 27) Find the value of

i) $\frac{\tan 30^0}{\tan 60^0 + \tan 30^0}$ ii) $\frac{\sin 45^0}{\cos 45^0 + \tan 45^0}$

Solution :

i) $\frac{\tan 30^0}{\tan 60^0 + \tan 30^0}$

$$= \frac{\frac{1}{\sqrt{3}}}{\sqrt{3} + \frac{1}{\sqrt{3}}}$$

$$= \frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{3+1} = \frac{1}{4}$$

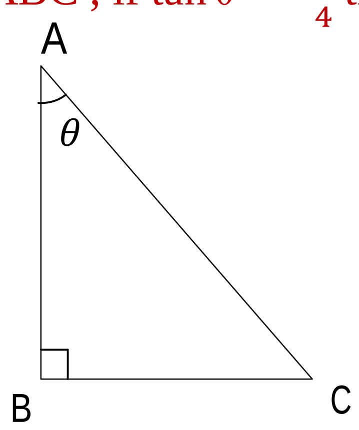
ii) $\frac{\sin 45^0}{\cos 45^0 + \tan 45^0}$

$$= \frac{\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}} + 1}$$

$$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}+1}$$

$$= \frac{1}{\sqrt{2}+1}$$

Q. 28) In ΔABC , if $\tan\theta = \frac{3}{4}$ then find $\cos\theta$, $\sin\theta$



Solution :

$$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}} = \frac{BC}{AB} = \frac{3}{4}$$

$$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}} = \frac{AB}{AC} = \frac{4k}{5k} = \frac{4}{5}$$

$$\sin\theta = \frac{\text{opposite side}}{\text{hypotenues}} = \frac{BC}{AC} = \frac{3k}{5k} = \frac{3}{5}$$

Here, BC = 3k, AB =4k, AC = ?

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

$$(4k)^2 + (3k)^2 = (AC)^2$$

$$16k + 9k = (AC)^2$$

$$\sqrt{25k} = AC$$

$$AC = 5k$$

So, $AC = 5k$

Q. 29) find the value of $\frac{\cos 58^0}{\sin 32^0} + \frac{\tan 40^0}{\cot 50^0}$

Solution :

$$= \frac{\cos 58^0}{\sin 32^0}$$

$$= \sin\theta = \cos(90 - \theta)$$

$$\sin\theta = \cos(90 - 58)$$

$$\sin\theta = \cos 32^0$$

$$\frac{\cos 58^0}{\sin 32^0} + \frac{\tan 40^0}{\cot 50^0} = 1 + 1 = 2$$

$$\tan\theta = \cot(90 - \theta)$$

$$\tan\theta = \cos(90 - 50)$$

$$\tan\theta = \cot 40^0$$

$$\frac{\tan 40^0}{\tan 40^0} = 1$$

Q. 30) Find the value of :

$$2\tan 45^0 + \cos 60^0 - \sin 30^0$$

Solution : $2\tan 45^0 + \cos 60^0 - \sin 30^0$

$$= 2 \times (1) + \frac{1}{2} - \frac{1}{2}$$

$$= 2 + 0$$

$$= 2$$

$$\therefore 2\tan 45^0 + \cos 60^0 - \sin 30^0 = 2$$

Q. 31) Find the value of :

$$\sin 60^0 \times \sin 30^0 + \tan 45^0 \times \cot 45^0$$

Solution : $\frac{\sqrt{3}}{2} \times \frac{1}{2} + 1 \times 1$

$$= \frac{\sqrt{3}}{4} + \frac{1 \times 4}{1 \times 4}$$

$$= \frac{\sqrt{3}}{4} = \frac{\sqrt{3}}{4} + 1$$

Q. 32) $\frac{4}{5}\tan^2 60 + 3\sin^2 60^0$ Find value for it

Solution : $\tan 60^0 = \sqrt{3}$ and $\sin 60^0 = \frac{\sqrt{3}}{2}$

$$= \frac{4}{5} \times (\sqrt{3})^2 + 3\left(\frac{\sqrt{3}}{2}\right)^2$$

$$= \frac{4}{5} \times \sqrt{3} \times \sqrt{3} + 3 \times \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$$

$$= \frac{4}{5} \times \sqrt{9} + 3\frac{\sqrt{9}}{4}$$

$$= \frac{4}{5} \times 3 + 3 \times \frac{3}{4}$$

$$= \frac{12}{5} + \frac{9}{4}$$

$$= \frac{12 \times 4}{5 \times 4} + \frac{9 \times 5}{4 \times 5}$$

$$= \frac{48}{20} + \frac{45}{20} = \frac{93}{20}$$

$$\therefore \frac{4}{5}\tan^2 60 + 3\sin^2 60^0 = \frac{93}{20}$$

Q. 33) Find the value of:

$$2\sin 30^0 + \cos 0^0 + 3\sin 90^0$$

Solution : $\sin 30^0 = \frac{1}{2}$, $\cos 0^0 = 1$ and $\sin 90^0 = 1$

$$= 2 \times \frac{1}{2} + 1 + 3 \times 1$$

$$= 1 + 1 + 3$$

$$= 5$$

$$\therefore 2\sin 30^0 + \cos 0^0 + 3\sin 90^0 = 5$$

Q. 34) Find the value of :

$$\cos^2 45^0 + \sin^2 30^0$$

Solution : $\cos 45^0 = \frac{1}{\sqrt{2}}$ and $\sin 30^0 = \frac{1}{2}$

$$\cos^2 45^0 + \sin^2 30^0$$

$$= \left[\frac{1}{\sqrt{2}}\right]^2 + \left[\frac{1}{2}\right]^2$$

$$= \frac{1}{2} + \frac{1}{4}$$

$$= \frac{1 \times 2}{2 \times 2} + \frac{1}{4}$$

$$= \frac{2+4}{1}$$

$$= \frac{3}{4}$$

$$\therefore \cos^2 45^0 + \sin^2 30^0 = \frac{3}{4}$$

Q. 35) Find the value of : $4 \sin 30^0 + 2 \tan 45^0$

Solution : $\sin 30^0 = \frac{1}{2}$ and $\tan 45^0 = 1$

$$4 \sin 30^0 + 2 \tan 45^0$$

$$= 4 \times \frac{1}{2} + 2 \times 1$$

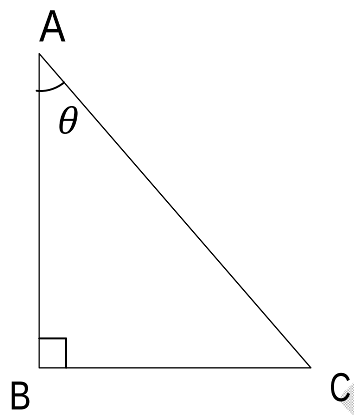
$$= 2 + 2$$

$$= 4$$

$$\therefore 4 \sin 30^0 + 2 \tan 45^0 = 4$$

Q. 36) find $\sin\theta$ if $\cos\theta = \frac{4}{5}$

Solution :



$$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}}$$

$$= \frac{AB}{AC}$$

$$\frac{AB}{AC} = \frac{4}{5}$$

here, AB = 4k and AC = 5k

by using Pythagoras theorem

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

$$(4k)^2 + (BC)^2 = (5k)^2$$

$$16k + (BC)^2 = (25k)^2$$

$$(BC)^2 = 25k - 16k$$

$$BC = \sqrt{9k}$$

$$BC = 3k$$

$$\sin\theta = \frac{\text{opposite side}}{\text{hypotenues}}$$

$$= \frac{BC}{AC}$$

$$= \frac{3k}{5k} = \frac{3}{5}$$

$$\therefore \sin\theta = \frac{3}{5}$$

Q. 37) Find the value:

$$2\cos 30^0 + \sin 90^0 + \cos 0^0$$

Solution : $\cos 30^0 = \frac{\sqrt{3}}{2}$, $\sin 90^0 = 1$, $\cos 0^0 = 1$

$$2\cos 30^0 + \sin 90^0 + \cos 0^0$$

$$= 2 \times \frac{\sqrt{3}}{2} + 1 + 1$$

$$= \frac{2\sqrt{3}}{2} + 2$$

$$= (2 + \sqrt{3})$$

$$\therefore 2\cos 30^0 + \sin 90^0 + \cos 0^0 = 2 + \sqrt{3}$$

Q. 38) Find the value of ,

$$\frac{8}{15}\tan^2 60^0 + 9\sin^2 60^0$$

Solution :

$$\frac{8}{15}\tan^2 60^0 + 9\sin^2 60^0$$

$$\tan 60^0 = \sqrt{3} \ \& \ \sin 60^0 = \frac{\sqrt{3}}{2}$$

$$= \frac{8}{15} \times (\sqrt{3})^2 + 9 \times \left(\frac{\sqrt{3}}{2}\right)^2$$

$$= \frac{8}{15} \times (\sqrt{3} \times \sqrt{3}) + 9 \times \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$$

$$= \frac{8}{15} \times 3 + 9 \times \frac{3}{4}$$

$$= \frac{24}{15} + \frac{27}{4}$$

$$= \frac{24 \times 4}{15 \times 4} + \frac{27 \times 15}{4 \times 15}$$

$$= \frac{96}{60} + \frac{405}{60} = \frac{501}{60} = \frac{167}{20}$$

$$\therefore \frac{8}{15} \times \tan^2 60^0 + 9\sin^2 60^0 = \frac{167}{20}$$

Q. 39) Find $\tan\theta$, if $\cos\theta = \frac{15}{17}$

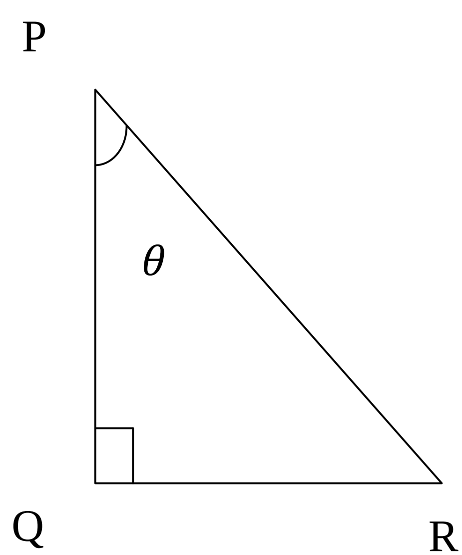
Solution : $\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}}$

$$= \frac{PQ}{PR}$$

$$\therefore \frac{PQ}{PR} = \frac{15}{17}$$

here,

PQ = 15k, PR = 17k



By using Pythagoras theorem

$PQ^2 + QR^2 = PR^2$

$(15k)^2 + QR^2 = (17k)^2$

$225k + QR^2 = 289k$

$QR^2 = 289k - 225k$

$= \sqrt{64\,k}$

QR = 8 k

So , PQ = 15k, PR = 17k & QR = 8k

$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$

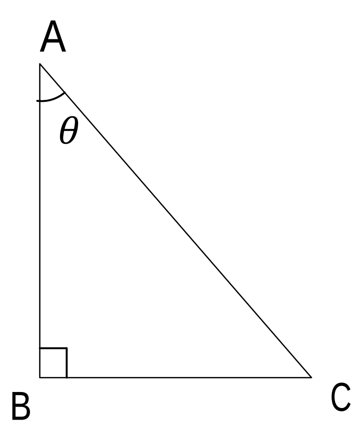
$= \frac{QR}{PQ}$

$= \frac{8k}{15k} = \frac{8}{15}$

$\tan\theta = \frac{8}{15}$

Q. 40) In right angled triangle ΔABC, $\angle A = \theta \sin\theta = \frac{3}{5}$ then

find $\cos\theta$ and $\tan\theta$



Solution : $\sin\theta = \dfrac{\text{opposite side}}{\text{hypotenues}}$

$$\frac{BC}{AC} = \frac{3}{5}$$

So here, BC = 3k AC = 5k

By using Pythagoras theorem

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

$$(AB)^2 + (3k)^2 = (5k)^2$$

$$(AB)^2 + 9k = 25k$$

$$28k - 9k = AB^2$$

$$\sqrt{16k} = AB$$

$$AB = 4k$$

$$\therefore AB = 4k$$

$$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}}$$

$$= \frac{AB}{AC}$$

$$= \frac{4k}{5k} = \frac{4}{5}$$

$$\therefore \cos\theta = \frac{4}{5}$$

$$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

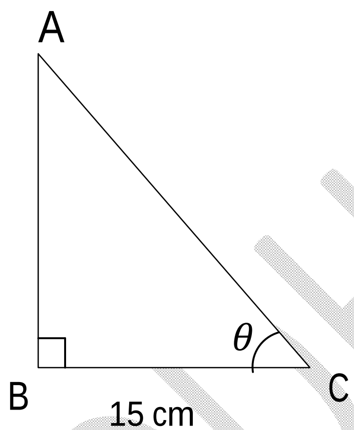
$$= \frac{BC}{AB}$$

$$= \frac{3k}{4k}$$

$$\therefore \tan\theta = \frac{3}{4}$$

Q. 41) How to use $\tan\theta$ to calculate side of triangle

Δ ABC, $\tan\theta = 0.4$ where BC = 15cm



Solution : $\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$

$$0.4 = \frac{x}{15}$$

$$x = 0.4 \times 15$$

$$x = 6 \text{ cm}$$

Q. 42) Find the value of ;

i) $5\sin 30^0 + 3\tan 45^0$

Solution : $\sin 30^0 = \frac{1}{2}$, $\tan 45^0 = 1$

$$5 \sin 30^0 + 3 \tan 45^0$$

$$= 5 \times \frac{1}{2} + 3 \times 1$$

$$= \frac{5}{2} + 3$$

$$= \frac{5}{2} \times \frac{3 \times 2}{2}$$

$$= \frac{11}{2}$$

$$\therefore \sin 30^0 + 3 \tan 45^0 = \frac{11}{2}$$

Q. 43) Find the value of

i) $\frac{4}{5} \tan^2 60^0 + 3\sin^2 60^0$

Solution : $\frac{4}{5} \tan^2 60^0 + 3\sin^2 60^0$

$$= \frac{4}{5} \times \left(\sqrt{3}\right)^2 + 3 \times \left(\frac{\sqrt{3}}{2}\right)^2$$

$$= \frac{4}{5} \times 3 + 3 \times \frac{3}{4}$$

$$= \frac{12}{5} + \frac{9}{4} = \frac{12 \times 4}{5 \times 4} + \frac{9 \times 5}{4 \times 5}$$

$$= \frac{48+45}{20}$$

$$= \frac{93}{20}$$

$$\therefore \frac{4}{5} \tan^2 60^0 + 3\sin^2 60^0 = \frac{93}{20}$$

Q. 44) Find the value of following

$$\frac{\tan 60^0}{\sin 60^0 + \cos 60^0}$$

Solution : $\tan 60 = \sqrt{3}, \sin 60^0 = \frac{\sqrt{3}}{2}$

$$= \cos 60^0 = \frac{1}{2}$$

$$= \frac{\sqrt{3}}{\frac{\sqrt{3}}{2}+\frac{1}{2}}$$

$$= \frac{\sqrt{3}}{\frac{\sqrt{3}}{2}+\frac{1}{2}}$$

$$= \frac{2\sqrt{2}}{\sqrt{3}+1}$$

$$\therefore \frac{\tan 60^0}{\sin 60^0 + \cos 60^0} = \frac{2\sqrt{3}}{\sqrt{3+1}}$$

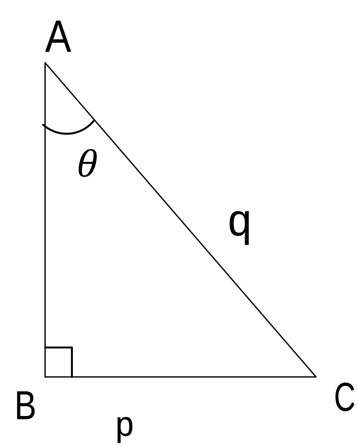
Q. 45) If $\sin\theta = \frac{p}{q}$ then $\cos\theta$ equal to

Solution : $\sin\theta = \frac{\text{opposite side}}{\text{hypotenues}}$

$$= \frac{Rq}{pq}$$

$$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}}$$

$$\cos\theta = \frac{PR}{pq}$$

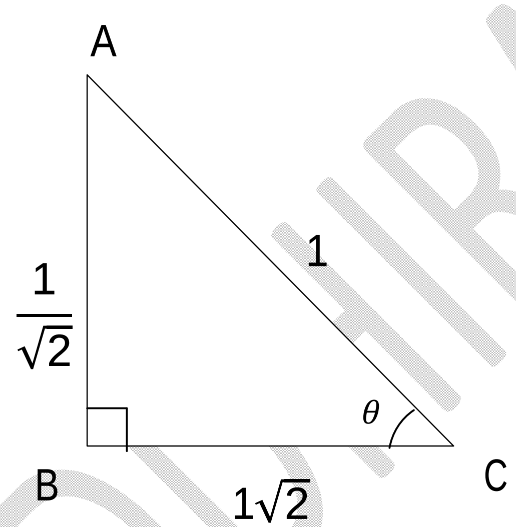


$$= \frac{\sqrt{q^2 - P^2}}{q}$$

$$\cos\theta = \frac{\sqrt{q^2 - P^2}}{q}$$

Q. 46) In ΔABC, $A = 90^0$ and $C = \theta$ if $\tan\theta = 1$, find

$\sin\theta, \cos\theta$



Solution : $\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$

$$1 = \frac{BC}{AB}$$

$$\sin\theta = \frac{\text{opposite side}}{\text{hypotenues}} = \frac{1}{\sqrt{2}} = \frac{BC}{AC}$$

$$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenues}} = \frac{1}{\sqrt{2}} = \frac{AB}{AC}$$

Q. 47) find the value of $\frac{\sin 20^0}{\cos 70^0}$

Solution : 20^0 and 70^0 are complementary angles

$$\sin(90 - \theta) = \cos\theta$$

$$\sin(90 - 20) = \cos\theta$$

$$\sin(70) = \cos\theta$$

$$\cos 70^0$$

$$\therefore \frac{\sin 20^0}{\cos 70^0} = \frac{\cos 70^0}{\cos 70^0} = 1$$

$$\frac{\sin 20^\circ}{\cos 70^0} = 1$$

Q. 48) find the value of $3\ \sin 30^0 - \cos 60^0$

Solution : $3\ \sin 30^0 - \cos 60^0$

$$\sin 30^0 = \frac{1}{2}, \cos 60^0 = \frac{1}{2}$$

$$\therefore 3 \times \frac{1}{2} - \frac{1}{2}$$

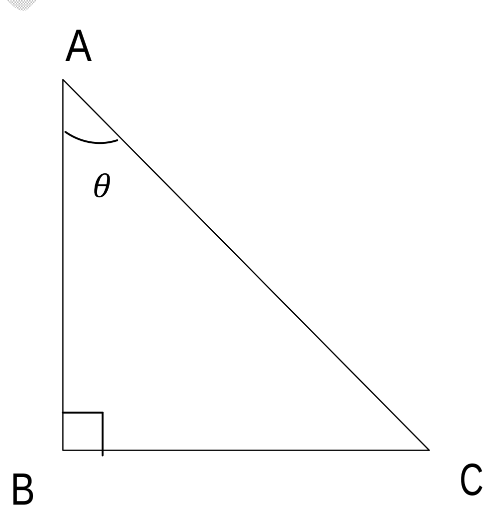
$$= \frac{3}{2} - \frac{1}{2}$$

$$= \frac{2}{2}$$

$$= 1$$

$$\therefore 3\ \sin 30^0 - \cos 60^0 = 1$$

Q. 49) If $\sin\theta = \frac{15}{17}$ then find $\tan\theta$



Solution : $\sin\theta = \dfrac{\text{opposite side}}{\text{hypotenues}}$

$$\frac{15}{17} = \frac{BC}{AC}$$

Here , BC = 15k & AC = 17k

By using, Pythagoras theorem

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

$$(AB)^2 + (15k)^2 = (17k)^2$$

$$(AB)^2 + 225k = 289k$$

$$AB^2 = 289k - 225k$$

$$AB^2 = 64k$$

$$AB^2 = 8k$$

$$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

$$= \frac{BC}{AB}$$

$$= \frac{15k}{8k}$$

$$= \frac{15}{8}$$

$$\therefore \tan\theta = \frac{15}{8}$$

Q. 50) Find the value of :

$$\frac{\sin 30^0}{\cos 60^0}$$

Solution : 30^0 and 60^0 are complementary angles by formula,

$$\sin(90 - \theta) = \cos\theta$$

$$\sin(90 - 60) = \cos 60^0$$

$$\sin 30^0 = \cos 60^0$$

$$\therefore \frac{\sin 30^0}{\cos 60^0} = \frac{\cos 60^0}{\cos 60^0} = 1$$

Q. 51) Find the value of :

$$\frac{\tan 45^0}{\sin 45^0 + \cos 45^0}$$

Solution : $\tan 45^0 = 1, \sin 45^0 = \frac{1}{\sqrt{2}}, \cos 45^0 = \frac{1}{\sqrt{2}}$

$$= \frac{\tan 45^0}{\sin 45^0 + \cos 45^0} = \frac{1}{\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}}$$

$$= \frac{1}{\frac{2}{\sqrt{2}}} = \frac{\sqrt{2}}{2}$$

$$\therefore \frac{\tan 45^0}{\sin 45^0 + \cos 45^0} = \frac{\sqrt{2}}{2}$$