

Exercise 9.3

1. Prove that following:

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

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

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

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

Solution:

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

$$\text{L.H.S} = \sin 60^\circ \cdot \cos 30^\circ - \cos 60^\circ \cdot \sin 30^\circ$$

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

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

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

Hence proved $\text{L.H.S} = \text{R.H.S}$

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

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

$$\text{L.H.S} = \sin^2 \frac{\pi}{6} + \sin^2 \frac{\pi}{3} + \tan^2 \frac{\pi}{4}$$

$$\begin{aligned}
 &= \left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + (1)^2 \\
 &= \frac{1}{4} + \frac{3}{4} + 1 \\
 &= \frac{1+3+4}{4} = \frac{8}{4} = 2 = R.H.S
 \end{aligned}$$

Hence proved: L.H.S = R.H.S

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

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

$$\begin{aligned}
 \text{L.H.S} &= 2 \sin 45^\circ + \frac{1}{2} \operatorname{cosec} 45^\circ \\
 &= 2 \cdot \frac{1}{\sqrt{2}} + \frac{1}{2} \cdot \sqrt{2} \\
 &= \frac{2}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{2+1}{\sqrt{2}} = \frac{3}{\sqrt{2}} = R.H.S
 \end{aligned}$$

Hence proved L.H.S = R.H.S

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

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

$$\text{L.H.S} = \sin^2 \frac{\pi}{6} : \sin^2 \frac{\pi}{4} : \sin^2 \frac{\pi}{3} : \sin^2 \frac{\pi}{2}$$

$$\begin{aligned}
 &= \left(\frac{1}{2}\right)^2 : \left(\frac{1}{\sqrt{2}}\right)^2 : \left(\frac{\sqrt{3}}{2}\right)^2 : (1)^2 \\
 &= \frac{1}{4} : \frac{1}{2} : \frac{3}{4} : 1 \\
 &= \frac{1}{4} \times 4 : \frac{1}{2} \times 4 : \frac{3}{4} \times 4 : 1 \times 4 \\
 &= 1 : 2 : 3 : 4
 \end{aligned}$$

Hence proved L.H.S = R.H.S

$$\sin^2 \frac{\pi}{6} : \sin^2 \frac{\pi}{4} : \sin^2 \frac{\pi}{3} : \sin^2 \frac{\pi}{2} = 1 : 2 : 3 : 4$$

2. Evaluate the following:

$$\text{i. } \frac{\tan \frac{\pi}{3} - \tan \frac{\pi}{6}}{1 + \tan \frac{\pi}{3} \tan \frac{\pi}{6}} \quad \text{ii. } \frac{1 - \tan^2 \frac{\pi}{3}}{1 + \tan^2 \frac{\pi}{3}}$$

Solution:

$$\begin{aligned}
 \text{i. } &\frac{\tan \frac{\pi}{3} - \tan \frac{\pi}{6}}{1 + \tan \frac{\pi}{3} \tan \frac{\pi}{6}} \\
 &= \frac{\sqrt{3} - \frac{1}{\sqrt{3}}}{1 + \sqrt{3} \cdot \frac{1}{\sqrt{3}}} \\
 &= \frac{3-1}{\sqrt{3}+1}
 \end{aligned}$$

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

Hence; $\frac{\tan \frac{\pi}{3} - \tan \frac{\pi}{6}}{1 + \tan \frac{\pi}{3} \tan \frac{\pi}{6}} = \frac{1}{\sqrt{3}}$

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

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

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

Hence; $\frac{1 - \tan^2 \frac{\pi}{3}}{1 + \tan^2 \frac{\pi}{3}} = -\frac{1}{2}$

3. Verify the following when $\theta = 30^\circ, 45^\circ$

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

ii. $\cos 2\theta = \cos^2 \theta - \sin^2 \theta$

iii. $\cos 2\theta = 2 \cos^2 \theta - 1$

iv. $\cos 2\theta = 1 - 2 \sin^2 \theta$

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

Solution:

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

Let $\theta = 30^\circ$

$$\text{L.H.S} = \sin 2\theta$$

$$= \sin 2(30)^\circ = \sin 60^\circ = \frac{\sqrt{3}}{2}$$

$$\text{R.H.S} = 2 \cdot \sin \theta \cdot \cos \theta$$

$$= \sin 30^\circ \cdot \cos 30^\circ$$

$$= 2 \cdot \frac{1}{2} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2} = \text{L.H.S}$$

And

Let $\theta = 45^\circ$

$$\text{L.H.S} = \sin 2\theta$$

$$= \sin 2(45)^\circ = \sin 90^\circ = 1$$

$$\text{R.H.S} = 2 \cdot \sin \theta \cdot \cos \theta = 2 \sin 45^\circ \cdot \cos 45^\circ$$

$$= 2 \cdot \frac{1}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}} = 2 \cdot \frac{1}{2} = 1 = \text{L.H.S}$$

Hence proved L.H.S = R.H.S

$$\sin 2\theta = 2 \sin \theta \cdot \cos \theta$$

ii. $\cos 2\theta = \cos^2 \theta - \sin^2 \theta$

$$\text{L.H.S} = \cos 2\theta$$

Let $\theta = 30$

$$= \cos 2(30)$$

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

$$\text{R.H.S} = \cos^2 \theta - \sin^2 \theta$$

$$\begin{aligned}
 &= (\cos 30^\circ)^2 - (\sin 30^\circ)^2 \\
 &= \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2 \\
 &= \frac{3}{4} - \frac{1}{4} = \frac{3-1}{4} = \frac{2}{4} = \frac{1}{2} = L.H.S
 \end{aligned}$$

And let $\theta = 45^\circ$

$$\begin{aligned}
 L.H.S &= \cos 2\theta \\
 &= \cos 2(45^\circ) = \cos 90^\circ = 0
 \end{aligned}$$

$$\begin{aligned}
 R.H.S &= \cos^2 \theta - \sin^2 \theta = \cos^2 45^\circ - \sin^2 45^\circ \\
 &= \left(\frac{1}{\sqrt{2}}\right)^2 - \left(\frac{1}{\sqrt{2}}\right)^2 \\
 &= \frac{1}{2} - \frac{1}{2} = 0 = L.H.S
 \end{aligned}$$

Hence proved L.H.S = R.H.S

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$

iii. $\cos 2\theta = 2\cos^2 \theta - 1$

Let $\theta = 30^\circ$

$$\begin{aligned}
 L.H.S &= \cos 2\theta \\
 &= \cos 2(30^\circ) = \cos 60^\circ = \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 R.H.S &= 2\cos^2 \theta - 1 \\
 &= 2\cos^2 30^\circ - 1
 \end{aligned}$$

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

$$= 2 \times \frac{3}{4} - 1 = \frac{3}{2} - 1 = \frac{3-2}{2} = \frac{1}{2} = L.H.S$$

And let $\theta = 45^\circ$

$$\begin{aligned} \text{L.H.S} &= \cos 2\theta \\ &= \cos 2(45^\circ) = \cos 90^\circ = 0 \end{aligned}$$

$$\begin{aligned} \text{R.H.S} &= 2\cos^2 \theta - 1 \\ &= 2(\cos 45^\circ)^2 - 1 \\ &= \left(\frac{1}{\sqrt{2}}\right)^2 - 1 \\ &= 2 \cdot \frac{1}{2} - 1 \\ &= 1 - 1 = 0 = \text{L.H.S} \end{aligned}$$

Hence proved; L.H.S = R.H.S

$$\cos 2\theta = 2\cos^2 \theta - 1$$

iv. $\cos 2\theta = 1 - 2\sin^2 \theta$

Let $\theta = 30^\circ$

$$\begin{aligned} \text{L.H.S} &= \cos 2\theta \\ &= \cos(2)(30^\circ) = \cos 60^\circ = \frac{1}{2} \end{aligned}$$

$$\text{R.H.S} = 1 - 2\sin^2 \theta$$

$$\begin{aligned}
 &= 1 - 2 \sin(30^\circ)^2 \\
 &= 1 - 2 \left(\frac{1}{2}\right)^2 \\
 &= 1 - 2 \left(\frac{1}{4}\right) = 1 - \frac{1}{2} = \frac{2-1}{2} = \frac{1}{2} = R.H.S
 \end{aligned}$$

And Let $\theta = 45^\circ$

$$\begin{aligned}
 L.H.S &= \cos 2(45^\circ) \\
 &= \cos 90^\circ = 0 \\
 R.H.S &= 1 - 2 \sin^2 \theta \\
 &= 1 - 2(\sin 45^\circ)^2 \\
 &= 1 - 2 \left(\frac{1}{\sqrt{2}}\right)^2 \\
 &= 1 - 2 \cdot \frac{1}{2} = 1 - 1 = 0 = R.H.S
 \end{aligned}$$

$$L.H.S = R.H.S$$

$$\cos 2\theta = 1 - 2 \sin^2 \theta$$

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

Let $\theta = 30^\circ$

$$\begin{aligned}
 L.H.S &= \tan 2\theta \\
 &= \tan^2(30^\circ) = \tan 60^\circ = \sqrt{3}
 \end{aligned}$$

$$\begin{aligned} \text{R.H.S} &= \frac{2 \tan \theta}{1 - \tan^2 \theta} = \frac{2 \tan(30^\circ)}{1 - (\tan 30^\circ)^2} \\ &= \frac{2\left(\frac{1}{\sqrt{3}}\right)}{1 - \frac{1}{3}} = \frac{\frac{2}{\sqrt{3}}}{\frac{3-1}{3}} \\ &= \frac{2}{\sqrt{3}} \cdot \frac{3}{2} = \sqrt{3} = \text{L.H.S} \end{aligned}$$

And let $\theta = 45^\circ$

$$\text{L.H.S} = \tan 2(45^\circ) = \tan 90^\circ = \infty$$

$$\begin{aligned} \text{R.H.S} &= \frac{2 \tan \theta}{1 - \tan^2 \theta} = \frac{2 \tan 45^\circ}{1 - \tan^2 45^\circ} \\ &= \frac{2\left(\frac{1}{1}\right)}{1 - \left(\frac{1}{1}\right)^2} = \frac{2}{1-1} = \frac{2}{0} = \infty = \text{R.H.S} \end{aligned}$$

Hence proved L.H.S=R.H.S

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

4. Find x, if $\tan^2 45^\circ - \cos^2 60^\circ = x \sin 45^\circ \tan 60^\circ$.

Solution:

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

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

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

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

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

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

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

5. Find the values of the trigonometric functions of the following quadrantal angles:

i. $-\pi$ ii. -3π iii. $\frac{5}{2}\pi$ iv. $-\frac{9}{2}\pi$

v. -15π vi. 1530° vii. -2430° viii. $\frac{235}{2}\pi$ ix. $\frac{407}{2}\pi$

Solution:

i. $-\pi$

a) $\cos(-\pi) = +\cos(\pi) = -1$

b) $\sin(-\pi) = -\sin(\pi) = 0$

c) $\tan(-\pi) = -\tan(\pi) = 0$

d) $\operatorname{cosec}(-\pi) = -\operatorname{cosec}(\pi) = \infty$

e) $\sec(-\pi) = \sec(\pi) = -1$

f) $\cot(-\pi) = -\cot(\pi) = \infty$

ii. -3π

a) $\cos(-3\pi) = \cos(3\pi) = -1$

b) $\sin(-3\pi) = -\sin(3\pi) = 0$

c) $\tan(-3\pi) = -\tan(3\pi) = 0$

d) $\sec(-3\pi) = \sec(3\pi) = -1$

e) $\operatorname{cosec}(-3\pi) = -\operatorname{cosec}(3\pi) = \infty$

f) $\cot(-3\pi) = -\cot(3\pi) = \infty$

iii. $\frac{5}{2}\pi$

a) $\sin 5\left(\frac{\pi}{2}\right) = 1$

b) $\cos 5\left(\frac{\pi}{2}\right) = 0$

c) $\tan 5\left(\frac{\pi}{2}\right) = \infty$

d) $\operatorname{cosec} 5\left(\frac{\pi}{2}\right) = 1$

e) $\sec 5\left(\frac{\pi}{2}\right) = \infty$

f) $\cot 5\left(\frac{\pi}{2}\right) = 0$

iv. $\frac{9}{2}\pi$

$$\text{a) } \sin\left(-9\frac{\pi}{2}\right) = -\sin 9\left(\frac{\pi}{2}\right) = -1$$

$$\text{b) } \cos\left(-9\frac{\pi}{2}\right) = \cos 9\left(\frac{\pi}{2}\right) = 0$$

$$\text{c) } \tan\left(-9\frac{\pi}{2}\right) = -\tan 9\left(\frac{\pi}{2}\right) = \infty$$

$$\text{d) } \operatorname{cosec}\left(-9\frac{\pi}{2}\right) = -\operatorname{cosec} 9\left(\frac{\pi}{2}\right) = -1$$

$$\text{e) } \sec\left(-9\frac{\pi}{2}\right) = \sec 9\left(\frac{\pi}{2}\right) = \infty$$

$$\text{f) } \cot\left(-9\frac{\pi}{2}\right) = -\cot 9\left(\frac{\pi}{2}\right) = 0$$

v. -15π

$$\text{a) } \cos(-15\pi) = \cos(15\pi) = -1$$

$$\text{b) } \sin(-15\pi) = -\sin(15\pi) = 0$$

$$\text{c) } \tan(-15\pi) = -\tan(15\pi) = 0$$

$$\text{d) } \operatorname{cosec}(-15\pi) = -\operatorname{cosec}(15\pi) = \infty$$

$$\text{e) } \sec(-15\pi) = \sec(15\pi) = -1$$

$$\text{f) } \cot(-15\pi) = -\cot(15\pi) = \infty$$

vi. 1530°

$$1530^\circ = 4(360)^\circ + 90^\circ = 90^\circ$$

The values of the trigonometric function is same as 90°

$$\text{a) } \cos(90^\circ) = 0$$

- b) $\sin(90^\circ) = 1$
- c) $\tan(90^\circ) = \infty$
- d) $\sec(90^\circ) = \infty$
- e) $\operatorname{cosec}(90^\circ) = 1$
- f) $\cot(90^\circ) = 0$

vii. -2430°

$$-2430^\circ = -7(360^\circ) + 90 = 90^\circ$$

The values of trigonometric function is same as 90° .

- a) $\sin 90^\circ = 1$
- b) $\cos 90^\circ = 0$
- c) $\tan 90^\circ = \infty$
- d) $\operatorname{cosec} 90^\circ = 1$
- e) $\sec 90^\circ = \infty$
- f) $\cot 90^\circ = 0$

viii. $\frac{235}{2}\pi$

$$\frac{235}{2}\pi = 116\pi + 3\frac{\pi}{2} = 58(2\pi) + \left(3\frac{\pi}{2}\right)$$

The values of trigonometric function is same as $3\frac{\pi}{2}$.

- a) $\sin\left(3\frac{\pi}{2}\right) = -1$

$$\text{b) } \cos\left(3\frac{\pi}{2}\right) = 0$$

$$\text{c) } \tan\left(3\frac{\pi}{2}\right) = \infty$$

$$\text{d) } \operatorname{cosec}\left(3\frac{\pi}{2}\right) = -1$$

$$\text{e) } \sec\left(3\frac{\pi}{2}\right) = \infty$$

$$\text{f) } \cot\left(3\frac{\pi}{2}\right) = 0$$

$$\text{ix. } \frac{407}{2}\pi$$

$$\frac{407}{2}\pi = 203\pi + \frac{\pi}{2}$$

$$= 202\pi + 3\frac{\pi}{2}$$

The values of the trigonometric function is same as $3\frac{\pi}{2}$

$$\text{a) } \sin\left(3\frac{\pi}{2}\right) = -1$$

$$\text{b) } \cos\left(3\frac{\pi}{2}\right) = 0$$

$$\text{c) } \tan\left(3\frac{\pi}{2}\right) = \infty$$

$$\text{d) } \operatorname{cosec}\left(3\frac{\pi}{2}\right) = -1$$

$$e) \quad \sec\left(3\frac{\pi}{2}\right) = \infty$$

$$f) \quad \cot\left(3\frac{\pi}{2}\right) = 0$$

6. Find the values of the trigonometric functions of the following angles:

$$i. \quad 390^\circ \quad ii. \quad -330^\circ \quad iii. \quad 765^\circ$$

$$iv. \quad -675^\circ \quad v. \quad \frac{-17}{3}\pi \quad vi. \quad \frac{13}{3}\pi$$

$$vii. \quad \frac{25}{6}\pi \quad viii. \quad \frac{-71}{6}\pi \quad ix. \quad -1035^\circ$$

Solution:

$$i. \quad 390^\circ$$

$$390^\circ = 360^\circ + 30^\circ = 30^\circ$$

The values of trigonometric function is same as 30° .

$$i. \quad \sin 30^\circ = \frac{1}{2} \quad ; \quad \operatorname{cosec} 30^\circ = 2$$

$$ii. \quad \cos 30^\circ = \frac{\sqrt{3}}{2} \quad ; \quad \sec 30^\circ = \frac{2}{\sqrt{3}}$$

$$iii. \quad \tan 30^\circ = \frac{1}{\sqrt{3}} \quad ; \quad \cot 30^\circ = \sqrt{3}$$

$$ii. \quad -330^\circ$$

$$-330^\circ = -360^\circ + 30^\circ = 30^\circ$$

The values of trigonometric function is same as 30°

$$\text{i.} \quad \sin 30^\circ = \frac{1}{2} \quad ; \quad \operatorname{cosec} 30^\circ = 2$$

$$\text{ii.} \quad \cos 30^\circ = \frac{\sqrt{3}}{2} \quad ; \quad \sec 30^\circ = \frac{2}{\sqrt{3}}$$

$$\text{iii.} \quad \tan 30^\circ = \frac{1}{\sqrt{3}} \quad ; \quad \cot 30^\circ = \sqrt{3}$$

iii. 765°

$$\begin{aligned} 765^\circ &= 720^\circ + 45^\circ \\ &= 2(360^\circ) + 45^\circ = 45^\circ \end{aligned}$$

The values of the trigonometric function is same as 45°

$$\text{i.} \quad \sin 45^\circ = \frac{1}{\sqrt{2}} \quad ; \quad \operatorname{cosec} 45^\circ = \sqrt{2}$$

$$\text{ii.} \quad \cos 45^\circ = \frac{1}{\sqrt{2}} \quad ; \quad \sec 45^\circ = \sqrt{2}$$

$$\text{iii.} \quad \tan 45^\circ = 1 \quad ; \quad \cot 45^\circ = 1$$

iv. -675°

$$\begin{aligned} -675^\circ &= -720^\circ + 45^\circ \\ &= -2(360^\circ) + 45^\circ = 45^\circ \end{aligned}$$

The values of trigonometric function is same as 45°

$$\text{i.} \quad \sin 45^\circ = \frac{1}{\sqrt{2}} \quad ; \quad \operatorname{cosec} 45^\circ = \sqrt{2}$$

$$\text{ii.} \quad \cos 45^\circ = \frac{1}{\sqrt{2}} \quad ; \quad \sec 45^\circ = \sqrt{2}$$

$$\text{iii. } \tan 45^\circ = 1 \quad ; \quad \cot 45^\circ = 1$$

$$\text{v. } \frac{-17}{3}\pi$$

$$\frac{-17}{3}\pi = -6\pi + \frac{\pi}{3}$$

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

The values of trigonometric function is same as $\frac{\pi}{3}$

$$\text{i. } \sin \frac{\pi}{3} = \frac{\sqrt{3}}{2} \quad ; \quad \operatorname{cosec} \frac{\pi}{3} = \frac{2}{\sqrt{3}}$$

$$\text{ii. } \cos \frac{\pi}{3} = \frac{1}{2} \quad ; \quad \sec \frac{\pi}{3} = 2$$

$$\text{iii. } \tan \frac{\pi}{3} = \sqrt{3} \quad ; \quad \cot \frac{\pi}{3} = \frac{1}{\sqrt{3}}$$

$$\text{vi. } \frac{13}{3}\pi$$

$$\frac{13}{3}\pi = 4\pi + \frac{\pi}{3} = 2(2\pi) + \frac{\pi}{3} = \frac{\pi}{3}$$

The values of trigonometric function is same as $\frac{\pi}{3}$ or (60°)

$$\text{i. } \sin \frac{\pi}{3} = \frac{\sqrt{3}}{2} \quad ; \quad \operatorname{cosec} \frac{\pi}{3} = \frac{2}{\sqrt{3}}$$

$$\text{ii. } \cos \frac{\pi}{3} = \frac{1}{2} \quad ; \quad \sec \frac{\pi}{3} = 2$$

$$\text{iii. } \tan \frac{\pi}{3} = \sqrt{3} \quad ; \quad \cot \frac{\pi}{3} = \frac{1}{\sqrt{3}}$$

$$\text{vii. } \frac{25}{6}\pi$$

$$25\frac{\pi}{6} = 4\pi + \frac{\pi}{6} = 2(2\pi) + \frac{\pi}{6} = \frac{\pi}{6}$$

The values of trigonometric function is same as $\frac{\pi}{6}$ or 30°

$$\text{i. } \sin \frac{\pi}{6} = \frac{1}{2} \quad ; \quad \csc \frac{\pi}{6} = 2$$

$$\text{ii. } \cos \frac{\pi}{6} = \frac{\sqrt{3}}{2} \quad ; \quad \sec \frac{\pi}{6} = \frac{2}{\sqrt{3}}$$

$$\text{iii. } \tan \frac{\pi}{6} = \frac{1}{\sqrt{3}} \quad ; \quad \cot \frac{\pi}{6} = \sqrt{3}$$

$$\text{viii. } \frac{-71}{6}$$

$$\frac{-71}{6}\pi = -6(2\pi) + \frac{\pi}{6} = \frac{\pi}{6}$$

The values of trigonometric function is same as $\frac{\pi}{6}$.

$$\text{i. } \sin \frac{\pi}{6} = \frac{1}{2} \quad ; \quad \csc \frac{\pi}{6} = 2$$

$$\text{ii. } \cos \frac{\pi}{6} = \frac{\sqrt{3}}{2} \quad ; \quad \sec \frac{\pi}{6} = \frac{2}{\sqrt{3}}$$

$$\text{iii. } \tan \frac{\pi}{6} = \frac{1}{\sqrt{3}} \quad ; \quad \cot \frac{\pi}{6} = \sqrt{3}$$

ix. -1035°

$$= -3(360^\circ) + 45^\circ = 45^\circ$$

The values of trigonometric function is same as 45°

i. $\sin 45^\circ = \frac{1}{\sqrt{2}}$; $\operatorname{cosec} 45^\circ = \sqrt{2}$

ii. $\cos 45^\circ = \frac{1}{\sqrt{2}}$; $\sec 45^\circ = \sqrt{2}$

iii. $\tan 45^\circ = 1$; $\cot 45^\circ = 1$

