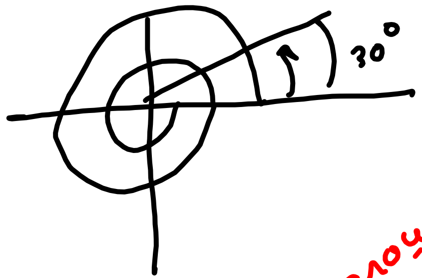
coterminal with $-\frac{23\pi}{6}$



$$\left(-\frac{23\pi}{6}\right)\left(\frac{180}{\pi}\right) = (-23)(30)$$

$$= -690^\circ$$

$$\frac{-690^\circ}{360^\circ} \quad -1.916666667$$

Once around the circle

$-.91\bar{6}$ is how many degrees?

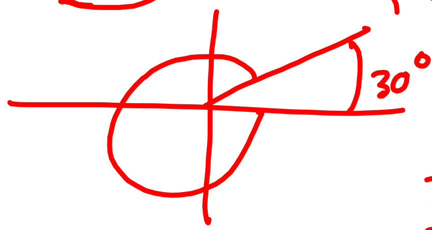
Times around

$-3.$ ~~~

$$-690+360 = -330^\circ$$

$$-690+(3)(360)$$

3 times around



The remainder after dividing by 360°.

2 angles -330°, 30°

$-\frac{11\pi}{6}$, $\frac{\pi}{6}$

$$-(330)\left(\frac{\pi}{180}\right) = -\frac{11\pi}{6}$$

(2) Arc length: $r = 7\text{cm}$

$\theta = 6000^\circ$

$s = r\theta = \boxed{(7)(\cancel{6000}^{100})\left(\frac{\pi}{\cancel{180}_3}\right)} = \frac{700\pi}{3}\text{ cm}$ is exact

Need in radians for $s = r\theta$.

$\approx$ 733.0382858 cm

to 3 places: $\boxed{733.038\text{ cm}}$

(3) $\boxed{\begin{array}{l} A = \frac{1}{2}r^2\theta \\ s = r\theta \end{array}}$

$\pi r^2 = \frac{1}{2}\cdot 2\pi r^2$ angle for whole circle.

$r\theta$

$2\pi r$

$r\theta$

$\theta = 2\pi$ whole circle.

$\theta = \frac{2\pi}{3}$, $r = 12$ cm

$\text{Area} = \frac{1}{2}r^2\theta = \frac{1}{2}(12)^2\left(\frac{2\pi}{3}\right)$

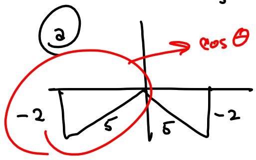
$= \frac{1}{\cancel{2}}(\cancel{144}^{48})\left(\frac{\cancel{2}\pi}{\cancel{3}}\right) = \boxed{\begin{array}{c}\text{EXACT} \\ 48\pi\text{ cm}^2\end{array}}$

(4) $\csc\theta = -\frac{5}{2}$

$\sin\theta = -\frac{2}{5}$ is easier to see (for me).

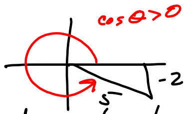
(a)

$\cos\theta < 0$



$\cos\theta > 0$

(b) Given $\cos\theta > 0$ →



$0 \le \theta < 2\pi$. Find θ in degrees & radians to 3 places.

$\sin\theta = -\frac{2}{5}$

Take $\sin^{-1}(\sin\theta) = \sin^{-1}\left(-\frac{2}{5}\right)$

$\boxed{\begin{array}{l} -.4115168461 \\ -23.57817847 \end{array}}$

Range of $\arcsin(x)$ is $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ OR $[-90^\circ, 90^\circ]$

sine

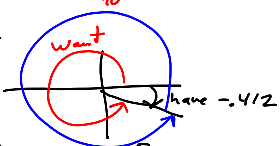
sine restricted to be 1-to-1

Need to make between

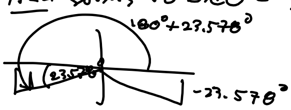
$(-.412) + 2\pi \approx$ etc.

$(-23.578^\circ) + 360^\circ \approx$ etc.

want



(d) ALL solns to $\csc\theta = -\frac{5}{2}$:



$\mathbb{Z} = \{\ldots, -1, 0, 1, 2, 3\ldots\}$

Pretty much as far as we needed

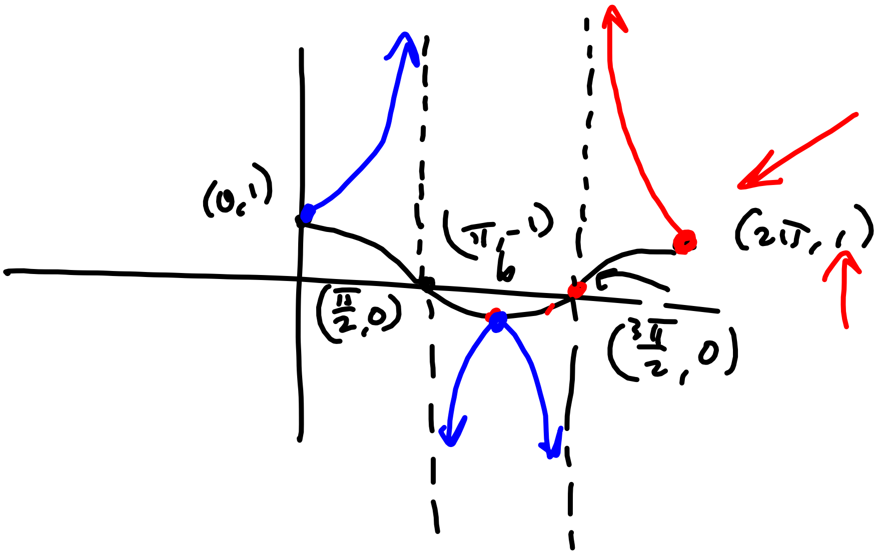
$\left\{\begin{array}{l} -23.578^\circ + 360^\circ n \quad \text{OR} \\ 180^\circ + 23.578^\circ + 360^\circ n \quad \text{for all } n \in \mathbb{Z} \end{array}\right.$

When in doubt, lay off the calculator!

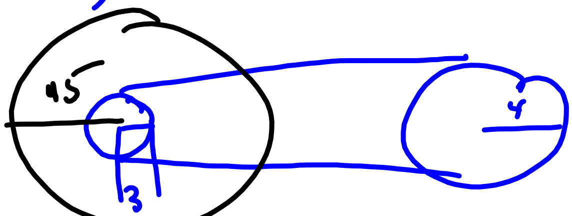
If calculations are taking 5 or 10 minutes, MOVE ON.

Graph $\cos x$ & $\sec x$

5



6 The rear wheel of the bike spins exactly as fast as the rear sprocket.



$$\left(\frac{1.4 \cancel{\text{revs front}}\ \text{sprocket}}{s}\right)\left(\frac{4 \cancel{\text{revs back}}\ \text{sprocket}}{3\ \text{revs}\ \cancel{\text{front}}\ \text{sprocket}}\right)\cdot\left(\frac{1 \cancel{\text{rev back wheel}}}{1 \cancel{\text{rev back sprocket}}}\right)\left(\frac{(2\pi)(15\ \cancel{\text{in}})}{1\ \cancel{\text{rev back}}\ \text{wheel}}\right)$$

$$\cdot\left(\frac{1\ \text{ft}}{12\ \cancel{\text{in}}}\right)$$

Rest is calculator

This is ft/s.

(7) $f(x) = 13\cos\left(\frac{\pi}{20}x + \frac{7\pi}{20}\right) + 12$

Ampl.

controls period

y=12 midline

Period of cosine is 2π
This thing goes through one period when

$$\frac{\pi}{20}x = 2\pi$$

$$x = \frac{2\pi \cdot 20}{\pi} = 40 = \text{Period!}$$

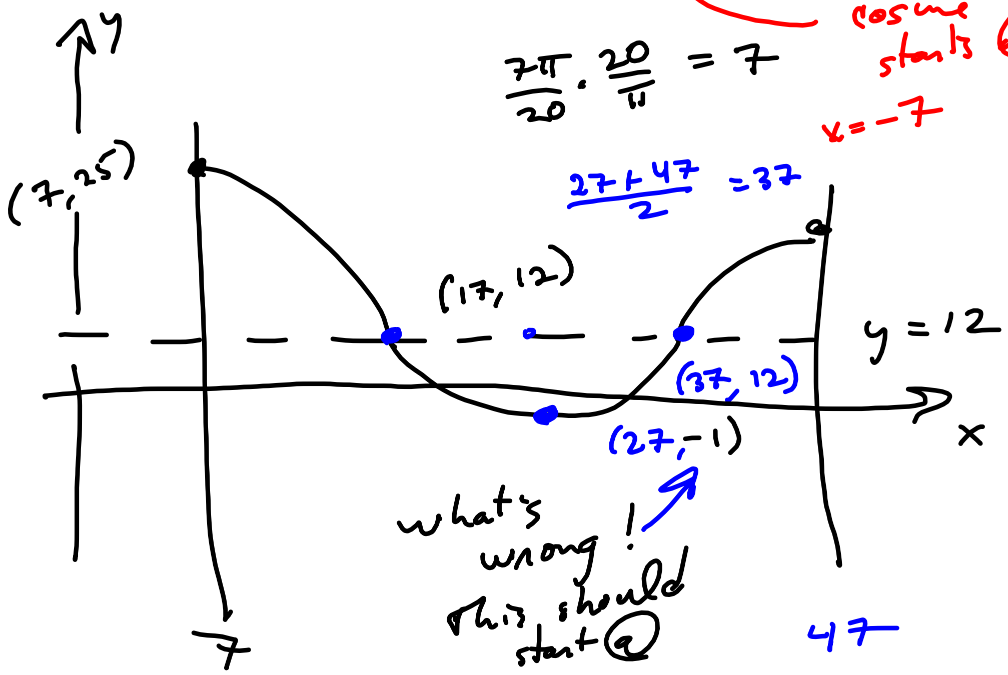
Where do we start?

$$\frac{\pi}{20}x + \frac{7\pi}{20} = \frac{\pi}{20}(x + 7)$$

cosine starts @ x=-7

$$\frac{7\pi}{20} \cdot \frac{20}{\pi} = 7$$

$$\frac{27+47}{2} = 37$$

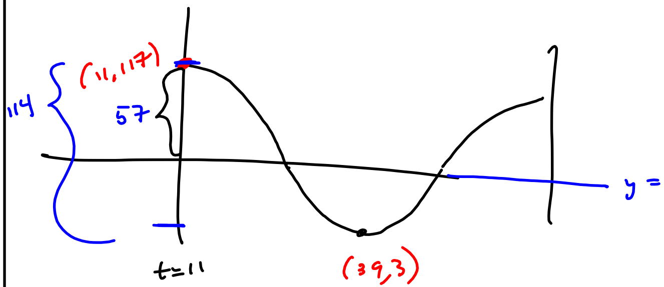


what's wrong! this should start @ ∴ x=-7

$$\frac{47+7}{2} = \frac{54}{2} = 27$$

Move the whole stinking thing left 14 units to start @ x=-7. No Time

8 cosine high @ 117 = y, t = 11
Low @ y = 3, t = 39



amp =

$$Amp = \frac{High - Low}{2} = \frac{117-3}{2} = \frac{114}{2} = 57$$

$$midline = \frac{High + Low}{2} = \frac{117+3}{2} = \frac{120}{2} = 60$$

$57\cos(\qquad) + 60$

starts @ t = 11

$57\cos(b(x-11)) + 60$

All we need

$$Period = (39-11)(2)$$

$T = 56.$ $\quad = (28)(2) = 56$

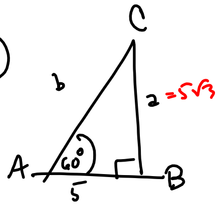
Want $bx = 2\pi$ when $x = 56$

$(b)(56) = 2\pi$

$$b = \frac{2\pi}{56} = \frac{\pi}{28}$$

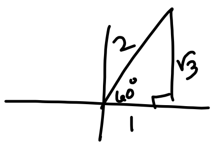
$$57\cos\left(\frac{\pi}{28}(x-11)\right) + 60$$

9



$\frac{a}{b} = \sin 60°$

$a = b\sin 60°$



$\frac{a}{5} = \tan 60°$

$a = 5\tan 60°$

$\boxed{5\sqrt{3} = a}$

$\frac{5}{b} = \sin 60°$

$5 = b\sin 60°$

$\frac{5}{\sin 60°} = b$

$\frac{b}{5} = \csc 60°$

$b = 5\csc 60° = \frac{5}{\sin 60°}$

$= \frac{5}{\frac{\sqrt{3}}{2}} = \boxed{\frac{10}{\sqrt{3}}} = \frac{10\sqrt{3}}{3}$

$= b$

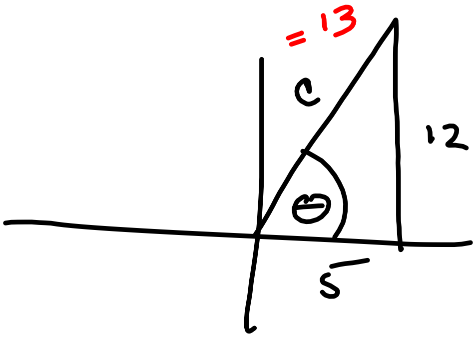
$\boxed{C = 30° \quad B = 90°}$

$\boxed{b = \frac{10}{\sqrt{3}} \quad a = 5\sqrt{3}}$

Sep 14-9:07 AM

10 $\sin\left(\arctan\left(\frac{12}{5}\right)\right) = \sin\theta$

$=$



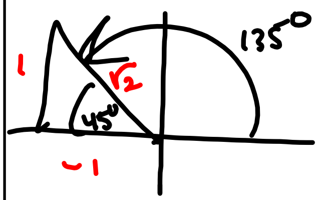
$12^2 + 5^2 = 144 + 25$

$= 169 \Rightarrow c = \sqrt{169} = 13$

$\boxed{\text{so } \sin\theta = \frac{12}{13}}$

b $\text{Arcsin}\left(\cos\left(\frac{3\pi}{4}\right)\right)$

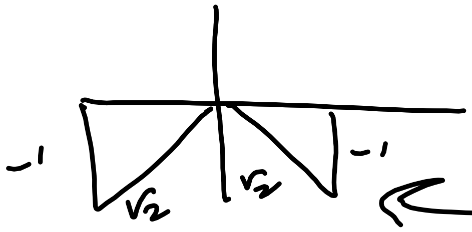
$\left(\frac{3\pi}{4}\right)\left(\frac{180^\circ}{\pi}\right)$



$= \text{Arcsin}\left(-\frac{1}{\sqrt{2}}\right)$

$= 135^\circ$

Arcsin only sees This one

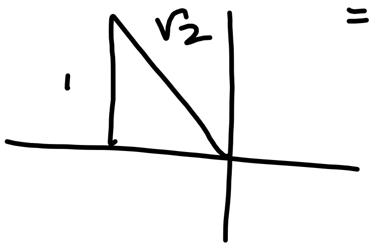


and spits out -45°

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

$\arcsin\left(\sin\left(\frac{3\pi}{4}\right)\right) = \frac{\pi}{4}$

$= \arcsin\left(\frac{1}{\sqrt{2}}\right) = 45^\circ$



FORMAT FOR TEST

Same as homework, but don't write out the question.

Bio 122-G11 top left corner