

Ex # 9.3

Q.1-

		$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
	0°	30°	45°	60°	90°
$\sin$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞

c) $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin 30^\circ$
L.H.S.

$$= \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$$

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

$$= \frac{(\sqrt{3})^2}{4} - \frac{1}{4}$$

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

$$= \frac{3-1}{4} = \frac{2}{4} = \frac{1}{2} = \sin 30^\circ$$

= R.H.S.

$$ii) \sin^2 \frac{\pi}{6} + \sin^2 \frac{\pi}{3} + \tan^2 \frac{\pi}{4} = 2$$

L.H.S.

$$= \sin^2 \frac{\pi}{6} + \sin^2 \frac{\pi}{3} + \tan^2 \frac{\pi}{4}$$

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

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

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

$$= \frac{8}{4}$$

$$= 2$$

= R.H.S.

$$iii) 2 \sin 45^\circ + \frac{1}{2} \operatorname{cosec} 45^\circ = \frac{3}{\sqrt{2}}$$

L.H.S.

$$= 2 \sin 45^\circ + \frac{1}{2} \operatorname{cosec} 45^\circ$$

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

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

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

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

$$= R.H.S.$$

$$\text{Q.ii) } \sin^2 \frac{\pi}{6} : \sin^2 \frac{\pi}{4} : \sin^2 \frac{\pi}{3} : \sin^2 \frac{\pi}{2} = 1 : 2 : 3 : 4$$

$$L.H.S.$$

$$= \sin^2 \frac{\pi}{6} : \sin^2 \frac{\pi}{4} : \sin^2 \frac{\pi}{3} : \sin^2 \frac{\pi}{2}$$

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

$$= \frac{1}{4} : \frac{1}{2} : \frac{3}{4} : 1$$

$$= \frac{1 \times 1}{4} : \frac{2 \times 1}{2} : \frac{3 \times 1}{4} : 4 \times 1 \quad \text{Multiply by 4}$$

$$= 1 : 2 : 3 : 4$$

$$= R.H.S.$$

$$\frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$= \frac{(\sqrt{2})^2}{2\sqrt{2}}$$

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

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

Q22

$$i) \frac{\tan \frac{\pi}{3} - \tan \frac{\pi}{6}}{1 + \tan \frac{\pi}{3} \tan \frac{\pi}{6}}$$

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

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

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

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

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

Q2) (ii)

$$\frac{1 - \tan^2 \pi/3}{1 + \tan^2 \pi/3}$$

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

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

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

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

Q3:-

For $\theta = 30^\circ$

$$i) \sin 2\theta = 2 \sin \theta \cos \theta$$

$$\sin 2(30^\circ) = 2 \sin 30^\circ \cos 30^\circ$$

$$\sin 60^\circ = 2 \times \frac{1}{2} \times \frac{\sqrt{3}}{2}$$

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

Hence Proved

$$\frac{1}{0} = \infty \quad \frac{1}{\infty} = 0$$

For $\theta = 45^\circ$

$$1) \tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

$$\tan 2(45^\circ) = \frac{2 \tan 45^\circ}{1 - \tan^2 45^\circ}$$

$$\tan 90^\circ = \frac{2(1)}{1 - (1)^2}$$

$$\infty = \frac{2}{0}$$

$$\infty = \infty$$

Hence Proved

Q4:- Find x ,

$$\tan^2 45^\circ - \cos^2 60^\circ = x \sin 45^\circ \cos 45^\circ \tan 60^\circ$$

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

$$1 - \frac{1}{4} = x \frac{\sqrt{3}}{(\sqrt{2})^2}$$

$$\frac{4-1}{4} = x \frac{\sqrt{3}}{2}$$

$$\frac{3}{4} \times \frac{2}{\sqrt{3}} = x$$

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

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

Q5:-

i) $-\pi$

$$= \pi + (-1)2\pi$$

$$\theta = \pi$$

$\vec{z}$
 $\uparrow$
 $\theta + 2k\pi$

$$\pi - 2\pi$$

$$\pi + (-1)(2\pi)$$

$$\theta + k 2\pi$$

$$i^o) \pi$$

$$= \pi + (-2)2\pi$$

$$\theta = \pi$$

$$\sin(\pi) = 0, \quad \operatorname{cosec}(\pi) = 0$$

$$\cos(\pi) = -1, \quad \sec(\pi) = -1$$

$$\tan(\pi) = 0, \quad \cot(\pi) = 0$$

$$ii^o) \frac{5}{2}\pi$$

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

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

$$\sin \frac{\pi}{2} = 1$$

$$\operatorname{cosec} \frac{\pi}{2} = 1$$

$$\cos \frac{\pi}{2} = 0, \quad \sec \frac{\pi}{2} = 0$$

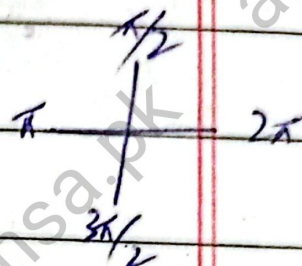
$$\tan \frac{\pi}{2} = \infty, \quad \cot \frac{\pi}{2} = 0$$

$$\begin{aligned} \sin(\pi) &= 0 \leftarrow \operatorname{cosec} \pi \\ \cos(\pi) &= -1 \leftarrow \sec \pi \\ \tan(\pi) &= 0 \leftarrow \cot \pi \end{aligned}$$

$$\begin{array}{r} 2 \overline{) 5} \\ \underline{-4} \\ 1 \end{array}$$

$$\frac{3\pi}{2}$$

$$2 \sqrt{9}$$



$$= \frac{3\pi}{2} + (-3)2\pi$$

$$\theta = \frac{3\pi}{2}$$

$$\frac{\frac{3}{2} - 6}{2} = \frac{3 - 12}{2} = \frac{-9}{2}$$

$$\sin \frac{3\pi}{2} = -1, \quad \operatorname{cosec} \frac{3\pi}{2} = -1$$

$$\cos \frac{3\pi}{2} = 0, \quad \sec \frac{3\pi}{2} = 0$$

$$\tan \frac{3\pi}{2} = \infty, \quad \cot \frac{3\pi}{2} = \infty$$

$$v) -15\pi$$

$$= \pi + (-8)2\pi$$

$$\sin \frac{0=\pi}{\pi} = 0, \quad \operatorname{cosec} \pi = 0$$

$$\cos \pi = -1, \quad \sec \pi = -1$$

$$\tan \pi = 0, \quad \cot \pi = 0$$

$$\begin{aligned}
 \text{vi)} \quad & 1530^\circ \\
 & = 90^\circ + 1440^\circ \rightarrow 2\pi \\
 & = 90^\circ + 4(360^\circ)
 \end{aligned}$$

$$\theta = 90^\circ$$

$$\sin 90^\circ = 1, \quad \operatorname{cosec} 90^\circ = 1$$

$$\cos 90^\circ = 0, \quad \sec 90^\circ = 0$$

$$\tan 90^\circ = \infty, \quad \cot 90^\circ = 0$$

$$\begin{aligned}
 \text{vii)} \quad & -2430^\circ \\
 & = 90^\circ + (-7) 360^\circ \\
 & \theta = 90^\circ
 \end{aligned}$$

$$\sin 90^\circ = 1, \quad \operatorname{cosec} 90^\circ = 1$$

$$\cos 90^\circ = 0, \quad \sec 90^\circ = 0$$

$$\tan 90^\circ = \infty, \quad \cot 90^\circ = 0$$

$$V_{III}) \frac{235\pi}{2}$$

$$\begin{array}{r} 21150 \\ - 20880 \\ \hline 270 \end{array}$$

$$= \frac{3\pi}{2} + 58(2\pi)$$

$$\theta = \frac{3\pi}{2}$$

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

$$\operatorname{cosec} \frac{3\pi}{2} = -1$$

$$\cos \frac{3\pi}{2} = 0$$

$$\sec \frac{3\pi}{2} = \infty$$

$$\tan \frac{3\pi}{2} = \infty$$

$$\cot \frac{3\pi}{2} = 0$$

$$ix) \frac{407\pi}{2}$$

$$\begin{array}{r} 396630 \\ 270 \\ \hline +1101(360^\circ) \end{array}$$

$$= \frac{3\pi}{2} + 1101(2\pi)$$

$$\theta = \frac{3\pi}{2}$$

Same as above

Q6:-

$$i) 390^\circ$$

$$= 30^\circ + (1) 360^\circ$$

$$\theta = 30^\circ$$

$$\sin 30^\circ = \frac{1}{2}$$

$$\operatorname{cosec} 30^\circ = 2$$

$$\cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$\sec 30^\circ = \frac{2}{\sqrt{3}}$$

$$\tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\cot \theta = \sqrt{3}$$

$$ii) -675^\circ$$

$$= 45^\circ + (-2) 360^\circ$$

$$\theta = 45^\circ$$

$$\sin 45^\circ = \frac{1}{\sqrt{2}}$$

$$\operatorname{cosec} 45^\circ = \sqrt{2}$$

$$\cos 45^\circ = \frac{1}{\sqrt{2}}$$

$$\sec 45^\circ = \sqrt{2}$$

$$\tan 45^\circ = 1$$

$$\cot 45^\circ = 1$$

-1020

$$60^\circ + (-3)360^\circ$$

$$v) \frac{-17\pi}{3}$$

$$= \frac{\pi}{3} + (-3)2\pi$$

$$\theta = \frac{\pi}{3}$$

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

$$\operatorname{cosec} \frac{\pi}{3} = \frac{2}{\sqrt{3}}$$

$$\cos \frac{\pi}{3} = \frac{1}{2}$$

$$\sec \frac{\pi}{3} = 2$$

$$\tan \frac{\pi}{3} = \sqrt{3}$$

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

