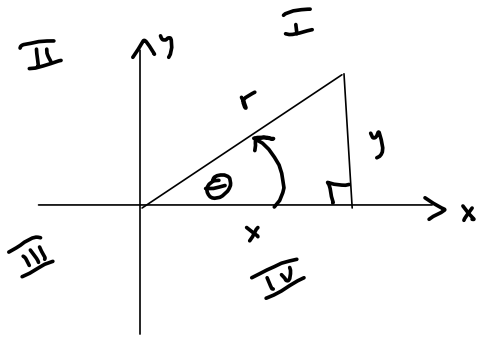
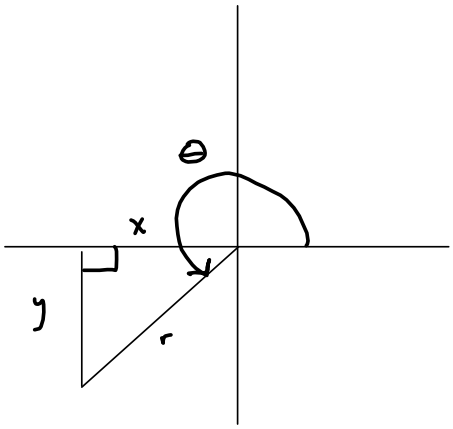
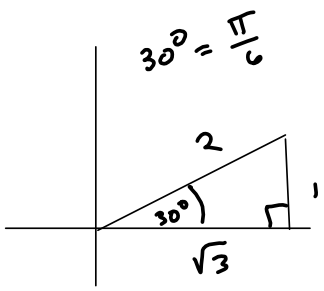
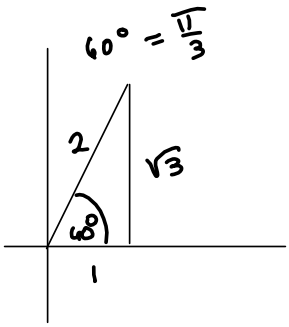
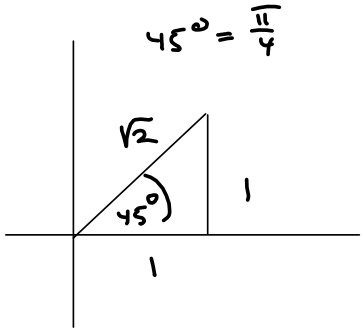
12-point unit circle sucks.

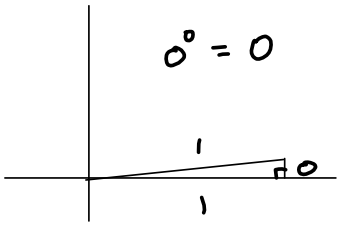


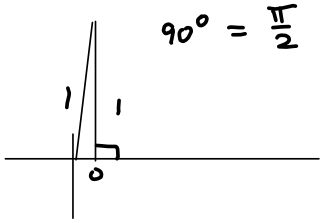












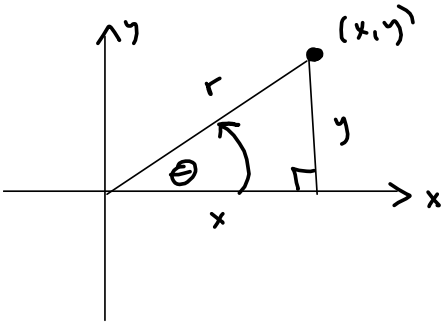
$$\frac{2\pi \text{ radians}}{360^\circ} = 1$$

$$(57^\circ)\left(\frac{2\pi}{360^\circ}\right) \approx 0.994837673637 \quad \text{(radian measure)}$$

We use $\frac{\pi}{180^\circ}$ OR $\frac{180^\circ}{\pi}$

Degrees to Radians

Radians to Degrees



θ = theta = THAY-tuh

Sine: $\sin(\theta) = \frac{y}{r} = \frac{\text{opposite}}{\text{hypotenuse}}$

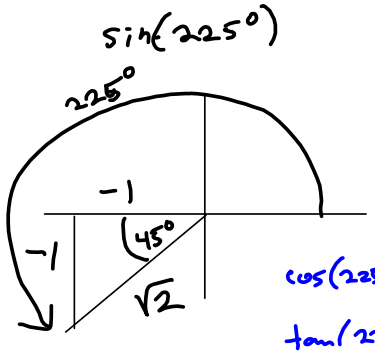
Cosine: $\cos(\theta) = \frac{x}{r} = \frac{\text{adjacent}}{\text{hypotenuse}}$

tangent: $\tan(\theta) = \frac{y}{x} = \frac{\text{opposite}}{\text{adjacent}}$

cosecant: $\csc(\theta) = \frac{1}{\sin(\theta)} = \frac{r}{y}$

secant: $\sec(\theta) = \frac{1}{\cos(\theta)} = \frac{r}{x}$

cotangent: $\cot(\theta) = \frac{1}{\tan(\theta)} = \frac{x}{y}$



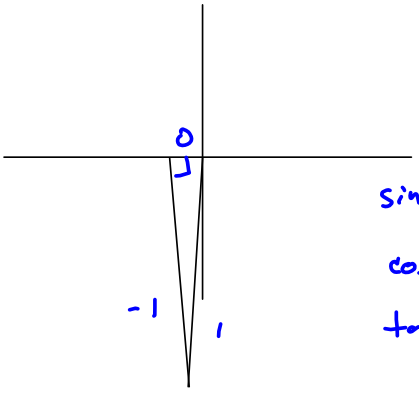
$\sin(225°) = -\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$

$\cos(225°) = -\frac{1}{\sqrt{2}}$

$\tan(225°) = \frac{-1}{-1} = 1$

Rationalize denominator (optional unless specifically requested)

Find 6 trig values for $\theta = 270°$



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

$\cos\theta = \frac{0}{1} = 0$

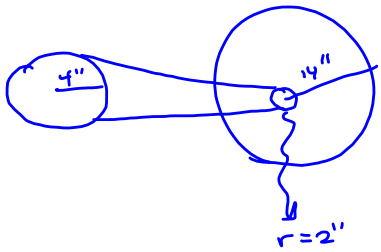
$\tan\theta = -\frac{1}{0} = \text{DNE}$ (undefined)

$\csc\theta = -1$

$\sec\theta = \frac{1}{0}$ DNE

$\cot\theta = \frac{0}{-1} = 0$

S1.1 #b24



$\frac{4\text{" front}}{2\text{" rear}} = 2$ means rear goes 2 times faster.

$$\left(\frac{1 \text{ rev front}}{1 \text{ sec}}\right)\left(\frac{2 \text{ revs rear}}{1 \text{ revs front}}\right)\left(\frac{2\pi \text{ (radians)}}{1 \text{ rev rear}}\right)(14 \text{ in})$$

$\frac{\Theta}{t}$ r = linear speed in $\frac{\text{in}}{\text{sec}}$.

$$= \left(56\pi \frac{\text{in}}{\text{sec}}\right)\left(\frac{1 \text{ ft}}{12 \text{ in}}\right) = \frac{56\pi}{12} \frac{\text{ft}}{\text{sec}} = \frac{14\pi}{3} \frac{\text{ft}}{\text{sec}}$$

$\frac{20}{C} = \frac{14}{3}$

$$\frac{88 \text{ ft}}{\text{sec}} = \frac{60 \text{ mi}}{\text{hr}}$$

$$\left(\frac{14\pi}{3} \frac{\text{ft}}{\text{sec}}\right)\left(\frac{60 \frac{\text{mi}}{\text{hr}}}{88 \frac{\text{ft}}{\text{sec}}}\right)$$

$$\left(\frac{14\pi}{3} \frac{\text{ft}}{\text{sec}}\right)\left(\frac{1 \text{ mi}}{5280 \text{ ft}}\right)\left(\frac{60 \text{ sec}}{1 \text{ min}}\right)\left(\frac{60 \text{ min}}{1 \text{ hr}}\right) = \frac{35\pi}{11} \frac{\text{mi}}{\text{hr}}$$

(b) Want Distance as a function of revolutions of pedal sprocket.

$\frac{1 \text{ rev}}{\text{sec}}$ gives $\frac{35\pi}{11} \frac{\text{mi}}{\text{hr}}$ = rate

$$\left(\frac{1 \text{ rev}}{\text{sec}}\right)\left(\frac{3600 \text{ sec}}{\text{hr}}\right) = \frac{3600 \text{ rev}}{\text{hr}} \Rightarrow 1 \text{ rev} = \frac{35\pi}{11} \cdot \frac{1}{3600} \text{ ft}$$

$\frac{7\pi}{7920} t$

$\frac{1 \text{ rev}}{\text{sec}}$ is $\frac{35\pi}{11} \frac{\text{mi}}{\text{hr}}$

$$\frac{1 \text{ rev}}{\text{sec}} \cdot t \text{ sec} = \frac{35\pi}{11} \frac{\text{mi}}{\text{hr}} \cdot t \text{ sec}$$

$$= \frac{35\pi}{11} \frac{\text{mi}}{\text{hr}} \cdot (t \text{ sec})\left(\frac{1 \text{ hr}}{3600 \text{ sec}}\right)$$

$$1 \text{ rev} = \frac{7\pi}{7920} \text{ mi}$$