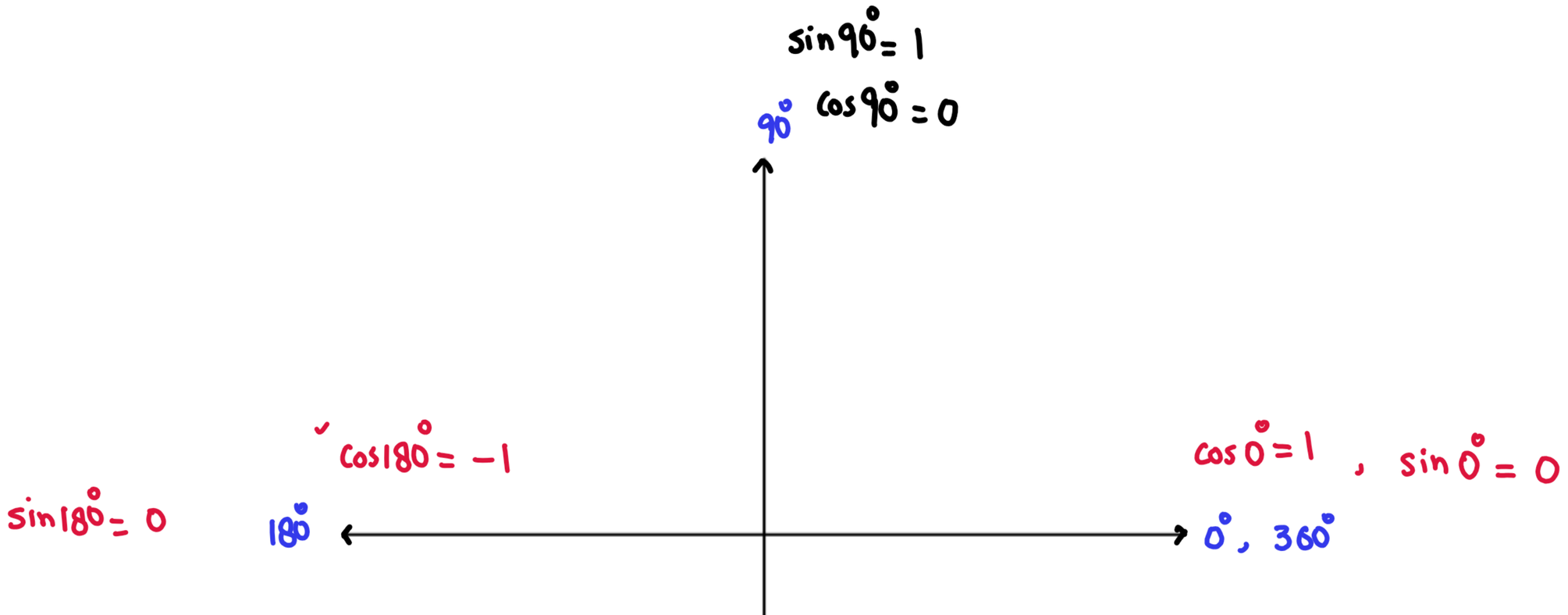
Exercise 9.3

	$0^\circ = 0$	$30^\circ = \frac{\pi}{6}$	$45^\circ = \frac{\pi}{4}$	$60^\circ = \frac{\pi}{3}$	$90^\circ = \frac{\pi}{2}$
	$\sqrt{\frac{0}{4}}$	$\sqrt{\frac{1}{4}} = \frac{1}{2}$	$\sqrt{\frac{2}{4}}_2$	$\sqrt{\frac{3}{4}}$	$\sqrt{\frac{4}{4}}$
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	undefined.

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

$\frac{1}{0}$



Exercise 9.3

Q1 Verify the following:

(i) $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin 30^\circ$

L.H.S

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

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

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

$$= \frac{1}{2} = \sin 30^\circ \quad = \text{R.H.S}$$

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

L.H.S

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

$$= \sin^2 30^\circ + \sin^2 60^\circ + \tan^2 45^\circ$$

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

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

$$= \frac{1+3+4}{4} = \frac{8}{4} = 2 \quad = \text{R.H.S}$$

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

L.H.S

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

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

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

$$= \frac{4+2}{2\sqrt{2}} = \frac{\overset{3}{\cancel{6}}}{\cancel{2}\sqrt{2}} = \frac{3}{\sqrt{2}}$$ = R.H.S

(iv) $\sin^2\frac{\pi}{6} : \sin^2\frac{\pi}{4} : \sin^2\frac{\pi}{3} : \sin^2\frac{\pi}{2} = 1:2:3:4$ ✓

L.H.S

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

$$\sin^2 30^\circ : \sin^2 45^\circ : \sin^2 60^\circ : \sin^2 90^\circ$$

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

✓

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

Multiply by 4

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

$$1 : 2 : 3 : 4$$ = R.H.S

(2) Evaluate the following:

$$\tan 60 = \frac{\sin 60}{\cos 60} = \frac{\sqrt{3}/2}{1/2}$$

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

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

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

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

$$= \frac{2}{\sqrt{3}} \times \frac{1}{2} = \frac{1}{\sqrt{3}} \quad \text{Ans.}$$

(ii) $$\frac{1 - \tan^2\frac{\pi}{3}}{1 + \tan^2\frac{\pi}{3}}$$

$$= \frac{1 - \tan^2 60^\circ}{1 + \tan^2 60^\circ} = \frac{1 - (\sqrt{3})^2}{1 + (\sqrt{3})^2}$$

$$= \frac{1-3}{1+3} = -\frac{2}{4} = -\frac{1}{2} \quad \text{Ans.}$$

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