

(c) Write a function for the distance  $d$  (in miles) a cyclist travels in terms of the time  $t$  (in seconds).

$d =$    $\times$   $\frac{7\pi t}{7920}$  mi *no assume  $\frac{1 \text{ rev}}{\text{sec}}$  on front sprocket*

Compare this function with the function from part (b).

The function from (b) is   $\times$   linear .

*$n = n'$  is linear  
 $t = t'$  is linear*

The function from (c) is   $\times$   linear .

Part (b)  $(n \text{ rev front}) \left( \frac{4 \text{ rev rear}}{2 \text{ front rev}} \right) \left( \frac{2\pi \text{ radians}}{1 \text{ rev}} \right) (14 \text{ in}) \left( \frac{1 \text{ ft}}{12 \text{ in}} \right) \left( \frac{1 \text{ mi}}{5280 \text{ ft}} \right)$

$\underbrace{\hspace{15em}}_{\theta}$   $\underbrace{\hspace{15em}}_r$

Distance per rev front

(c) Assume  $\frac{1 \text{ rev front}}{\text{sec}}$

$\left( \frac{1 \text{ rev front}}{\text{sec}} \right) \left( \frac{4 \text{ rear rev}}{2 \text{ front rev}} \right) \left( \frac{2\pi \text{ radians}}{1 \text{ rev rear}} \right) (14 \text{ in}) \left( \frac{1 \text{ ft}}{12 \text{ in}} \right) \left( \frac{1 \text{ mi}}{5280 \text{ ft}} \right)$

$D = r t$   
 $= \text{rate} \cdot \text{time} = \text{Distance}$  Rate of speed is  $\frac{\text{mi}}{\text{sec}}$

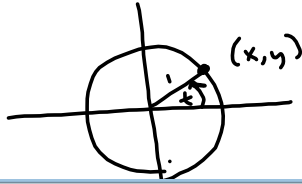
TIMES  $t \text{ sec} = \frac{7\pi}{7920} t$

Section 1.2

$$s = r\theta$$

Arc length = radius  $\cdot$  radian measure of the angle.

Unit Circle



$$x = \cos t$$

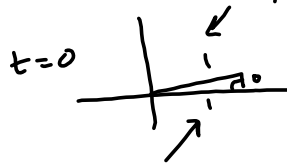
$$y = \sin t$$

$$\frac{y}{x} = \tan t$$

Use a unit circle divided into 8 equal parts to complete the table for selected values of  $t$ . (If an answer is undefined, enter UNDEFINED.)

$t$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	$\pi$
$x$	1	$\frac{\sqrt{2}}{2}$	0	$-\frac{\sqrt{2}}{2}$	-1
$y$	0	$\frac{\sqrt{2}}{2}$	1	$\frac{\sqrt{2}}{2}$	0
$\sin t$	<input type="text"/> $\times$ <input type="text"/>	$\frac{\sqrt{2}}{2}$	<input type="text"/> $\times$ <input type="text"/>	<input type="text"/> $\times$ <input type="text"/>	<input type="text"/> $\times$ <input type="text"/>
$\cos t$	<input type="text"/> $\times$ <input type="text"/>	$\frac{\sqrt{2}}{2}$	<input type="text"/> $\times$ <input type="text"/>	<input type="text"/> $\times$ <input type="text"/>	<input type="text"/> $\times$ <input type="text"/>
$\tan t$	<input type="text"/> $\times$ <input type="text"/>	1	<input type="text"/> $\times$ <input type="text"/>	-1	<input type="text"/> $\times$ <input type="text"/>

MY WAY



$$\begin{aligned} \sin t &= \frac{0}{1} = 0 \\ \cos t &= \frac{1}{1} = 1 \\ \tan t &= \frac{0}{1} = 0 \end{aligned}$$

$t \rightarrow \frac{\pi}{4}$

$$\sin t = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\cos t = \frac{1}{\sqrt{2}}$$

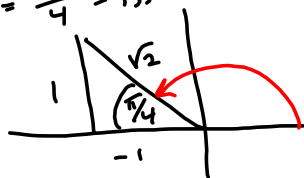
$$\tan t = \frac{1}{1} = 1$$

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



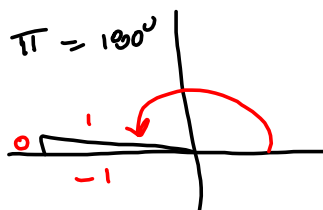
$$\begin{aligned} \sin t &= \frac{1}{1} = 1 \\ \cos t &= \frac{0}{1} = 0 \\ \tan t &= \frac{1}{0} \text{ DNE} \end{aligned}$$

$t = \frac{3\pi}{4} = 135^\circ$



$$\begin{aligned} \sin t &= \frac{1}{\sqrt{2}} \\ \cos t &= -\frac{1}{\sqrt{2}} \\ \tan t &= \frac{1}{-1} = -1 \end{aligned}$$

$t = \pi = 180^\circ$



$$\begin{aligned} \sin t &= \frac{0}{1} = 0 \\ \cos t &= -\frac{1}{1} = -1 \\ \tan t &= \frac{0}{-1} = 0 \end{aligned}$$

$\cos(-2.9)$  to 4 places:

-2.9 is in radians. If it were degrees,  
it'd say  $\cos(-2.9^\circ)$

Mode Needs to be Radians

```

NORMAL SCI ENG
FLOAT 0123456789
RADIAN DEGREE
FUNC PAR POL SEQ
CONNECTED DOT
SEQUENTIAL SIMUL
REAL a+bi re^θi
FULL HORIZ G-T
↓NEXT↓
  
```

See? Good

```

NORMAL SCI ENG
FLOAT 0123456789
RADIAN DEGREE
FUNC PAR POL SEQ
CONNECTED DOT
SEQUENTIAL SIMUL
REAL a+bi re^θi
FULL HORIZ G-T
↓NEXT↓
  
```

```

cos(-2.9
-.9709581651 ≈ -.9710
  ↑
  
```

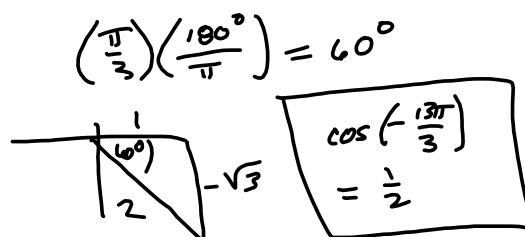
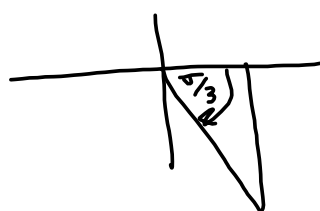
3. 0/1 points

Evaluate the trigonometric function using its period as an aid.

$$\cos\left(-\frac{13\pi}{3}\right) = \cos\left(-\frac{13\pi}{3} + 2n\pi\right)$$

$$-\frac{13\pi}{3} = -\left(\frac{12\pi}{3} + \frac{1\pi}{3}\right) = -\left(4\pi + \frac{\pi}{3}\right)$$

$$\cos\left(-\left(4\pi + \frac{\pi}{3}\right)\right) = \cos\left(-4\pi - \frac{\pi}{3}\right) = \cos\left(-\frac{\pi}{3}\right)$$



We've talked about sine, cosine and tangent.

Now, we talk about their reciprocals,

cosecant, secant, and cotangent.

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

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

$$\cot \theta = \frac{1}{\tan \theta}$$

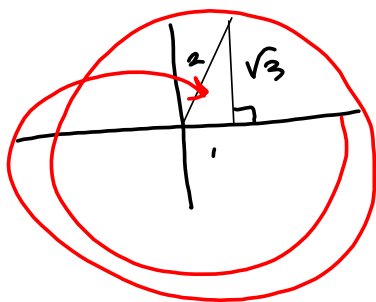
Calculator doesn't have  
these 3 keys!  
Or keys for their inverses

$$\cot(-1.9) = \frac{1}{\tan(-1.9)} \approx .3416$$

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1/tan(-1.9)
.3416353555
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$\sin\left(-\frac{11\pi}{3}\right)$  Find EXACT value  
calculator's no help!

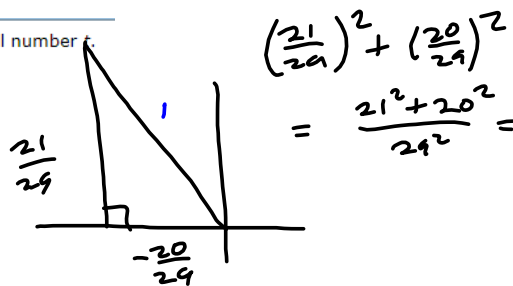
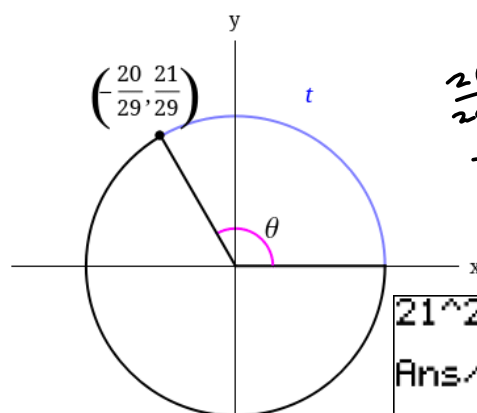
$$-\frac{9\pi}{3} - \frac{2\pi}{3} = -3\pi - \frac{2\pi}{3} = -540^\circ - 120^\circ$$



$$\sin\left(-\frac{11\pi}{3}\right) = \frac{\sqrt{3}}{2}$$

Use degrees to build  
intuition

Find the exact values of the six trigonometric functions of the real number  $t$ .



$$\left(\frac{21}{29}\right)^2 + \left(\frac{20}{29}\right)^2 = \frac{21^2 + 20^2}{29^2} =$$

$$\sin \theta =$$

$21^2 + 20^2$	841
$\text{Ans} / 29^2$	1
$\text{Ans}^{(.5)}$	1

We are, indeed on the unit circle.

$$\sin \theta = \frac{21}{29} \quad \csc \theta = \frac{29}{21}$$

$$\cos \theta = -\frac{20}{29} \quad \sec \theta = -\frac{29}{20}$$

$$\tan \theta = -\frac{21}{20} \quad \cot \theta = -\frac{20}{21}$$