17. TRIGONOMETRICAL RATIOS OF STD ANGLES

EXERCISE – 17.1

Solution 1 (i):

$7 \sin 30^\circ \cos 60^\circ$

$\Rightarrow 7 \cdot \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)$

$\Rightarrow \frac{7}{4}$

(ii) $3 \sin^2 45^\circ + 2 \cos^2 60^\circ$

$\rightarrow 3 \cdot \left(\frac{1}{\sqrt{2}}\right)^2 + 2 \cdot \left(\frac{1}{2}\right)^2$

$\Rightarrow \frac{3}{2} + \frac{2}{4}$

$\Rightarrow \frac{3}{2} + \frac{1}{2}$

$\Rightarrow \frac{3+1}{2}$

$\Rightarrow \frac{4}{2}$

$\Rightarrow 2$

(iii) sol:- $\cos^2 45^\circ + \sin^2 60^\circ + \sin^2 30^\circ$

$\Rightarrow \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2$

$\Rightarrow \frac{1}{2} + \frac{3}{4} + \frac{1}{4}$

$\Rightarrow \frac{2+3+1}{4} = \frac{6}{4} = \frac{3}{2}$

(iv) Sol :-

$\cos 90^\circ + \cos^2 45^\circ \sin 30^\circ \tan 45^\circ$

$\Rightarrow \quad 0 + \left(\frac{1}{\sqrt{2}}\right)^2 \cdot \left(\frac{1}{2}\right) \cdot (1)$

$\Rightarrow \quad 0 + \frac{1}{2} \cdot \frac{1}{2}$

$\Rightarrow \quad 0 + \frac{1}{4}$

$\Rightarrow \quad \frac{0+1}{4}$

$\Rightarrow \quad \frac{1}{4}$

Solution - 2

(i) Sol :- $\frac{\sin^2 45^\circ + \cos^2 45}{\tan^2 60}$

$\Rightarrow \quad \frac{\left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2}{(\sqrt{3})^2}$

$\Rightarrow \quad \frac{\frac{1}{2} + \frac{1}{2}}{3}$

$\Rightarrow \quad \frac{1+1}{2 \cdot 3}$

$\Rightarrow \quad \frac{2}{6}$

$\Rightarrow \quad \frac{1}{3}$

(ii) sol :-

$$\frac{\sin 30^\circ - \sin 90^\circ + 2\cos 0^\circ}{\tan 30^\circ \times \tan 60^\circ}$$

$$\Rightarrow \frac{\frac{1}{2} - 1 + 2\cdot(1)}{\frac{1}{\cancel{\sqrt{3}}} \times \cancel{\sqrt{3}}}$$

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

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

$$\Rightarrow \frac{3}{2}$$

(iii) sol :-

$$\frac{4}{3}\tan^2 30^\circ + \sin^2 60^\circ - 3\cos^2 60^\circ + \frac{3}{4}\tan^2 60^\circ - 2\tan^2 45^\circ$$

$$\Rightarrow \frac{4}{3}\left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 - 3\left(\frac{1}{2}\right)^2 + \frac{3}{4}(\sqrt{3})^2 - 2\cdot(1)^2$$

$$\Rightarrow \frac{4}{3}\cdot\frac{1}{3} + \cancel{\frac{3}{4}} - \cancel{\frac{3}{4}} + \frac{9}{4} - 2$$

$$\Rightarrow \frac{4}{9} + \frac{9}{4} - 2$$

$$\Rightarrow \frac{4\times 4 + 9\times 9 - 2\times 36}{36} = \frac{16+81-72}{36}$$

$$\Rightarrow \frac{25}{36}$$

Solution - 3 :

(i) $\frac{\sin 60^\circ}{\cos^2 45^\circ} - 3\tan 30^\circ + 5\cos 90^\circ$

$\Rightarrow \frac{\sqrt{3}/2}{(1/\sqrt{2})^2} - 3\frac{1}{\sqrt{3}} + 5(0)$

$\Rightarrow \frac{\frac{\sqrt{3}}{\cancel{2}}}{\frac{1}{\cancel{2}}} - \frac{3}{\sqrt{3}} + 0$

$\Rightarrow \sqrt{3} - \frac{3}{\sqrt{3}}$

$\Rightarrow \frac{\sqrt{3}\cdot\sqrt{3} - 3}{\sqrt{3}}$

$\Rightarrow \frac{3-3}{\sqrt{3}}$

$\Rightarrow \underline{0}$

(ii) Sol :

$2\sqrt{2}\cos 45^\circ \cos 60 + 2\sqrt{3}\sin 30^\circ \tan 60^\circ - \cos 0^\circ$

$\Rightarrow \cancel{2}\cancel{\sqrt{2}}\frac{1}{\cancel{\sqrt{2}}}\cdot\frac{1}{\cancel{2}} + \cancel{2}\sqrt{3}\cdot\frac{1}{\cancel{2}}\cdot\sqrt{3} - 1$

$\Rightarrow \cancel{1} + 3 - \cancel{1}$

$\Rightarrow \underline{3}$

(iii) Sol :

$$\frac{4}{5}\tan^2 60^\circ - \frac{2}{\sin^2 30^\circ} - \frac{3}{4}\tan^2 30^\circ$$

$$\Rightarrow \frac{4}{5}(\sqrt{3})^2 - \frac{2}{\left(\frac{1}{2}\right)^2} - \frac{3}{4}\left(\frac{1}{\sqrt{3}}\right)^2$$

$$\Rightarrow \frac{4}{5}\cdot 3 - \frac{2}{\left(\frac{1}{4}\right)} - \frac{\cancel{3}}{4}\cdot\frac{1}{\cancel{3}}$$

$$\Rightarrow \frac{12}{5} - 8 - \frac{1}{4}$$

$$\Rightarrow \frac{12\times 4 - 8\times 5\times 4 - 1\times 5}{5\times 4}$$

$$\Rightarrow \frac{48 - 160 - 5}{20}$$

$$\Rightarrow -\frac{117}{20}$$

$$\Rightarrow -5\frac{17}{20}$$

Solution - 4 :

(i) Sol :

$$\text{LHS} \Rightarrow \cos^2 30 + \sin 30 + \tan^2 45^\circ$$

$$\Rightarrow \left(\frac{\sqrt{3}}{2}\right)^2 + \frac{1}{2} + 1^2$$

$$\Rightarrow \frac{3}{4} + \frac{1}{2} + 1$$

$$\Rightarrow \frac{3+2+4}{4}$$

$\Rightarrow \quad \frac{9}{4}$

$\Rightarrow \quad 2\frac{1}{4}$

(ii) Sol:

LHS $\Rightarrow \quad 4\left(\sin^4 30^\circ + \cos^4 60^\circ\right) - 3\left(\cos^2 45^\circ - \sin^2 90^\circ\right)$

$\Rightarrow \quad 4 \cdot \left[\left(\frac{1}{2}\right)^4 + \left(\frac{1}{2}\right)^4\right] - 3\left(\left(\frac{1}{\sqrt{2}}\right)^2 - 1^2\right)$

$\Rightarrow \quad 4\left(\frac{1}{16} + \frac{1}{16}\right) - 3\left(\frac{1}{2} - 1\right)$

$\Rightarrow \quad 4\left(\frac{1+1}{16}\right) - 3\left(\frac{-1}{2}\right)$

$\Rightarrow \quad \cancel{4}\,\frac{\cancel{2}}{\cancel{16}\,4_{2}} + \frac{3}{2}$

$\Rightarrow \quad \frac{1}{2} + \frac{3}{2}$

$\Rightarrow \quad \frac{1+3}{2}$

$\Rightarrow \quad -\frac{4}{2}$

$\Rightarrow \quad -2 = \text{RHS}$

(iii) Sol :-

LHS $\Rightarrow \quad \cos 60^\circ = \frac{1}{2}$

RHS $\Rightarrow \quad \cos^2 30^\circ - \sin^2 30^\circ = \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2$

$= \frac{3}{4} - \frac{1}{4}$

$= \frac{3-1}{4}$

$= 2$

$$= \frac{\overline{}}{4}$$

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

$\therefore$ LHS = RHS.

Solution – 5 :

(i) sol : Given $x = 30^\circ$

LHS $\Rightarrow \tan 2x$

$\Rightarrow \tan 2(30^\circ)$

$\Rightarrow \tan 60^\circ$

$\Rightarrow \sqrt{3}$

RHS $\Rightarrow \dfrac{2\tan x}{1-\tan^2 x}$

$\Rightarrow \dfrac{2 \cdot \tan 30^\circ}{1-\tan^2 30}$

$\Rightarrow \dfrac{2 \cdot \frac{1}{\sqrt{3}}}{1-\left(\frac{1}{\sqrt{3}}\right)^2}$

$\Rightarrow \dfrac{\frac{2}{\sqrt{3}}}{1-\frac{1}{3}}$

$\Rightarrow \dfrac{\frac{2}{\sqrt{3}}}{\frac{3-1}{3}}$

$\Rightarrow \dfrac{\frac{\cancel{2}}{\sqrt{3}}}{\frac{\cancel{2}}{3}}$

$\Rightarrow \dfrac{3}{\sqrt{3}} \times \dfrac{\sqrt{3}}{\sqrt{3}}$

$\Rightarrow \dfrac{\cancel{3}\sqrt{3}}{\cancel{3}}$

$\Rightarrow \sqrt{3}$

$\therefore$ LHS = RHS.

(ii) Sol :

Given $x = 15^\circ$

LHS $\Rightarrow 4 \sin 2x \cdot \cos 4x \cdot \sin 6x$

$\Rightarrow 4 \cdot \sin(2 \cdot 15) \cdot \cos(4 \cdot 15) \cdot \sin 6(15)$

$\Rightarrow 4 \sin 30^\circ \cdot \cos 60^\circ \cdot \sin 90^\circ$

$\Rightarrow \cancel{4}^{2} \cdot \frac{1}{\cancel{2}} \cdot \frac{1}{\cancel{2}} \cdot 1$

$\Rightarrow \underline{\underline{1}}$.

$\therefore$ LHS = RHS.

Solution-6 :-

(i) Sol:

$$\sqrt{\frac{1-\cos^2 30^\circ}{1-\sin^2 30^\circ}} \qquad (\because \sin^2 A + \cos^2 A = 1)$$

$$\Rightarrow \sqrt{\frac{\sin^2 30}{\cos^2 30}}$$

$$\Rightarrow \sqrt{\frac{\left(\frac{1}{2}\right)^2}{\left(\frac{\sqrt{3}}{2}\right)^2}}$$

$$\Rightarrow \sqrt{\frac{\frac{1}{4}}{\frac{3}{4}}}$$

$\Rightarrow \quad \frac{1}{\sqrt{3}}$ //.

(ii) Sol :-

$$\frac{\sin 45^\circ \cdot \cos 45^\circ \cdot \cos 60^\circ}{\sin 60^\circ \cos 30^\circ \cdot \tan 45^\circ}$$

$$\Rightarrow \quad \frac{\frac{1}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}} \cdot \frac{1}{\cancel{2}}}{\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{\cancel{2}} \cdot 1}$$

$$\Rightarrow \quad \frac{\frac{1}{\cancel{2}}}{\frac{3}{\cancel{2}}}$$

$$\Rightarrow \quad \frac{1}{3}.$$

Solution – 7 :

Given $\theta = 30^\circ$

(i) Sol :

LHS $\Rightarrow$ $\sin 2\theta = \sin 2 \cdot 30^\circ$

$= \sin 60$

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

RHS $\Rightarrow$ $2 \sin\theta \cos\theta = 2 \cdot \sin 30^\circ \cdot \cos 30^\circ$

$= \cancel{2} \cdot \frac{1}{\cancel{2}} \cdot \frac{\sqrt{3}}{2}$

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

$\therefore$ LHS $=$ RHS.

(ii) Sol:

LHS $\Rightarrow \cos 2\theta = \cos 2\cdot 30^\circ$

$= \cos 60^\circ$

$= \frac{1}{2}$

RHS $\Rightarrow 2\cos^2\theta - 1 = 2\cdot\cos^2 30^\circ - 1$

$= 2\cdot\left(\frac{\sqrt{3}}{2}\right)^2 - 1$

$= \cancel{2}\cdot\frac{3}{\cancel{4}_2} - 1$

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

$= \frac{1}{2}$

$\therefore$ LHS = RHS.

(iii) Sol: LHS $\Rightarrow \sin 3\theta = \sin 3\cdot 30^\circ$

$= \sin 90^\circ$

$= 1$

RHS $\Rightarrow 3\sin\theta - 4\sin^3\theta$.

$3\cdot\sin 30^\circ - 4\sin^3 30^\circ$

$\Rightarrow 3\cdot\frac{1}{2} - 4\left(\frac{1}{2}\right)^3$

$\Rightarrow \frac{3}{2} - \frac{4}{8_2}$

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

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

$\therefore$ LHS = RHS.

(iv) Sol :

LHS = $\cos 3\theta \Rightarrow \cos 3 \cdot 30^\circ$

$\Rightarrow \cos 90^\circ$

$\Rightarrow 0$

RHS $\Rightarrow 4\cos^3\theta - 3\cos\theta = 4 \cdot \cos^3 30^\circ - 3\cos 30^\circ$

$= 4 \cdot \left(\frac{\sqrt{3}}{2}\right)^3 - 3 \cdot \frac{\sqrt{3}}{2}$

$= \cancel{4} \cdot \frac{3\sqrt{3}}{\cancel{8}_2} - \frac{3\sqrt{3}}{2}$

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

$= 0$

$\therefore$ LHS = RHS.

Solution -8 :-

Given $\theta = 30^\circ$.

$\Rightarrow 2\sin\theta : \sin 2\theta$

$\Rightarrow \frac{2\sin\theta}{\sin 2\theta} = \frac{2 \cdot \sin 30^\circ}{\sin 2 \cdot 30^\circ}$

$= \frac{\cancel{2} \frac{1}{\cancel{2}}}{\sin 60}$

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

$\frac{2\sin\theta}{\ldots} = \frac{2}{\ldots}$

$\sin 2\theta \quad \sqrt{3}$

$\therefore \; 2\sin\theta : \sin 2\theta = 2 : \sqrt{3}$

12

Solution – 9 :-

Given $A = 30^\circ$; $B = 60^\circ$

LHS $\Rightarrow \sin(A+B)$

$\Rightarrow \sin(30^\circ + 60^\circ)$

$\Rightarrow \sin 90^\circ$

$\Rightarrow 1$.

RHS $\rightarrow \sin A + \sin B$

$\Rightarrow \sin 30^\circ + \sin 60^\circ$

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

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

$\therefore$ LHS $\neq$ RHS

i.e., $\sin(A+B) \neq \sin A + \sin B$.

Solution – 10 :-

Given $A = 60^\circ$; $B = 30^\circ$

(i) Sol :

LHS $\Rightarrow \sin(A+B) = \sin(60+30)$

$= \sin 90^\circ$

$= 1$

RHS $\Rightarrow \sin A \cos B + \cos A \sin B$

$\Rightarrow \sin 60^\circ \cdot \cos 30^\circ + \cos 60^\circ \sin 30^\circ$

$$\Rightarrow \frac{\sqrt{3}}{2}\cdot\frac{\sqrt{3}}{2} + \frac{1}{2}\cdot\frac{1}{2}$$

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

(ii) Sol :-

$A = 60$; $B = 30°$

LHS $\Rightarrow \cos(A+B) = \cos(60° + 30°)$

$= \cos 90°$

$= 0$

RHS $\Rightarrow \cos A \cdot \cos B - \sin A \sin B$

$\Rightarrow \cos 60° \cdot \cos 30° - \sin 60° \sin 30$

$\Rightarrow \frac{1}{2}\cdot\frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2}\cdot\frac{1}{2}$

$\Rightarrow \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4}$

$\Rightarrow 0$

$\therefore$ LHS = RHS

i.e, $\cos(A+B) = \cos A \cos B - \sin A \sin B$.

(iii) Sol:

LHS

$\Rightarrow \sin(A-B) = \sin(60-30)$

$= \sin 30°$

$= \frac{1}{2}$

RHS $\Rightarrow \sin A \cos B - \cos A \sin B$

$\Rightarrow \sin 60° \cdot \cos 30° - \cos 60 \cdot \sin 30$

$\Rightarrow \frac{\sqrt{3}}{2}\cdot\frac{\sqrt{3}}{2} - \frac{1}{2}\cdot\frac{1}{2}$

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

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

$\therefore \sin(A-B) = \sin A \cos B - \cos A \sin B$

(iv) Sol :-

$A = 60 \; ; \; B = 30^\circ$

LHS $\Rightarrow \tan(A-B) = \tan(60-30)$

$= \tan 30^\circ$

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

RHS $\Rightarrow \frac{\tan A - \tan B}{1 + \tan A \cdot \tan B}$

$\Rightarrow \frac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \cdot \tan 30^\circ}$

$\Rightarrow \frac{\sqrt{3} - \frac{1}{\sqrt{3}}}{1 + \cancel{\sqrt{3}} \frac{1}{\cancel{\sqrt{3}}}}$

$\Rightarrow \frac{\frac{\sqrt{3} \cdot \sqrt{3} - 1}{\sqrt{3}}}{2}$

$\Rightarrow \frac{\frac{3-1}{\sqrt{3}}}{2}$

$\Rightarrow \frac{\frac{\cancel{2}}{\sqrt{3}}}{\cancel{2}}$

$\Rightarrow \frac{1}{\sqrt{3}}$

$\therefore$ LHS = RHS

i.e., $\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \cdot \tan B}$.

Solution – 11 :-

(i) Sol :

Given $2\sin 2\theta = \sqrt{3}$

$$\sin 2\theta = \frac{\sqrt{3}}{2}.$$

$$\sin 2\theta = \sin 60^\circ$$

$$2\theta = 60$$

$$\theta = \frac{60}{2}$$

$$\underline{\theta = 30^\circ}$$

(ii) Sol :

Given $\cos(20^\circ + x) = \sin 60^\circ$

$$\cos(20 + x) = \frac{\sqrt{3}}{2}$$

$$\cos(20 + x) = \cos 30^\circ$$

$$20 + x = 30^\circ$$

$$x = 30 - 20$$

$$\underline{x = 10^\circ}$$

(iii) Given $3\sin^2\theta = 2\frac{1}{4}$

$$3\sin^2\theta = \frac{9}{4}$$

$$\sin^2\theta = \frac{\cancel{9}^{3}}{4 \times \cancel{3}}$$

$$\sin^2\theta = \frac{3}{4}$$

$$\sin\theta = \sqrt{\frac{3}{4}}$$

$$\sin\theta = \frac{\sqrt{3}}{2}.$$

$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\sin\theta = \sin 60^\circ$$

$$\theta = 60^\circ$$

Solution - 12 :-

Given $\sin\theta = \cos\theta$

$$\frac{\sin\theta}{\cos\theta} = 1$$

$$\tan\theta = 1$$

$$\therefore \quad \theta = 45^\circ$$

$\Rightarrow$ $2\tan^2\theta + \sin^2\theta - 1$

$\Rightarrow$ $2 \cdot \tan^2 45 + \sin^2 45 - 1$

$\Rightarrow$ $2 \cdot (1) + \left(\frac{1}{\sqrt{2}}\right)^2 - 1$

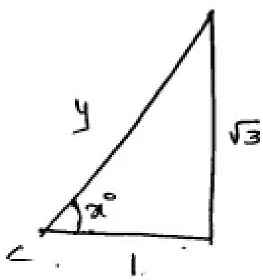
$\Rightarrow$ $2 + \frac{1}{2} - 1$

$\Rightarrow$ $\frac{4+1-2}{2}$

$\Rightarrow$ $\frac{3}{2}$

Solution -13 :

(i) From figure



$$\tan x^\circ = \frac{\sqrt{3}}{1}$$

$$\tan x^\circ = \sqrt{3}$$

(ii) $x = 60^\circ$.

Solution – 15 :-

Given $\tan 3x = \sin 45^\circ . \cos 45^\circ + \sin 30^\circ$

$\tan 3x = \frac{1}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}} + \frac{1}{2}$

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

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

$= \frac{2}{2}$

$\mathrm{Tan}\ 3x = 1$

$\mathrm{Tan}\ 3x = \mathrm{Tan}\ 45^\circ$

$3x = 45^\circ$

$x = 15^\circ$

Solution – 16 :

(i) Given $4\cos^2 x - 1 = 0$

$4\cos^2 x = 1$

$\cos^2 x = \frac{1}{4}$

$\cos^2 x = \frac{1}{\sqrt{4}}$

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

$\cos x = \cos 60^\circ$

$x = 60^\circ$

(ii) $\sin^2 x^\circ + \cos^2 x^\circ \Rightarrow \sin^2 60^\circ + \cos^2 60^\circ$

$\Rightarrow \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2$

$\Rightarrow \frac{3}{4} + \frac{1}{4}$

$\Rightarrow \frac{3+1}{4}$

$\Rightarrow \frac{4}{4}$

$\Rightarrow 1.$

(iii) $\cos^2 x^\circ - \sin^2 x^\circ$

$\Rightarrow \cos^2 60^\circ - \sin^2 60^\circ$

$\Rightarrow \left(\frac{1}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2$

$\Rightarrow \frac{1}{4} - \frac{3}{4}$

$\Rightarrow \frac{1-3}{4}$

$\Rightarrow \frac{-2}{4}$

$\Rightarrow \frac{-1}{2}$

Solution – 17 :-

(i) Sol :

Given $\sec\theta = \operatorname{cosec}\theta$

$\frac{1}{\cos\theta} = \frac{1}{\sin\theta}$

$\sin\theta = \cos\theta$

$\frac{\sin\theta}{\cos\theta} = 1$

$\tan\theta = 1$

$\theta = 45^\circ$

(ii) Sol :

Given $\tan\theta = \cot\theta$ $\quad\left(\because \tan\theta = \frac{1}{\cot\theta}\right)$

$$\frac{\tan\theta}{\cot\theta} = 1$$

$$\tan^2\theta = 1$$

$$\therefore \theta = 45^\circ$$

Solution- 18 :-

Given $\sin 3x = 1$.

$$\sin 3x = \sin 90^\circ$$

$$3x = 90^\circ$$

$$x = \frac{90^\circ}{3}$$

$$x = 30^\circ$$

(i) Sol :

$$\sin x \Rightarrow \sin 30 = \frac{1}{2}$$

(ii) $\cos 2x \Rightarrow \cos 2\cdot 30^\circ$

$$\Rightarrow \cos 60^\circ$$

$$\rightarrow \frac{1}{2}$$

(iii) $\tan^2 x - \sec^2 x = \tan^2 30^\circ - \sec^2 30^\circ$

$$= \left(\frac{1}{\sqrt{3}}\right)^2 - \left(\frac{2}{\sqrt{3}}\right)^2$$

$$= \frac{1}{3} - \frac{4}{3}$$

$$= \frac{1-4}{3} = \frac{-3}{3} = -1.$$

Solution – 19 :

Given $3\tan^2\theta - 1 = 0$

$$3\tan^2\theta = 1$$

$$\tan^2\theta = \frac{1}{3}$$

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

$$\theta = 30^\circ$$

$\therefore \cos 2\theta = \cos 2.30^\circ$

$$= \cos 60^\circ$$

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

Solution – 20 :–

Given $\sin x + \cos y = 1$

$\because x = 30^\circ$

$\therefore \sin 30^\circ + \cos y = 1$

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

$$\cos y = 1 - \frac{1}{2}$$

$$\cos y = \frac{1}{2}$$

$$y = 60^\circ.$$

Solution – 21 :-

Given $\sin(A+B) = \frac{\sqrt{3}}{2} = \cos(A-B)$

$$\sin(A+B) = \frac{\sqrt{3}}{2}$$

$$\sin(A+B) = \sin 60^\circ$$

$$A+B = 60^\circ \quad \text{-----} \ (\text{i})$$

$$\cos(A-B) = \frac{\sqrt{3}}{2}$$

$$\cos(A-B) = \cos 30^\circ$$

$$A-B = 30^\circ \quad \text{----} \ (\text{ii})$$

From (i) & (ii)

$$A+\cancel{B} = 60^\circ$$
$$A-\cancel{B} = 30^\circ$$

$$2A = 90^\circ$$

$$A = 45^\circ$$

From (i) $\Rightarrow$ $A+B = 60^\circ$

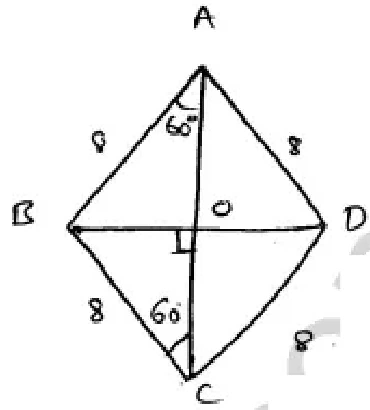
$$45^\circ + B = 60^\circ$$

$$B = 60^\circ - 45^\circ$$

$$B = 15^\circ$$

$\therefore$ $A = 45^\circ$; $B = 15^\circ$

Solution-22 :



From fig ΔBOC.

$$\sin 60 = \frac{BO}{BC}$$

$$\frac{\sqrt{3}}{2} = \frac{BO}{8}$$

$$BO = \frac{\overset{4}{\cancel{8}} \cdot \sqrt{3}}{\cancel{2}}$$

$$BO = 4\sqrt{3}$$

Similarly from ΔOCD

$$\sin 60 = \frac{OD}{CD}$$

$$\frac{\sqrt{3}}{2} = \frac{OD}{8}$$

$$OD = 4\sqrt{3}$$

$$\therefore BD = BO + OD = 4\sqrt{3} + 4\sqrt{3} = 8\sqrt{3}$$

and from ΔBOC; $\cos 60 = \frac{OC}{BC}$

$$\frac{OC}{8} = \frac{1}{2}$$

$$OC = 4$$

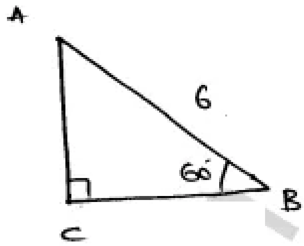
from ΔAOB; $\cos 60 = \frac{OA}{AB}$

$$\frac{1}{2} = \frac{OA}{8}$$

$$OA = 4$$

$\therefore AC = OA + OC = 4 + 4 = \underline{8}$

Solution-23)



Given $AB = 6$

$\angle C = 90°$

$\angle B = 60°$

From fig :

$$\sin 60 = \frac{AC}{AB}$$

$$\frac{\sqrt{3}}{2} = \frac{AC}{6}$$

$$AC = \frac{\overset{3}{\cancel{6}} \cdot \sqrt{3}}{\cancel{2}}$$

$$AC = 3\sqrt{3}.$$

from fig

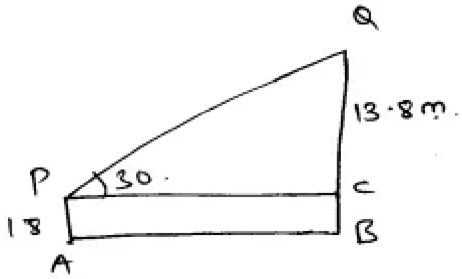
$$\cos 60 = \frac{BC}{AB}$$

$$\frac{1}{2} = \frac{BC}{6}$$

$$BC = \frac{6}{2}$$

$$BC = \underline{3}.$$

Solution-24.



Given $AP = 1{\cdot}8m.$

$QC = QB - CB$

$\because CB = AP = 1{\cdot}8\ m.$

$QC = 13{\cdot}8 - 1{\cdot}8$

$QC = 12\text{ m}$

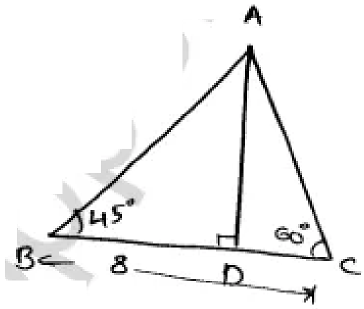
from fig ; $\quad \tan 30^\circ = \dfrac{QC}{PC}$

$$\frac{1}{\sqrt{3}} = \frac{12}{PC}$$

$$PC = 12\sqrt{3}\text{ mts}$$

PC = distance of man from the building is $12\sqrt{3}$ mts

Solution - 25 :-



ΔABC ; $\angle B = 45^\circ$

$\angle C = 60^\circ$

$BC = 8\text{m}$

from figure ΔABD

$$\tan 45^\circ = \frac{AD}{BD}$$

$$1 = \frac{AD}{BD}$$

$$AD = BD \quad \text{---(1)}$$

In ΔADC ; $\tan 60^\circ = \dfrac{AD}{DC}$

$$\sqrt{3} = \frac{AD}{DC}$$

$$\Rightarrow DC = \frac{AD}{\sqrt{3}}$$

$\because BC = 8$

$\Rightarrow BD + DC = 8$

$\Rightarrow AD + \dfrac{AD}{\sqrt{3}} = 8$

$\sqrt{3}AD + AD = 8$

$$(\sqrt{3}+1)\,AD = 8\sqrt{3}$$

$$AD = \frac{8\sqrt{3}}{\sqrt{3}+1}$$

$$AD = \frac{8\sqrt{3}}{\sqrt{3}+1} \cdot \frac{\sqrt{3}-1}{\sqrt{3}-1}$$

$$= \frac{8\sqrt{3}(\sqrt{3}-1)}{3-1}$$

$$= \frac{8\times 3 - 8\sqrt{3}}{2}$$

$$= \frac{24 - 8\sqrt{3}}{2}$$

$$= 12 - 4\sqrt{3}$$

$$AD = 4(3-\sqrt{3})$$

EXERCISE – 17.2

Solution – 1 :

(i) Sol :

Given $\dfrac{\cos 18^\circ}{\sin 72^\circ}$

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

$\Rightarrow \dfrac{\cos 18^\circ}{\sin(90^\circ - 18^\circ)}$

$\Rightarrow \dfrac{\cancel{\cos 18^\circ}}{\cancel{\cos 18^\circ}}$

$\Rightarrow 1$.

(ii) Sol :-

Given $\dfrac{\tan 41^\circ}{\cot 49^\circ}$

$\because \cot(90^\circ - \theta) = \tan\theta$

$\Rightarrow \dfrac{\tan 41^\circ}{\cot(90^\circ - 41^\circ)}$

$\Rightarrow \dfrac{\cancel{\tan 41^\circ}}{\cancel{\tan 41^\circ}}$

$\Rightarrow 1$

(iii) Sol :-

Given $\dfrac{\operatorname{cosec} 17^\circ 30'}{\sec 72^\circ 30'}$

$\sec(90-\theta) = \operatorname{cosec}\theta$

$= \dfrac{\operatorname{cosec} 17^\circ 30'}{\sec(90^\circ - 17^\circ 30')}$

$\Rightarrow \dfrac{\cancel{\operatorname{cosec} 17^\circ 30'}}{\cancel{\operatorname{cosec} 17^\circ 30'}}$

$\Rightarrow 1$

Solution - 2 :-

(i) Sol :

$$\frac{\cot 40^\circ}{\tan 50^\circ} - \frac{1}{2}\left(\frac{\cos 35^\circ}{\sin 55^\circ}\right)$$

$$\Rightarrow \frac{\cot 40^\circ}{\tan(90-40^\circ)} - \frac{1}{2}\left[\frac{\cos 35^\circ}{\sin(90-35^\circ)}\right]$$

$$\Rightarrow \frac{\cancel{\cot 40^\circ}}{\cancel{\cot 40^\circ}} - \frac{1}{2}\left(\frac{\cancel{\cos 35^\circ}}{\cancel{\cos 35^\circ}}\right)$$

$$\Rightarrow 1 - \frac{1}{2}$$

$$\Rightarrow \frac{2-1}{2}$$

$$\Rightarrow \frac{1}{2} //.$$

(ii) Sol :

$$\left(\frac{\sin 49^\circ}{\cos 41^\circ}\right)^2 + \left(\frac{\cos 41^\circ}{\sin 49^\circ}\right)^2$$

$$\Rightarrow \left[\frac{\sin 49^\circ}{\cos(90-49^\circ)}\right]^2 + \left[\frac{\cos 41^\circ}{\sin(90-41^\circ)}\right]^2$$

$$\Rightarrow \left(\frac{\cancel{\sin 49^\circ}}{\cancel{\sin 49^\circ}}\right)^2 + \left(\frac{\cancel{\cos 41^\circ}}{\cancel{\cos 41^\circ}}\right)^2$$

$$\Rightarrow 1^2 + 1^2$$

$$\Rightarrow 1 + 1$$

$$\Rightarrow 2$$

(iii) Sol:

$$\frac{\sin 72^\circ}{\cos 18^\circ} - \frac{\sec 32^\circ}{\operatorname{cosec} 58^\circ}$$

$$\Rightarrow \frac{\sin 72^\circ}{\cos(90-72^\circ)} - \frac{\sec 32^\circ}{\operatorname{cosec}(90-32^\circ)}$$

$$\Rightarrow \frac{\cancel{\sin 72^\circ}}{\cancel{\sin 72^\circ}} - \frac{\cancel{\sec 32^\circ}}{\cancel{\sec 32^\circ}}$$

$$\Rightarrow 1 - 1$$

$$\Rightarrow 0$$

(iv) Sol:

$$\frac{\cos 75^\circ}{\sin 15^\circ} + \frac{\sin 12^\circ}{\cos 78^\circ} - \frac{}{\sin 72^\circ}$$

$$\Rightarrow \frac{\cos 75^\circ}{\sin(90-75^\circ)} + \frac{\quad ^\circ}{\cos(90-12^\circ)} - \frac{\cos 18^\circ}{\sin(90-18^\circ)}$$

$$\Rightarrow \frac{\cancel{\cos 75^\circ}}{\cancel{\cos 75^\circ}} + \frac{\quad ^\circ}{\cancel{\sin 12^\circ}} - \frac{\cos 18^\circ}{\cos 18^\circ}$$

$$\Rightarrow 1 + 1 - 1$$

$$\Rightarrow 1$$

(v) Sol:

$$\frac{\sin 25^\circ}{\sec 65^\circ} + \frac{\cos 25^\circ}{\operatorname{cosec} 65^\circ}$$

$$\Rightarrow \frac{\sin 25^\circ}{\sec(90-25^\circ)} + \frac{\cos 25^\circ}{\operatorname{cosec}(90-25^\circ)}$$

$$\Rightarrow \frac{\sin 25^\circ}{\operatorname{cosec} 25^\circ} + \frac{\cos 25^\circ}{\sec 25^\circ}$$

$$\Rightarrow \frac{\sin 25^\circ}{\frac{1}{\sin 25^\circ}} + \frac{\cos 25^\circ}{\frac{1}{\cos 25^\circ}}$$

$$\Rightarrow \sin^2 25^\circ + \cos^2 25 \qquad (\because \cos^2\theta + \sin^2\theta = 1)$$

$$\Rightarrow 1$$

Solution- 3 :-

(i) Sol : $\sin 62^\circ - \cos 28^\circ$

$$\Rightarrow \sin 62^\circ - \cos(90 - 62^\circ)$$

$$\Rightarrow \sin 62^\circ - \sin 62^\circ$$

$$\Rightarrow 0$$

(ii) Sol : $\text{cosec } 35^\circ - \sec$

$$\Rightarrow \text{cosec } 35^\circ - \sec(90 - 35^\circ)$$

$$\Rightarrow \text{cosec } 35^\circ - \text{cosec } 35^\circ$$

$$\Rightarrow 0$$

Solution - 4 :-

(i) Sol : $\cos^2 26^\circ + \cos 64^\circ \sin 26^\circ + \frac{\tan 36^\circ}{\cot 54^\circ}$

$$\Rightarrow \cos^2 26^\circ + \cos(90 - 26^\circ) \sin 26^\circ + \frac{\tan 36^\circ}{\cot(90 - 36^\circ)}$$

$$\Rightarrow \cos^2 26^\circ + \sin 26^\circ \sin 26^\circ + \frac{\cancel{\tan 36^\circ}}{\cancel{\tan 36^\circ}}$$

$$\Rightarrow \cos^2 26^\circ + \sin^2 26 + 1$$

$$\Rightarrow 1 + 1 = 2$$

(ii) $\frac{\sec 17^\circ}{\operatorname{cosec} 73^\circ} + \frac{\tan 68^\circ}{\cot 22^\circ} + \cos^2 44^\circ + \cos^2 46^\circ$

$\Rightarrow \frac{\sec 17^\circ}{\operatorname{cosec}(90-17)} + \frac{\tan 68^\circ}{\cot(90-68^\circ)} + \cos^2 46^\circ + \cos^2 44^\circ$

$\Rightarrow \frac{\cancel{\sec 17^\circ}}{\cancel{\sec 17^\circ}} + \frac{\cancel{\tan 68^\circ}}{\cancel{\tan 68^\circ}} + \cos^2(90^\circ-44^\circ) + \cos^2 44^\circ$

$\Rightarrow 1+1+(\sin^2 44^\circ + \cos^2 44)$

$\Rightarrow 2+1$

$\Rightarrow \underline{3}.$

Solution - 5 :-

(i) Sol :- $\frac{\sin 65^\circ}{\cos 25^\circ} + \frac{\cos 32^\circ}{\sin 58^\circ} - \sin 28^\circ \sec 62^\circ + \operatorname{cosec}^2 30^\circ$

$\Rightarrow \frac{\sin 65^\circ}{\cos(90-65^\circ)} + \frac{\cos 32^\circ}{\sin(90-32^\circ)} - \sin 28 \sec(90-28^\circ) + (2)^2$

$\Rightarrow \frac{\cancel{\sin 65^\circ}}{\cancel{\sin 65^\circ}} + \frac{\cancel{\cos 32^\circ}}{\cancel{\cos 32^\circ}} - \sin 28 \cdot \operatorname{cosec} 28 + 4$

$\Rightarrow 1+1 - \cancel{\sin 28} \frac{1}{\cancel{\sin 28}} + 4$

$\Rightarrow 6-1$

$\Rightarrow \underline{5}.$

(ii) Sol :- $\frac{\sec 29^\circ}{\operatorname{cosec} 61^\circ} + 2\cot 8^\circ \cdot \cot 17^\circ \cdot \cot 45^\circ \cdot \cot 73^\circ \cdot \cot 82^\circ$

$- 3(\sin^2 38^\circ + \sin^2 52^\circ)$

$\Rightarrow \frac{\sec 29^\circ}{\operatorname{cosec}(90-29^\circ)} + 2\cot(90-82^\circ) \cdot \cot(90-73^\circ) \cot 45^\circ$

$\cot 73^\circ \cot 82^\circ - 3(\sin^2 38^\circ + \sin^2(90-38^\circ))$

$\Rightarrow \frac{\cancel{\sec 29^\circ}}{\cancel{\operatorname{cosec} 29^\circ}} + 2\cancel{\cot 82^\circ}\cancel{\tan 82^\circ} \cdot \cancel{\cot 73^\circ} \cdot \cancel{\tan 73^\circ} \cot 45^\circ$

$-3(\sin^2 38^\circ + \cos^2 38^\circ)$

$\Rightarrow 1 + 2(1) - 3(1)$

$\Rightarrow 1 + 2 - 3$

$\Rightarrow \underline{0}.$

Solution - 6 :-

(i) Sol :- $\tan 81^\circ + \cos 72^\circ$

$\Rightarrow \tan(90-9^\circ) + \cos(90-18^\circ)$

$\Rightarrow \cot 9^\circ + \sin 18^\circ$

(ii) Sol :- $\Rightarrow \cot 49^\circ + \operatorname{cosec} 87^\circ$

$\Rightarrow \cot(90-41^\circ) + \operatorname{cosec}(90-3^\circ)$

$\Rightarrow \tan 41^\circ + \sec 3^\circ$

Solution - 7 :-

(i) Sol: $\sin^2 28^\circ - \cos^2 62^\circ = 0$

LHS $\Rightarrow \sin^2 28 - \cos^2 62^\circ$

$\Rightarrow \sin^2 28^\circ - \cos^2(90 - 28^\circ)$

$\Rightarrow \sin^2 28^\circ - \sin^2 28^\circ$

$\Rightarrow \underline{0}$

$\therefore$ LHS = RHS.

(ii) Sol: LHS $\Rightarrow \cos^2 25^\circ + \cos^2 ..$

$\Rightarrow \cos^2 25^\circ + \cos^2(90 \quad 25^\circ)$

$\rightarrow \cos^2 25^\circ + \sin^2 25$

$\Rightarrow 1$

= RHS

$\therefore$ LHS = RHS.

(iii) Sol: $\Rightarrow \operatorname{cosec}^2 67^\circ - \tan^2 23^\circ$.

$\Rightarrow \operatorname{cosec}^2(90 - 23^\circ) - \tan^2 23^\circ$

$\Rightarrow \sec^2 23 - \tan^2 23^\circ$

$\Rightarrow 1$

$\therefore$ LHS = RHS

(iv) Sol: LHS $\sec^2 22^\circ - \cot^2 68^\circ$

$\Rightarrow \sec^2 22^\circ - \cot^2(90 - 22^\circ)$

$\Rightarrow \sec^2 22^\circ - \tan^2 22^\circ$

$\Rightarrow 1$ = RHS.

Pg

Solution - 8 :-

(i) Sol: LHS $\Rightarrow \sin 63^\circ \cdot \cos 27^\circ + \cos 63^\circ \sin 27^\circ$

$\Rightarrow \sin 63^\circ \cos(90-63^\circ) + \cos 63^\circ \sin(90-63^\circ)$

$\Rightarrow \sin 63^\circ \sin 63^\circ + \cos 63^\circ \cdot \cos 63^\circ$

$\Rightarrow \sin^2 63^\circ + \cos^2 63^\circ$

$\Rightarrow \underline{\underline{1}}$

$\therefore$ LHS = RHS.

(ii) Sol: LHS $\Rightarrow \sec 31^\circ \sin 59^\circ + \cos 31^\circ \operatorname{cosec} 59^\circ$.

$\Rightarrow \sec 31^\circ \sin(90-31^\circ) + \cos 31^\circ \operatorname{cosec}(90-31^\circ)$

$\Rightarrow \sec 31^\circ \cos 31^\circ + \cos 31^\circ \sec 31^\circ$

$\Rightarrow 2 \sec 31^\circ \cos 31^\circ$

$\Rightarrow 2 \dfrac{1}{\cancel{\cos 31^\circ}} \cdot \cancel{\cos 31^\circ}$

$\Rightarrow 2$.

$\therefore$ LHS = RHS.

Solution - 9 :-

(i) Sol: LHS $\Rightarrow \sec 70^\circ \sin 20^\circ - \cos 20^\circ \cdot \operatorname{cosec} 70^\circ$.

$\Rightarrow \sec 70^\circ \sin(90-70^\circ) - \cos 20^\circ \operatorname{cosec}(90-20^\circ)$.

$\Rightarrow \sec 70^\circ \cdot \cos 20^\circ - \cos 20^\circ \sec 70^\circ$

$\Rightarrow \underline{\underline{0}}$

(ii) Sol: LHS $\Rightarrow \sin^2 20^\circ + \sin^2 70^\circ - \tan^2 45$

$\Rightarrow \sin^2 20^\circ + \sin^2 (90-20^\circ) - \tan^2 45^\circ$

$\Rightarrow \sin^2 20 + \cos^2 20^\circ - (1)^2$

$\Rightarrow (1) - (1)$

$\Rightarrow 0$

$\therefore$ LHS = RHS.

Solution - 10 :-

(i) Sol: LHS $\Rightarrow \dfrac{\cot 54^\circ}{\tan 36^\circ} + \dfrac{\tan 20^\circ}{\cot 70^\circ} - 2$

$\Rightarrow \dfrac{\cot 54^\circ}{\tan(90-54)} + \dfrac{\tan 20^\circ}{\cot(90-20^\circ)} - 2$

$\Rightarrow \dfrac{\cancel{\cot 54^\circ}}{\cancel{\cot 54^\circ}} + \dfrac{\cancel{\tan 20^\circ}}{\cancel{\tan 20^\circ}} - 2$

$\Rightarrow 1 + 1 - 2$

$\Rightarrow 0$

$\therefore$ LHS = RHS.

(ii) Sol LHS $\Rightarrow \dfrac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \operatorname{cosec} 31^\circ$

$\Rightarrow \dfrac{\cos 80^\circ}{\sin(90-80^\circ)} + \cos 59^\circ \operatorname{cosec}(90-59)$

$\Rightarrow \dfrac{\cancel{\cos 80^\circ}}{\cancel{\cos 80^\circ}} + \cos \cancel{59^\circ} \sec \cancel{59^\circ}$

$\Rightarrow 1 + 1 = 2$ = RHS.

Solution - 12 :-

(i) Sol:

$$2\left(\frac{\tan 35^\circ}{\cot 55^\circ}\right)^2 + \left(\frac{\cot 55^\circ}{\tan 35^\circ}\right) - 3\left(\frac{\sec 40^\circ}{\operatorname{cosec} 50^\circ}\right)$$

$$\Rightarrow 2\cdot\left[\frac{\tan 35^\circ}{\cot(90-35^\circ)}\right]^2 + \frac{\cot 55^\circ}{\tan(90-55^\circ)} - 3\left(\frac{\sec 40^\circ}{\operatorname{cosec}(90-40^\circ)}\right)$$

$$\Rightarrow 2\left(\frac{\cancel{\tan 35^\circ}}{\cancel{\tan 35^\circ}}\right)^2 + \frac{\cancel{\cot 55}}{\cancel{\cot 55}} - 3\,\frac{\cancel{\sec 40}}{\cancel{\sec 40}}$$

$$\Rightarrow 2 + 1 - 3$$

$$\Rightarrow 0$$

(ii) Sol:

$$\frac{\sin 35^\circ \cos 55^\circ + \cos 35^\circ \sin 55^\circ}{\operatorname{cosec}^2 10^\circ - \tan^2 80}$$

$$\Rightarrow \frac{\sin 35^\circ \cdot \cos(90-35^\circ) + \cos 35^\circ \sin(90-35^\circ)}{\operatorname{cosec}^2(90-80^\circ) - \tan^2 80^\circ}$$

$$\Rightarrow \frac{\sin 35^\circ \cdot \sin 35^\circ + \cos 35^\circ \cdot \cos 35^\circ}{\sec^2 80^\circ + \tan^2 80^\circ}$$

$$\Rightarrow \frac{\sin^2 35^\circ + \cos^2 35^\circ}{\sec^2 80 - \tan^2 80}$$

$$\Rightarrow \frac{1}{1}$$

$$\Rightarrow 1$$

(iii) Sol: $\sin^2 34^\circ + \sin^2 56^\circ + 2\tan 18^\circ \cdot \tan 72^\circ - \cot^2 30^\circ$

$\Rightarrow \sin^2 34^\circ + \sin^2(90-34^\circ) + 2\tan 18 \cdot \tan(90-18^\circ) - \cot^2 30$

$\Rightarrow (\sin^2 34^\circ + \cos^2 34^\circ) + 2\cancel{\tan 18} \cdot \cancel{\cot 18} - (\sqrt{3})^2$

$\Rightarrow 1+2-3$

$\Rightarrow \underline{0}$

Solution - 13 :-

(i) Sol: LHS $\Rightarrow \dfrac{\cos\theta}{\sin(90-\theta)} + \dfrac{\sin\theta}{\cos(90-\theta)}$

$\Rightarrow \dfrac{\cancel{\cos\theta}}{\cancel{\cos\theta}} + \dfrac{\cancel{\sin\theta}}{\cancel{\sin\theta}}$

$\Rightarrow 1+1$

$\Rightarrow 2$

$\therefore$ LHS = RHS

(ii) Sol:

LHS $\Rightarrow \cos\theta \cdot \sin(90-\theta) + \sin\theta \cdot \cos(90-\theta)$

$\Rightarrow \cos\theta \cdot \cos\theta + \sin\theta \cdot \sin\theta$

$\Rightarrow \cos^2\theta + \sin^2\theta$

$\Rightarrow 1$

$\therefore$ LHS = RHS.

(iii) Sol :

$$LHS = \frac{\tan\theta}{\tan(90-\theta)} + \frac{\sin(90°-\theta)}{\cos\theta}$$

$$\Rightarrow \frac{\tan\theta}{\cot\theta} + \frac{\cancel{\cos\theta}}{\cancel{\cos\theta}}$$

$$\Rightarrow \frac{\tan\theta}{\left(\frac{1}{\tan\theta}\right)} + 1$$

$(\because \sec^2\theta - \tan^2\theta = 1)$

$$\Rightarrow \tan^2\theta + 1$$

$$\Rightarrow \sec^2\theta$$

$\therefore$ LHS = RHS .

(xiv) Solution - 14 :

(i) Sol :

$$LHS \Rightarrow \frac{\cos(90°-A) \cdot \sin(90°-A)}{\tan(90°-A)}$$

$$\Rightarrow \frac{\sin A \cdot \cos A}{\cot A}$$

$$\Rightarrow \frac{\sin A \cdot \cancel{\cos A}}{\frac{\cancel{\cos A}}{\sin A}}$$

$(\because \sin^2 A + \cos^2 A = 1)$

$$\Rightarrow \sin^2 A$$

$$\Rightarrow 1 - \cos^2 A$$

(ii) Sol:

LHS $\Rightarrow \dfrac{\sin(90^\circ-A)}{\operatorname{cosec}(90^\circ-A)} + \dfrac{\cos(90^\circ-A)}{\sec(90^\circ-A)}$

$\Rightarrow \dfrac{\cos A}{\sec A} + \dfrac{\sin A}{\operatorname{cosec} A}$

$\Rightarrow \dfrac{\cos A}{\left(\frac{1}{\cos A}\right)} + \dfrac{\sin A}{\left(\frac{1}{\sin A}\right)}$

$\Rightarrow \cos A \cdot \cos A + \sin A \cdot \sin A$

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

$\Rightarrow 1$

$\therefore$ LHS = RHS.

Solution- 15 :

(i) Sol: $\dfrac{\cos\theta}{\sin(90-\theta)} + \dfrac{\cos(90^\circ-\theta)}{\sec(90^\circ-\theta)} - 3\tan^2 30^\circ$

$\Rightarrow \dfrac{\cos\theta}{\cos\theta} + \dfrac{\sin A}{\operatorname{cosec}\theta} - 3\left(\frac{1}{\sqrt{3}}\right)^2$

$\Rightarrow 1 + \dfrac{\sin A}{\left(\frac{1}{\sin A}\right)} - \cancel{3}\dfrac{1}{\cancel{3}}$

$\Rightarrow 1 + \sin^2 A - 1$

$\Rightarrow \sin^2 A.$

(ii) Sol :- $\dfrac{\operatorname{cosec}(90^\circ-\theta)\cdot\sin(90^\circ-\theta)\cdot\cot(90^\circ-\theta)}{\cos(90^\circ-\theta)\cdot\sec(90^\circ-\theta)\cdot\tan\theta} + \dfrac{\cot\theta}{\tan(90-\theta)}$

$\Rightarrow \dfrac{\sec\theta\cdot\cos\theta\cdot\cancel{\tan\theta}}{\sin\theta\cdot\operatorname{cosec}\theta\cdot\cancel{\tan\theta}} + \dfrac{\cancel{\cot\theta}}{\cancel{\cot\theta}}$

$\Rightarrow \dfrac{\dfrac{1}{\cancel{\cos\theta}}\cdot\cancel{\cos\theta}}{\cancel{\sin\theta}\cdot\dfrac{1}{\cancel{\sin\theta}}} + 1$

$\Rightarrow 1+1$

$\Rightarrow 2$

Solution - 16 :-

(i) Sol : $\cos 63^\circ\cdot\sec(90^\circ-\theta) = 1$

$\Rightarrow \cos 63^\circ\cdot\operatorname{cosec}\theta = 1$

$\Rightarrow \cos 63^\circ = \dfrac{1}{\operatorname{cosec}\theta}$

$\Rightarrow \cos 63^\circ = \sin\theta$

$\Rightarrow \cos 63^\circ = \cos(90-\theta)$

$\therefore 90-\theta = 63^\circ$

$\theta = 90-63^\circ$

$\theta = 27^\circ$

(ii) $\tan 35^\circ \cdot \cot(90^\circ - \theta) = 1$

$$\cot(90^\circ - \theta) = \frac{1}{\tan 35^\circ}$$

$$\cot(90^\circ - \theta) = \cot 35^\circ$$

$$90^\circ - \theta = 35^\circ$$

$$\theta = 90 - 35^\circ$$

$$\theta = 55^\circ$$