5.1 Trigonometric Ratios of Acute Angles

Trigonometry:
- the study of the relationship between the angles and sides of a triangle.

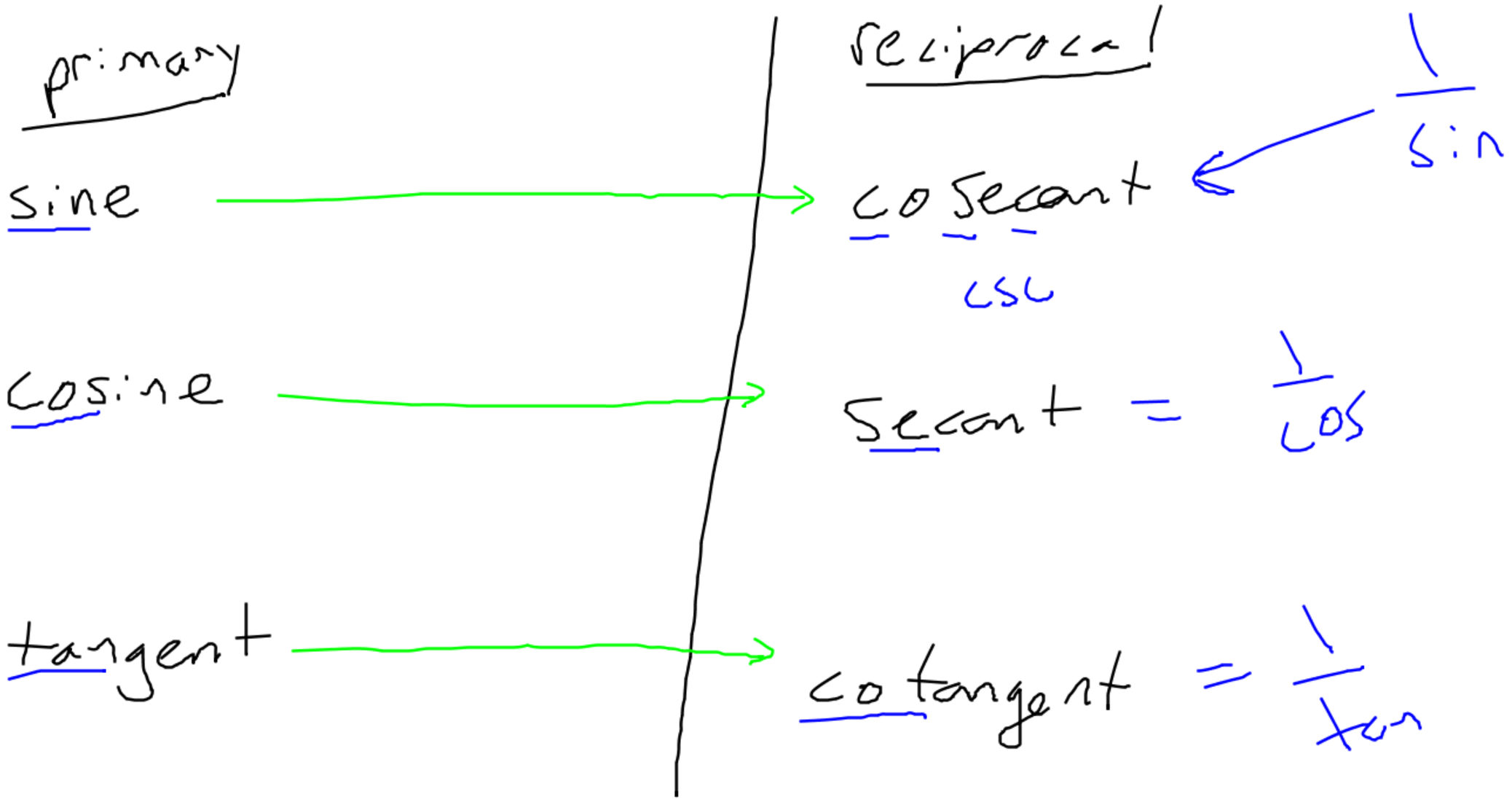
0° to 90°

- six ratios, 3 primary 3 reciprocal

Understanding: sin(Angle) ⇒ ratio ← decimal/fraction

inverse → $\sin^{-1}$(ratio) ⇒ angle

The Ratios:


primary
reciprocal
sine
cosine
tangent
cosecant
csc
secant = 1/cos
cotangent = 1/tan
1/sin

The Ratios:

primary

$$\text{sine} = \frac{\text{opp}}{\text{hyp}} < 1$$

$$\text{cosine} = \frac{\text{adj}}{\text{hyp}} < 1$$

$$\text{tangent} = \frac{\text{opp}}{\text{adj}}$$

reciprocal

$$\text{cosecant} = \frac{\text{hyp}}{\text{opp}} > 1$$

$$\text{secant} = \frac{\text{hyp}}{\text{adj}} > 1$$

$$\text{cotangent} = \frac{\text{adj}}{\text{opp}}$$

Find ratios on calculator:

- $\sin(75) = 0.9659$
- $\cos(54°) = 0.5878$
- $\cot(23°) = \frac{1}{\tan(23)} = 2.3559$
- $\sec(81°) = \frac{1}{\cos(81)} = 6.3925$

Finding Angles on calc:

- $\sin\theta = 0.2893$

$\theta = \sin^{-1}(0.2893)$

$\theta = 16.8^\circ$

- $\tan\theta = 1.4892$

$\theta = \tan^{-1}(1.4892)$

$\theta = 56.1^\circ$

- $\sec\theta = 3.4281$

$\frac{1}{\cos\theta} = 3.4281$

$\cos\theta = \frac{1}{3.4281} \Rightarrow \theta = \cos^{-1}\left(\frac{1}{3.4281}\right)$

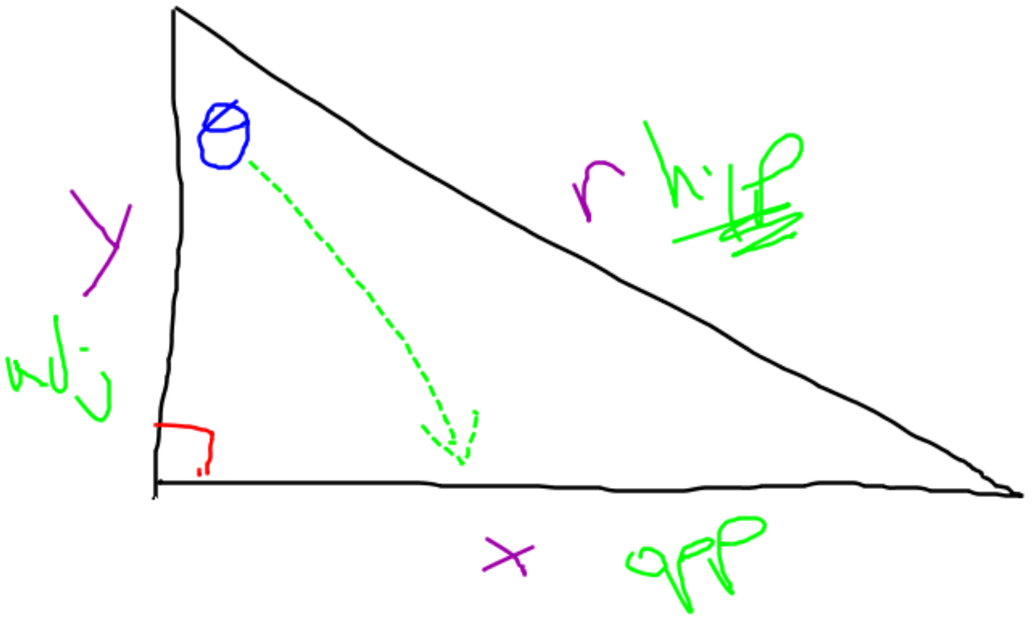
$\theta = 73^\circ$

- $\csc\theta = 1.8243$

$\sin\theta = \frac{1}{1.8243}$

$\theta = \sin^{-1}\left(\frac{1}{1.8243}\right) = 33.2^\circ$

Ratios From a 



$\sin\theta = \frac{x}{r}$ $\quad \csc\theta = \frac{r}{x}$

$\cos\theta = \frac{y}{r}$ $\quad \sec\theta = \frac{r}{y}$

$\tan\theta = \frac{x}{y}$ $\quad \cot\theta = \frac{y}{x}$

ex: Find θ

$$\sin\theta = \frac{12}{18}$$

$$\theta = \sin^{-1}\left(\frac{12}{18}\right)$$

$$\theta = 42^{\circ}$$

ex: Find x

there it is

$$\cos 30 = \frac{9}{x}$$

$$x = \frac{9}{\cos 30}$$

$$x = 10.4$$

$$9\cos 30 = \frac{x}{9}$$

$$7.8 = x$$