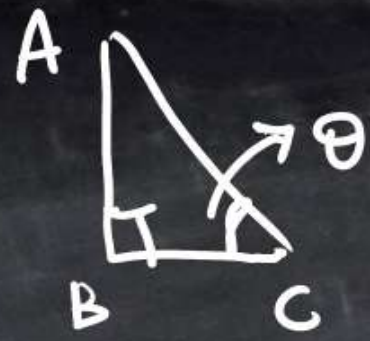




$$\sin \theta = \frac{p}{h}$$

$$\cos \theta = \frac{b}{h}$$

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

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{b}{p}$$

$$\operatorname{cosec} \theta = \frac{1}{\sin \theta} = \frac{h}{p}$$

$$\sec \theta = \frac{1}{\cos \theta} = \frac{h}{b}$$

Trigonometry ✓

0 ≠ Not def.

$$\sin \theta = \frac{1}{\operatorname{cosec} \theta}$$

Always true. ✓

~~True~~ False

$$\theta = 0^\circ \quad \text{LHS} = \sin 0^\circ = 0$$

$$\text{RHS} = \frac{1}{\operatorname{cosec} 0^\circ} = \frac{1}{\text{Not def'n.}}$$

$$\operatorname{cosec} \theta = \frac{1}{\sin \theta}$$

Always true.

$\theta \neq 0$ $\theta = \frac{1}{0} \times$

$$\boxed{\theta \neq 0^\circ}$$

$$F(x) = G(n)$$

- Domain same
- Range same

$$\sin \theta \Rightarrow \theta \in \mathbb{R}$$

$$\frac{1}{\operatorname{cosec} \theta} \Rightarrow \theta \neq 0, 180, \dots$$

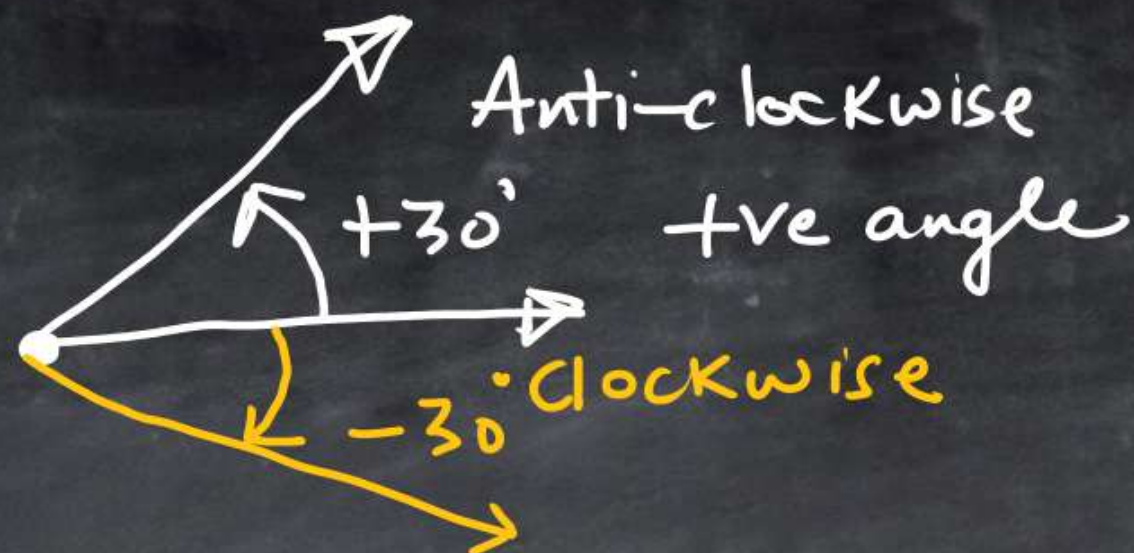
$$\checkmark \sin^2 \theta + \cos^2 \theta = 1 \quad \checkmark$$

(tan θ)

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$$

Angle



Degree Measurement

$$1 \text{ } \perp \text{ (Right angle)} = 90^\circ$$

$$1^\circ = 60 \text{ minutes } (60')$$

$$1' = 60 \text{ seconds } (60'')$$

Radian Measurement

$$\frac{\pi^c}{180} \rightarrow \text{Radian}$$

$$\boxed{\pi = 180^\circ}$$

$45^\circ \xrightarrow{\text{~~~~~}} \text{Radian}$

$$\begin{array}{lcl} \checkmark 180^\circ & \text{---} & \pi \\ 1^\circ & \text{---} & \frac{\pi}{180^\circ} \\ 0^\circ & \text{---} & \boxed{\frac{\pi}{180}} \end{array}$$

$$45^\circ \rightarrow \cancel{45} \times \frac{\pi}{\cancel{180}} = \frac{\pi}{4}$$

$$0^\circ = 0$$

$$30^\circ = \frac{\pi}{6}$$

$$45^\circ = \frac{\pi}{4}$$

$$60^\circ = \frac{\pi}{3}$$

$$90^\circ = \frac{\pi}{2}$$

$$\cancel{15^\circ} = \frac{\pi}{12}$$

$$\checkmark 22.5^\circ = \frac{\pi}{8}$$

$$\checkmark 75^\circ = \frac{5\pi}{4}$$

$$\checkmark 18^\circ = \frac{\pi}{10}$$

$$36^\circ = \frac{\pi}{5}$$

$$54^\circ = \frac{3\pi}{10}$$

$$72^\circ = \frac{2\pi}{5}$$

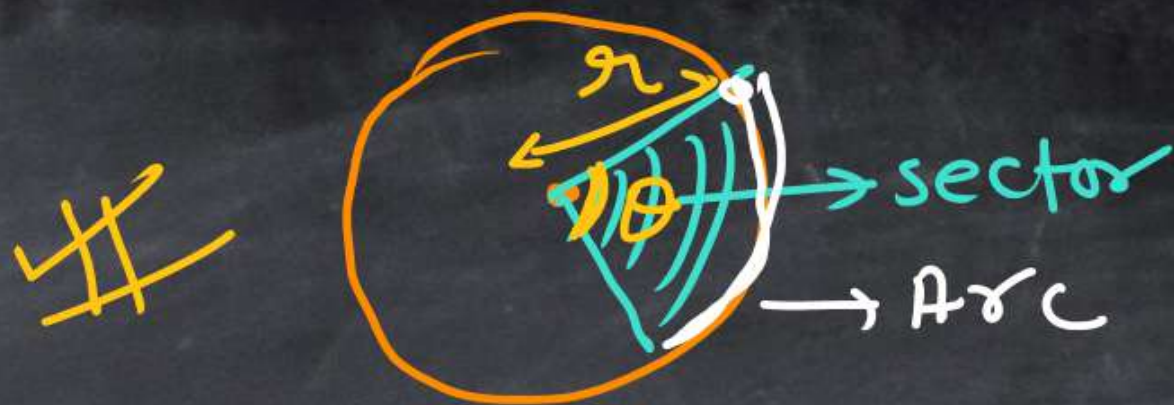
Radian $\rightarrow$ Degree

$$\pi \text{ ————— } 180^\circ$$

$$1 \text{ ————— } \frac{180}{\pi}$$

$$\theta \text{ ————— } \boxed{\frac{180^\circ \times \theta}{\pi}}$$

$$\frac{\cancel{3\pi}}{\cancel{8}2} \times \frac{\overset{45}{\cancel{180}}}{\cancel{\pi}} = \frac{135}{2} = \underline{\underline{67.5^\circ}}$$



$$\theta = \frac{l}{r}$$

θ must always be in radians.

> 90°

$$\sin(300^\circ)$$

300°

angle

$$\sin(120^\circ + 180^\circ)$$

$$\sin 120^\circ + \sin 180^\circ$$

Sin

$$300^\circ = 90^\circ \times 3 + 30^\circ \checkmark$$

$$\checkmark \quad 300^\circ = 90^\circ \times 4 - 60^\circ \checkmark$$

$$\sin(\cancel{90^\circ \times 3} + 30^\circ)$$

odd

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

Sign check: $-\frac{\sqrt{3}}{2}$

$\sin \Rightarrow \cos$
 $\tan \Rightarrow \cot$
 $\sec \Rightarrow \csc$

$$\sin(\cancel{90^\circ \times 4} - 60^\circ)$$

even

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

Sign check:

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

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

✓ II
sin, cosec
+ve

tan, cot
+ve

III

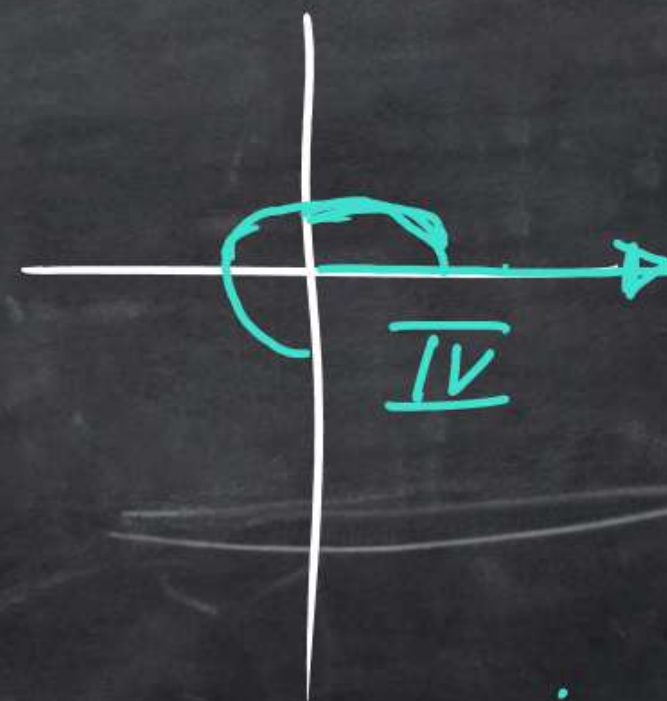
✓ I
All +ve

✓ cos, sec
+ve

IV

ASTC
After School To College
Add Sugar To coffee

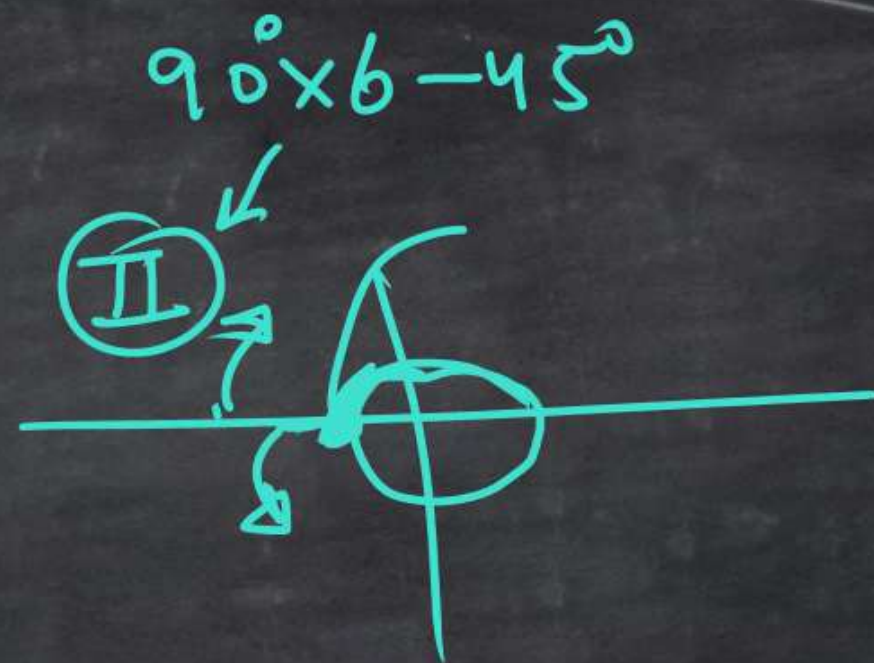
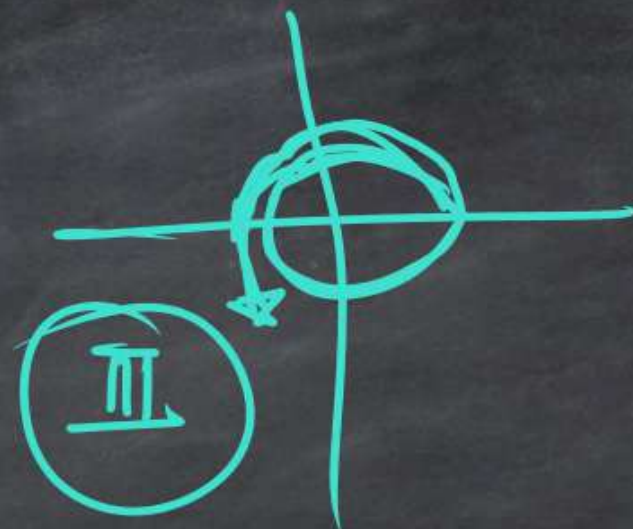
sin(300°)



$$\# \tan(75^\circ)$$

$$\tan(\cancel{90^\circ \times 8} + 30^\circ)$$

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



$$\csc(585^\circ)$$

$$\csc(\cancel{90^\circ \times 6} + 45^\circ)$$

$$= \sqrt{2}$$

$$=$$

$$-\sqrt{2}$$

$$\# \sec(105^\circ)$$

$$\sec(90^\circ \times 11 + 60^\circ)$$

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

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



#

$$\sin\left(\frac{100\pi}{3}\right)$$

$$\pi \frac{100}{3} = \left(\frac{33 \times 3}{3} + \frac{1}{3}\right)\pi = 33\pi + \frac{\pi}{3} \checkmark$$

$$90^\circ = \frac{\pi}{2}$$

$$\sin\left(\cancel{33\pi} + \frac{\pi}{3}\right)$$

$$\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$$

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

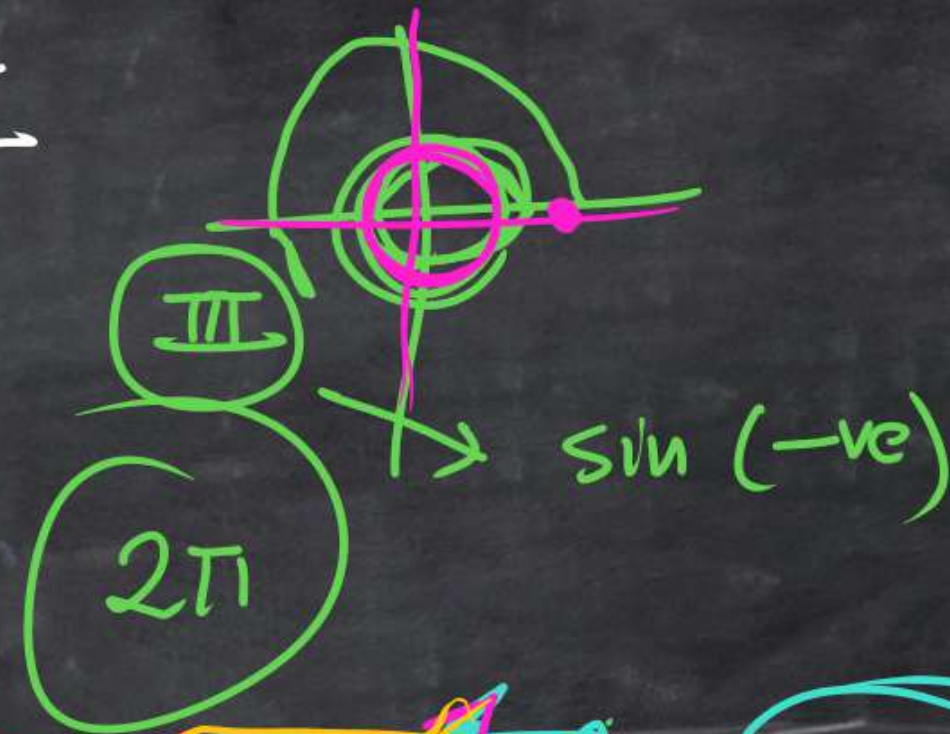
odd/even

$$\sin(\pi \times \text{odd} + \theta)$$

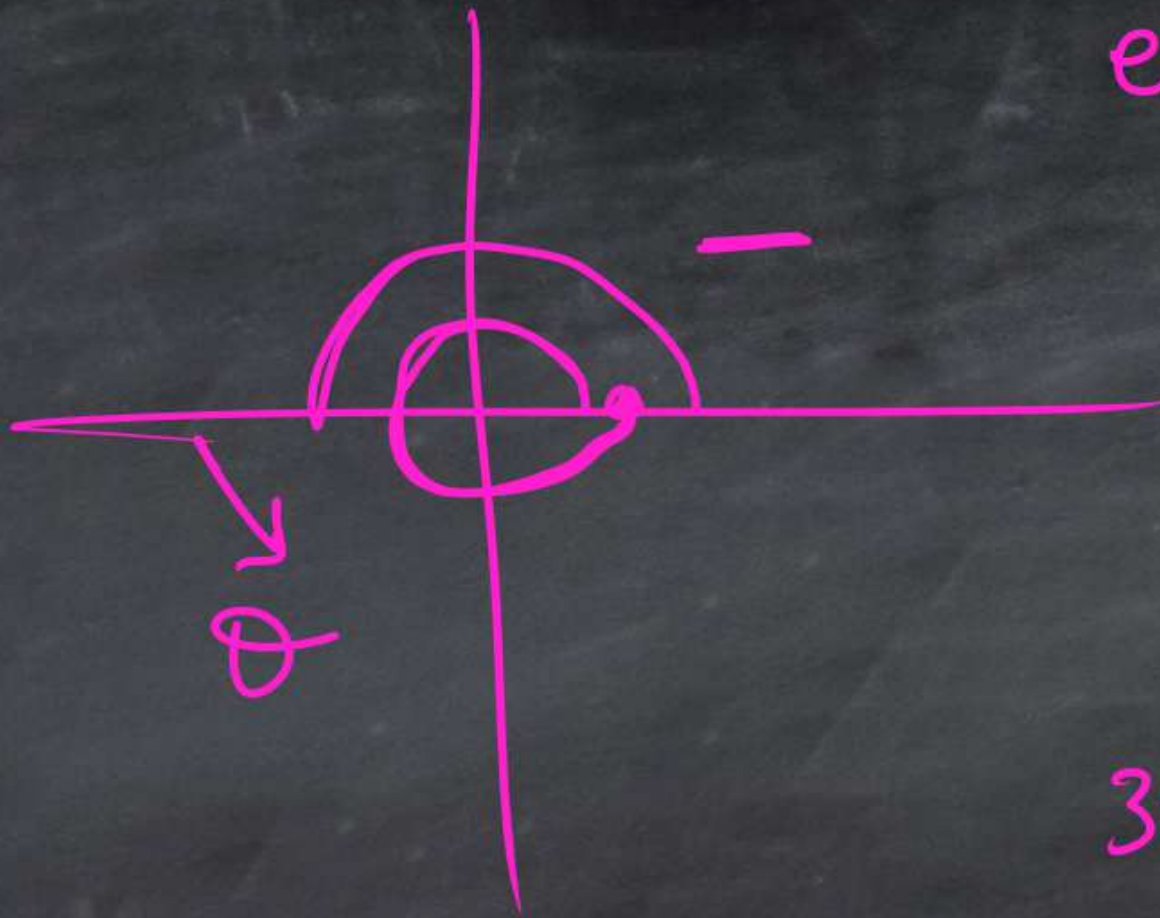
sin $\theta \rightarrow$ Sign check

$$2.33 \frac{\pi}{2}$$

$$66 \frac{\pi}{2}$$



$$\frac{\pi}{2} \times \text{even} \rightarrow \text{even}$$



even $\times \pi + \theta$

$$\frac{16 \times 2\pi}{32\pi}$$

33π



#

$$\cos\left(\frac{97\pi}{6}\right)$$

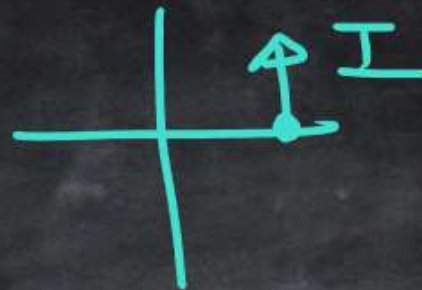
$$\cos\left(\cancel{16\pi} + \frac{\pi}{6}\right)$$

$$\cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$$

$$\cot(90^\circ + 45^\circ)$$

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

$$\boxed{-1} \checkmark$$



$$\frac{\pi}{2} \times \text{odd}$$

$$\tan\left(\frac{63\pi}{4}\right)$$

$$\tan\left(\cancel{15\pi} + \frac{3\pi}{4}\right)$$

$$\tan\left(\frac{3\pi}{4}\right)$$

$$0 \leq \theta \leq 90^\circ$$

$$\tan\left(\cancel{16\pi} + \frac{\pi}{4}\right)$$

$$\tan\frac{\pi}{4} = 1$$

Ans.

$\frac{6^3}{4} \rightarrow \text{Remainder}$ 0, 1, 2, 3

15 X

$$\begin{array}{r} 4 \overline{) 63} \quad (15 \\ \underline{60} \\ 3 \end{array}$$

$$\begin{array}{r} 4 \overline{) 63} \quad (16 \\ \underline{64} \\ -1 \end{array}$$

$$16\pi - \frac{\pi}{4}$$

$\sin(90^\circ \times \text{odd} + \theta) \rightarrow \cos(\theta) \rightarrow \text{sign check}$

$$\rightarrow \sin \rightleftharpoons \cos$$

$$\tan \rightleftharpoons \cot$$

$$\sec \rightleftharpoons \csc$$

$\sin(90^\circ \times \text{even} + \theta) \rightarrow \sin \theta \rightarrow \text{sign check}$

$$\sin\left(\frac{23\pi}{6}\right)$$

Remainder

Extra

→ 5

$$\sin\left(\frac{19\pi}{6}\right)$$

$$\sin\left(3\pi + \frac{\pi}{6}\right)$$

$$\sin\left(\frac{4\pi}{6} + \frac{\pi}{6}\right)$$

$$\rightarrow \sin \frac{\pi}{6}$$

sign check

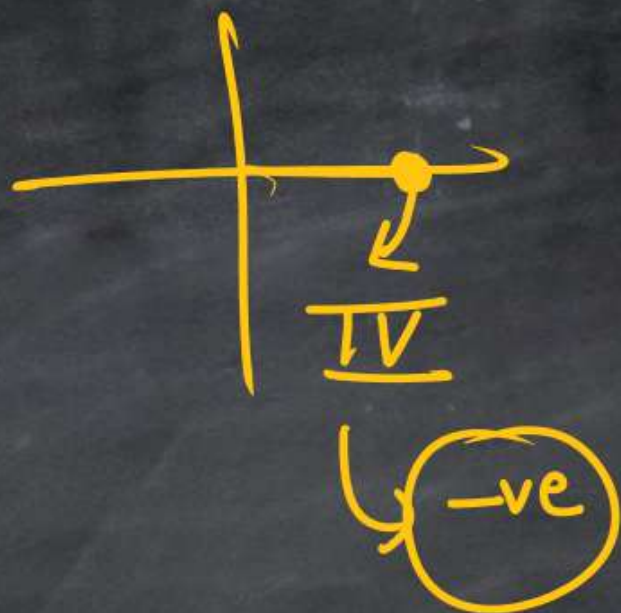
$$\# \cot\left(\frac{83\pi}{3}\right)$$

(27)

$$28 \times 3 = 84$$

$$\cot\left(\frac{28\pi}{3} - \frac{\pi}{3}\right)$$

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



Sign check

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

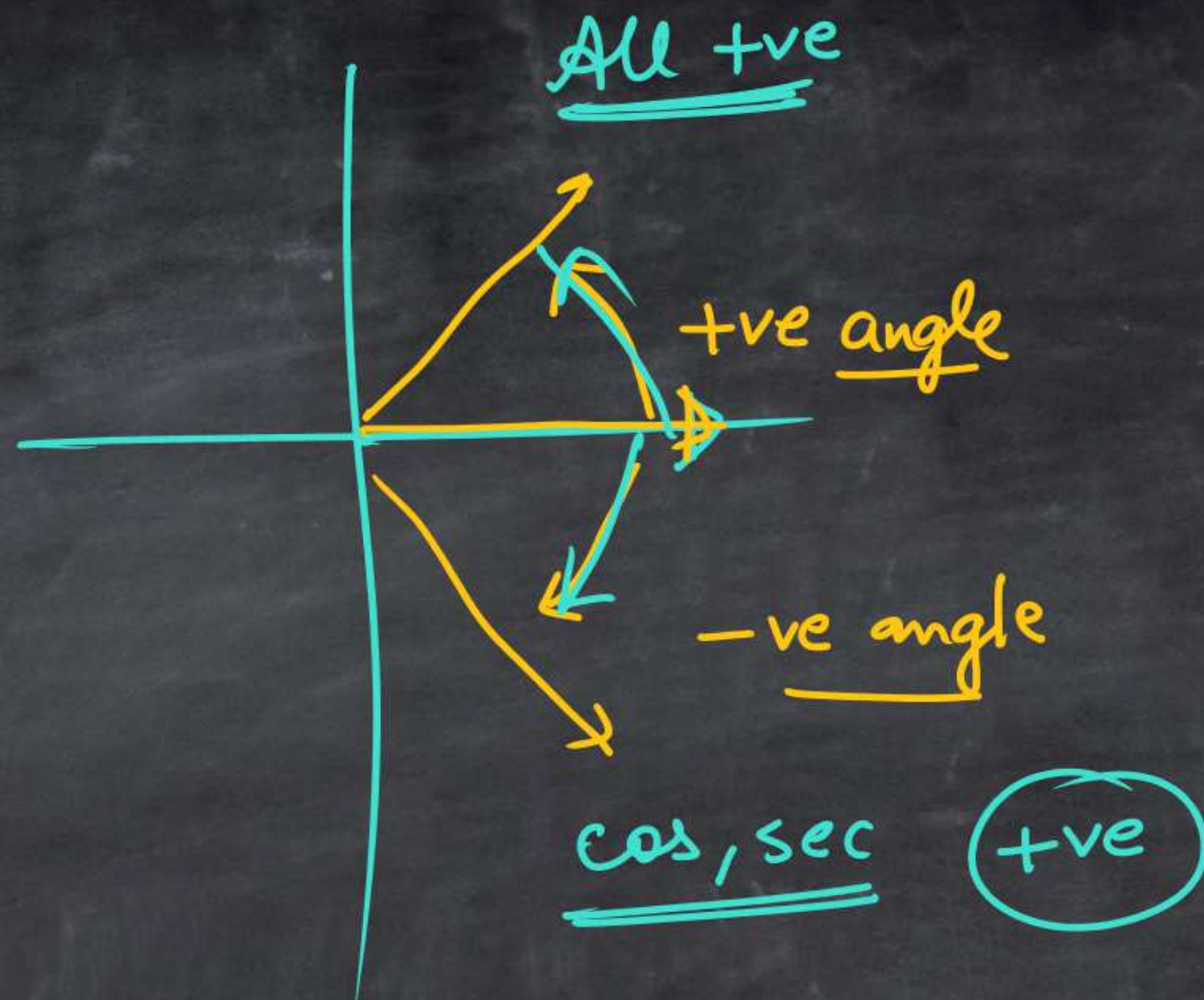
$$\sin(-\theta) = -\sin \theta$$

$$\tan(-\theta) = -\tan \theta$$

$$\cot(-\theta) = -\cot \theta$$

$$\operatorname{cosec}(-\theta) = -\operatorname{cosec} \theta$$

$$\left. \begin{aligned} \cos(-\theta) &= \cos \theta \\ \sec(-\theta) &= \sec \theta \end{aligned} \right\}$$



$$\underline{\underline{\cos(-30^\circ)}} = \underline{\underline{\cos 30^\circ}}$$

$$\begin{aligned}
 \tan(-1110^\circ) &= -[\tan(1110^\circ)] \\
 &= -\left[\tan(\cancel{12} \times \cancel{90} + 30^\circ) \right. \\
 &\quad \tan 30^\circ \\
 &\quad = \frac{1}{\sqrt{3}} \\
 &\quad = \checkmark \\
 &= \left(-\frac{1}{\sqrt{3}} \right) \checkmark
 \end{aligned}$$



Home Work:

- (1) $\sin(120^\circ)$
- (2) $\cos(150^\circ)$
- (3) $\tan(135^\circ)$
- (4) $\operatorname{cosec}(210^\circ)$
- (5) $\sec(480^\circ)$
- (6) $\sin(1845^\circ)$
- (7) $\sin(-750^\circ)$
- (8) $\cos(-300^\circ)$

- (9) $\operatorname{cosec}(-390^\circ)$
- (10) $\sec(-675^\circ)$
- (11) $\sin\left(-\frac{16\pi}{3}\right)$
- (12) $\tan\left(\frac{103\pi}{4}\right)$
- (13) $\cot\left(-\frac{101\pi}{6}\right)$
- (14) $\sec\left(-\frac{19\pi}{2}\right)$
- (15) $\tan(300\pi)$

- (16) $\sec(-2026\pi)$
- (17) $\cos \pi$
- (18) $\cos 20\pi$
- (19) $\sin\left(\frac{113\pi}{6}\right)$
- (20) $\tan\left(\frac{2105\pi}{4}\right)$