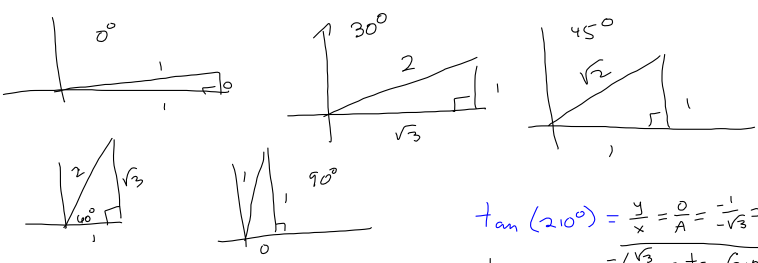
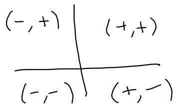
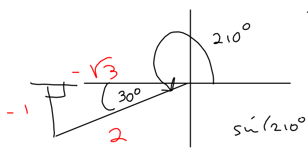
Questions?



$\tan(210^\circ) = \frac{y}{x} = \frac{O}{A} = \frac{-1}{-\sqrt{3}} = \frac{1}{\sqrt{3}}$

$= \boxed{\frac{\sqrt{3}}{3} = \tan(210^\circ)}$



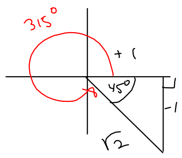


$\sin(210^\circ) = \frac{y}{r} = \frac{O}{H} = \frac{-1}{2}$

$\cos(210^\circ) = \frac{x}{r} = \frac{A}{H} = \frac{-\sqrt{3}}{2}$

$\cos(315^\circ) = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}} = \boxed{\frac{\sqrt{2}}{2} = \cos(315^\circ)}$

$360^\circ - 315^\circ = 45^\circ$ = Reference Angle.



Reciprocal Trig Functions.

$\frac{1}{\sin(\theta)} = \csc(\theta)$ = cosecant of θ.

$\frac{1}{\cos(\theta)} = \sec(\theta)$ = secant of θ.

$\frac{1}{\tan(\theta)} = \cot(\theta)$ = cotangent of θ.

6 trig functions

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

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

$\tan\theta = \frac{y}{x}$ $\quad \cot\theta = \frac{x}{y}$, according to Brent!

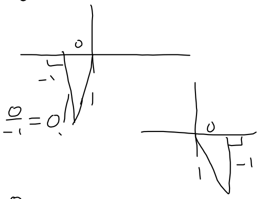
AND JOCELYN!

Find the value of the 6 trig functions corresponding to an angle of 270°.

$\sin(270^\circ) = \frac{-1}{1} = -1$ $\quad \csc(270^\circ) = \frac{1}{-1} = -1$

$\cos(270^\circ) = \frac{0}{1} = 0$ $\quad \sec(270^\circ) = \frac{1}{0}\ \not\exists$

$\tan(270^\circ) = \frac{-1}{0}\ \not\exists$ $\quad \cot(270^\circ) = \frac{1}{\left(\frac{-1}{0}\right)} = \frac{0}{-1} = 0$

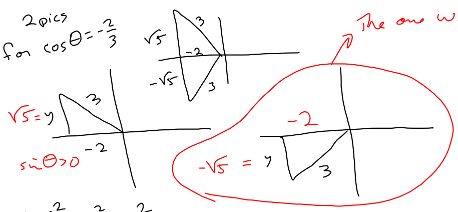


$\cot(270^\circ) = \frac{0}{-1} = 0$

Given $\cos\theta = \frac{-2}{3}$ & $\sin\theta < 0$, Find the remaining 5 trigs.

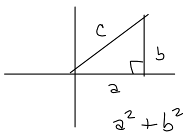
2 pics for $\cos\theta = \frac{-2}{3}$

The one w/ $\sin\theta < 0$



"The square of the hypotenuse is equal to the sum of the squares of the 2 opposing sides."

- Scarecrow -



$a^2 + b^2 = c^2$

$(-2)^2 + y^2 = 3^2$

$4 + y^2 = 9$

$y^2 = 9 - 4 = 5$

$y^2 = 5 \Rightarrow$

$y = \pm\sqrt{5}$

$y^2 = 5$

$\sqrt{y^2} = \sqrt{5}$

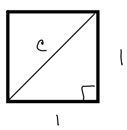
$|y| = \sqrt{5}$

$y = \pm\sqrt{5}$

$\sqrt{3^2} = 3$

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

$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$



$c^2 = a^2 + b^2 = 1^2 + 1^2 = 2$

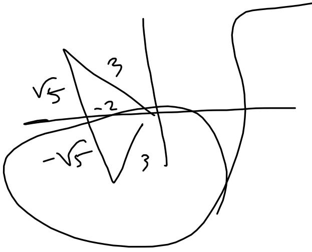
$c = \pm\sqrt{2} \rightsquigarrow +\sqrt{2}$, because hypotenuse is always positive.

Reals = Rationals ∪ Irrationals.

$\mathbb{Q} = \{\frac{a}{b} \mid a, b \in \mathbb{Z},\ b \neq 0\}$.

Irrationals = $\mathbb{R} \setminus \mathbb{Q}$

Given $\cos\theta = \frac{-2}{3}$ & $\sin\theta < 0$, Find the remaining 5 trigs.



$3^2 - (-2)^2 = 9 - 4 = 5 = y^2 \Rightarrow$

$y = \pm\sqrt{5}$

$\sin\theta = \frac{-\sqrt{5}}{3}$ $\qquad$ $\csc\theta = -\frac{3}{\sqrt{5}} = -\frac{3\sqrt{5}}{5}$

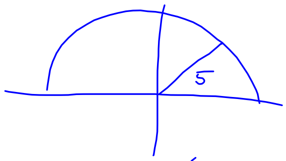
$\cos\theta = -\frac{2}{3}$ $\qquad$ $\sec\theta = -\frac{3}{2}$

$\tan\theta = \frac{-\sqrt{5}}{-2} = \frac{\sqrt{5}}{2}$ $\qquad$ $\cot\theta = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

Radians: want $2\pi r$ to be $r\theta = s =$ arc length for going all the way around the circle.

So, $\theta = \frac{s}{r}$ is the angle, in radians, corresponding to an arc length s.

$$\boxed{\text{Arc Length} = s = r\theta}$$



Notice, degrees don't work for this.

$r\theta = 5(180^\circ) = 900^\circ$ is NO HELP & NO GOOD

$\theta = 180^\circ$

$s = \frac{2\pi r}{2} = \pi r = 5\pi$

ANGLE MUST be in radians!

$$\frac{360^\circ \text{ to go full circle}}{2\pi \text{ (radians) to go full circle}} = \frac{180^\circ}{\pi} \text{ is conversion factor}$$

for radians to degrees

$$2900\text{ft} = (2900\text{ft})\boxed{\left(\frac{1\text{ mile}}{5280\text{ft}}\right)} \approx .5492424242\text{ mi}$$

A clever choice of "1."

$$270^\circ = (270^\circ)\left(\frac{\pi}{180^\circ}\right)$$

$$= \frac{3\pi}{2} \quad (\text{RADIANS})$$

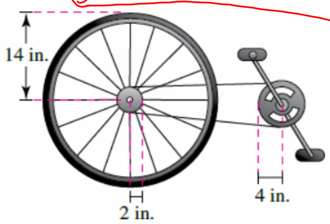
3ft 1ft

How many steps does baby take for 1 step of Dad's?

$$\left(1 \text{ DAD STEP}\right)\left(\frac{3 \text{ BABY STEPS}}{1 \text{ DAD STEP}}\right) = 3 \text{ BABY STEPS.}$$

The radii of the pedal sprocket, the wheel sprocket, and the wheel of the bicycle in the figure are 4 inches, 2 inches, and 14 inches, respectively. A cyclist pedals at a rate of 1 revolution per second.

2



(a) Find the speed of the bicycle in feet per second and miles per hour.

24a [ ] $\frac{14\pi}{3}$ feet per second

24b [ ] $\frac{35\pi}{11}$ mph

$$\frac{(8\pi)(14)}{12} = \frac{(2\pi)(14)}{3}$$

$$\underbrace{\left(\frac{2\text{ rev front}}{\text{sec}}\right)\left(\frac{4\text{ rev Rear}}{2\text{ rev Front}}\right)\left(\frac{2\pi\text{ radians}}{1\text{ rev}}\right)}_{\frac{\theta}{\text{Sec}}}\underbrace{\left(\frac{14\text{ in rear}}{\text{wheel}}\right)}_{r}\left(\frac{1\text{ ft}}{12\text{ in}}\right) = \ldots$$

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

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

multiply top answer by $\frac{60\text{ mi/hr}}{88\text{ ft/sec}}$ to get $\frac{\text{mi}}{\text{hr}}$

$r = 35$, $s = 80$

$\theta = ?$

$\theta = \frac{s}{r}$ bleah

$s = r\theta$

$80 = 35\theta$

$\frac{80}{35} = \theta$

$\frac{16}{7}$ radians