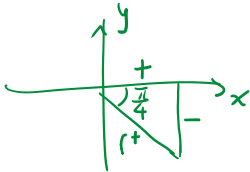
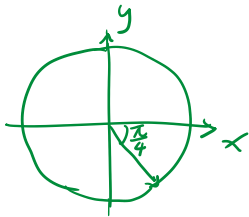


X. Trig Fctrs (Complete)

eg. Evaluate $\tan \frac{7\pi}{4}$.

Sol:



$$\frac{7\pi}{4} \text{ connects to } \frac{2\pi}{4} \downarrow \frac{8\pi}{4} : \frac{7\pi}{4} = \frac{8\pi}{4} - \frac{\pi}{4}$$

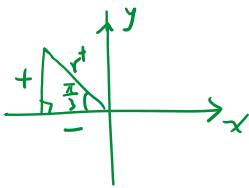
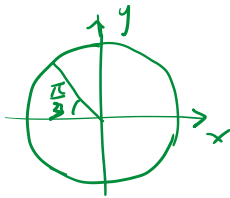


$$\tan \frac{7\pi}{4} = \tan \frac{\pi}{4} \text{ in r.q.}$$

$$= \boxed{-1}$$

eg. Evaluate $\csc \frac{2\pi}{3}$.

Sol:



$$\frac{2\pi}{3} \text{ connects to } \frac{\pi}{3} \curvearrowright \downarrow \frac{3\pi}{3} : \frac{2\pi}{3} = \frac{3\pi}{3} - \frac{\pi}{3}$$



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

$$= \frac{1}{\sin \frac{\pi}{3}} \text{ in r.q.}$$

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

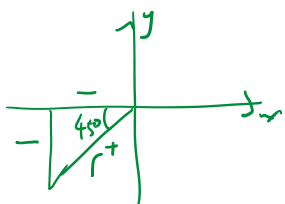
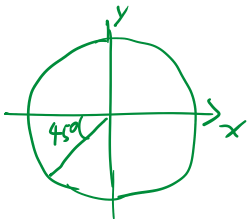
$$\leftarrow 1 \cdot \frac{2}{\sqrt{3}}$$

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

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

eg. Evaluate $\cot 225^\circ$.

Sol:



225° connects to 180° (or 270°):

$$225 = 180^\circ + 45^\circ$$



$$\cot 225^\circ = \frac{1}{\tan 225^\circ}$$

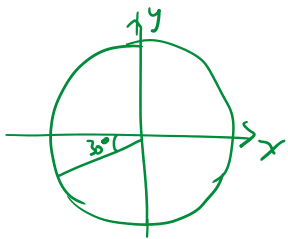
$$= \frac{1}{\tan 45^\circ} \text{ in r.a.}$$

$$= \frac{1}{1}$$

$$= \boxed{1}$$

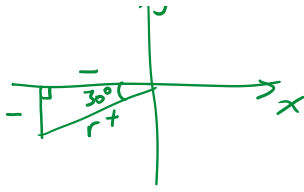
eg. Evaluate $\sec 210^\circ$.

Sol:



210° connects to 180° : $210^\circ = 180^\circ + 30^\circ$





$$\begin{aligned} \sec 210^\circ &= \frac{1}{\cos 210^\circ} \\ &= \frac{1}{\cos 30^\circ \text{ in r.a.}} \\ &= \frac{1}{-\frac{\sqrt{3}}{2}} \\ &= -\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\ &= \boxed{-\frac{2\sqrt{3}}{3}} \end{aligned}$$

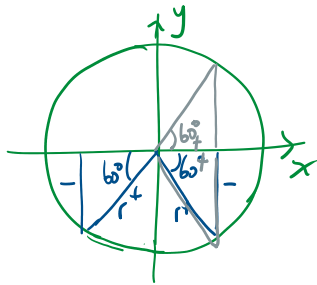
"easier"
↓

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

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

eg. If $\sin(t) = -\frac{\sqrt{3}}{2}$ and $\cos(t) = \frac{1}{2}$, find $\sec(t)$, $\csc(t)$, $\tan(t)$, $\cot(t)$.

sol:

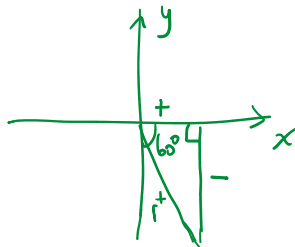


$$\sin(t) = -\frac{\sqrt{3}}{2}, \quad \cos(t) = \frac{1}{2}$$

$$\sin ? = \frac{\sqrt{3}}{2}, \quad \cos ? = \frac{1}{2}$$

$60^\circ \qquad \qquad \qquad 60^\circ$

$$\sin 60^\circ = -\frac{\sqrt{3}}{2} \text{ in r.a.}, \quad \cos 60^\circ = \frac{1}{2} \text{ in r.a.}$$



Thus, $t = 60^\circ$ in r.a. above

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

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

$$\csc 60^\circ = \frac{1}{\sin 60^\circ} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{-\frac{2\sqrt{3}}{3}}$$

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

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