

Q.1

find the value of the following trigonometric ratios without using the calculator.

(i) $\sin 30^\circ$

Ans:

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

(ii) $\cos 30^\circ$

Ans:

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

(iii) $\tan \frac{\pi}{6}$

Ans:

$$\tan \frac{\pi}{6} = \frac{1}{\sqrt{3}}$$

(iv) $\tan 60^\circ$

Ans:

$$\tan \frac{\pi}{6} = \frac{1}{\sqrt{3}}$$

(v) $\sec 60^\circ$

Ans:

$$\sec 60^\circ = 2$$

(vi) $\cos \frac{\pi}{3}$

Ans:

$$\sec 60^\circ = \frac{1}{2}$$

(vii) $\cot 60^\circ$

Ans:

$$\cot 60^\circ = \frac{1}{\sqrt{3}}$$

(viii) $\sin 60^\circ$

Ans:

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

(ix) $\sec 30^\circ$

Ans:

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

(x) $\operatorname{cosec} 30^\circ$

Ans:

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

(xi) $\sin 45^\circ$

Ans:

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

(xii) $\cos \frac{\pi}{4}$

Ans:

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

Q.2 Evaluate:

(i) $2 \sin 60^\circ \cos 60^\circ$

Ans:

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

(ii) $2 \cos \frac{\pi}{6} \sin \frac{\pi}{6}$

Ans:

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

(iii) $2 \sin 45^\circ + 2 \cos 45^\circ$

Ans:

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

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

(iv) $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$

Ans:

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

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

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

(v) $\cos 60^\circ \cos 30^\circ - \sin 60^\circ \sin 30^\circ$

Ans:

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

$$= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = 0$$

(vi) $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$

Ans:

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

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

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

(vii) $\cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ$

Ans:

$$\begin{aligned} &= \frac{1}{2} \times \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} \cdot \frac{1}{2} = \frac{\sqrt{3}}{4} + \frac{\sqrt{3}}{4} \\ &= \frac{\sqrt{3} + \sqrt{3}}{4} = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2} \end{aligned}$$

(viii) $\tan \frac{\pi}{6} \cot \frac{\pi}{6} + 1$

Ans:

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

Q.3 If $\sin \frac{\pi}{4}$ and $\cos \frac{\pi}{4}$ equal to $\frac{1}{\sqrt{2}}$ each, then find the value of the following:

(i) $2\sin 45^\circ - 2\cos 45^\circ$

Ans:

$$\begin{aligned} &= 2 \frac{1}{\sqrt{2}} - 2 \frac{1}{\sqrt{2}} \\ &= \frac{2-2}{\sqrt{2}} = \frac{0}{\sqrt{2}} = 0 \end{aligned}$$

(ii) $3\cos 45^\circ + 4\sin 45^\circ$

Ans:

$$\begin{aligned} &= 3 \frac{1}{\sqrt{2}} + 4 \times \frac{1}{\sqrt{2}} \\ &= \frac{3+4}{\sqrt{2}} = \frac{7}{\sqrt{2}} \end{aligned}$$

(iii) $5\cos 45^\circ - 3\sin 45^\circ$

Ans:

$$\begin{aligned} &= 5 \times \frac{1}{\sqrt{2}} - 3 \times \frac{1}{\sqrt{2}} \\ &= \frac{5-3}{\sqrt{2}} = \frac{2}{\sqrt{2}} \\ &= \frac{2}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{(\sqrt{2})^2} \\ &= \frac{2\sqrt{2}}{2} = \sqrt{2} \end{aligned}$$