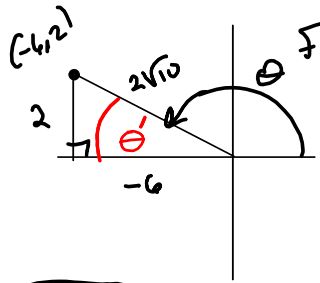
Week 3 Assignment is posted.

Week 2 grading will begin today or tomorrow.

Sorry so slow. Spent a lot of time trying to fix my pen display on my own and then a lot of time, today, on the phone with IT. It set me back, some.



Find 6 trigs for $(-6,2)$.

$\sin\theta = \frac{2}{2\sqrt{10}} = \frac{1}{\sqrt{10}}$ $\csc\theta = \sqrt{10}$

$\cos\theta = \frac{-6}{2\sqrt{10}} = \frac{-3}{\sqrt{10}}$ $\sec\theta = -\frac{\sqrt{10}}{3}$

$\tan\theta = \frac{2}{-6} = -\frac{1}{3}$ $\cot\theta = -3$

$\sqrt{2^2+6^2} =$

$\sqrt{4+36} = \sqrt{40}$

$2 \,|\, 40$

$2 \,|\, 20$

$2 \,|\, 10$

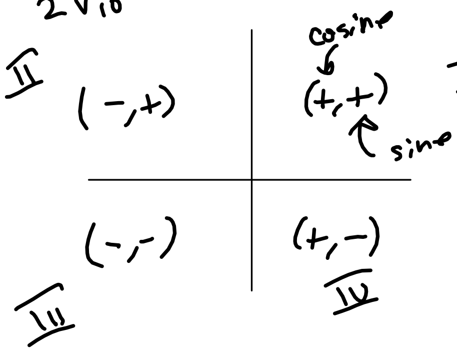
5

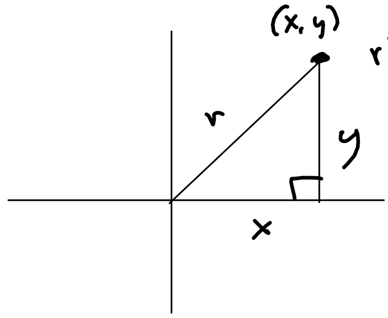
$2\sqrt{10}$

$\theta' =$ Reference Angle

There's always a triangle associated with any angle θ.

In QI, $\theta' = \theta$





$r^2 = x^2 + y^2$

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

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

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

$\sin\theta > 0$; $\cos\theta < 0$

$+$ $-$

y x

QII

If you can get your Week 2 in before I post solutions, no deduction.

See Late Edition for Week 2.

It will close and I will open up a Late-Late Edition, with 30% discount that'll just stay open, indefinitely.

$$\left(2.5 \text{ radians}\right)\left(\frac{180^\circ}{\pi \text{ radians}}\right) = \frac{\left(\frac{5}{2}\right)(180^\circ)}{\pi} = \frac{5(90^\circ)}{\pi} = \frac{450^\circ}{\pi} = \left(\frac{450}{\pi}\right)^\circ$$

$\theta = \frac{s \text{ in}}{r \text{ in}}$ is defin of radian, which is unit-less (PURE NUMBER)

$\frac{s \text{ m}}{r \text{ m}} = \frac{s}{r}$ No units, units cancel

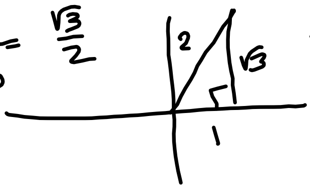
$$\cot(2.5) = \frac{1}{\tan(2.5)}$$

when I see $\cot\theta = \frac{a}{b}$, I automatically go to $\tan\theta = \frac{b}{a}$

$\sin\theta = \frac{\sqrt{3}}{2}$

$0 < \theta < 90^\circ$

$0 < \theta < \frac{\pi}{2}$



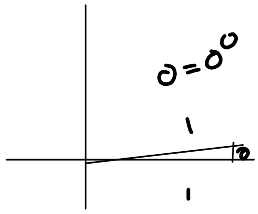
$\theta = \frac{\pi}{3} = 60^\circ$

$\csc\theta = \frac{a}{b} \Rightarrow \sin\theta = \frac{b}{a}$

$\sec\theta = \frac{a}{b} \Rightarrow \cos\theta = \frac{b}{a}$

I'm wired to "see" $\sin\theta, \cos\theta, \tan\theta$.

$\theta = 0^\circ$

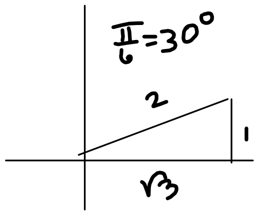


$\sin 0 = \frac{0}{1} = 0$ $\quad \csc 0 = \frac{1}{0}$ ∄

$\cos 0 = \frac{1}{1} = 1$ $\quad \sec 0 = \frac{1}{1} = 1$

$\tan\theta = \frac{0}{1} = 0$ $\quad \cot\theta = \frac{1}{0}$ ∄ (undefined)

$\frac{\pi}{6} = 30^\circ$

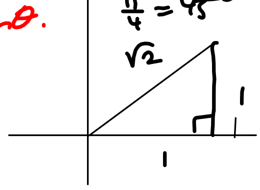


$\sin\frac{\pi}{6} = \frac{1}{2}$ $\quad \csc\frac{\pi}{6} = 2$

$\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$ $\quad \sec\frac{\pi}{6} = \frac{2}{\sqrt{3}}$

$\tan\frac{\pi}{6} = \frac{1}{\sqrt{3}}$ $\quad \cot\theta = \sqrt{3}$

$\frac{\pi}{4} = 45^\circ$

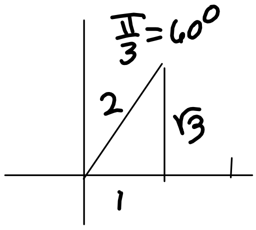


$\sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$\cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$\tan\theta = 1$

$\frac{\pi}{3} = 60^\circ$



$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$ $\quad \csc\frac{\pi}{3} = \frac{2}{\sqrt{3}}$

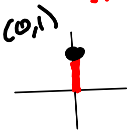
$\cos\frac{\pi}{3} = \frac{1}{2}$ $\quad \sec\frac{\pi}{3} = 2$

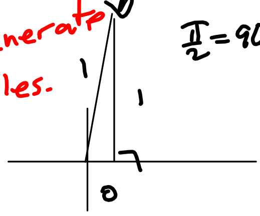
$\tan\frac{\pi}{3} = \frac{\sqrt{3}}{1} = \sqrt{3}$ $\quad \cot\left(\frac{\pi}{3}\right) = \frac{1}{\sqrt{3}}$

Degenerate Triangles.

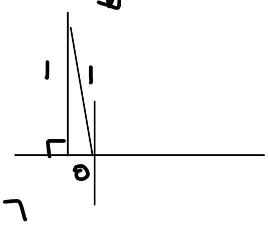
Basically the same

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





OR



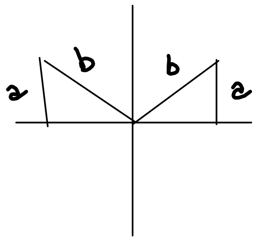
$\sin\frac{\pi}{2} = 1$ $\quad \csc\frac{\pi}{2} = 1$

$\cos\frac{\pi}{2} = 0$ $\quad \sec\frac{\pi}{2}$ ∄

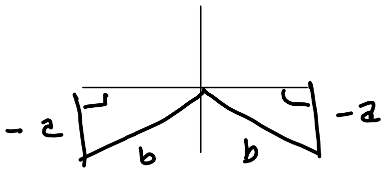
$\tan\frac{\pi}{2} = \frac{1}{0}$ ∄ $\quad \cot\frac{\pi}{2} = \frac{0}{1} = 0$

There are generally two pictures for

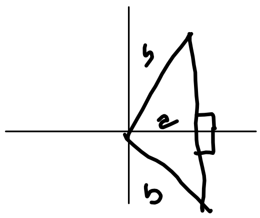
$\sin\theta = \frac{a}{b}$, where $a>0, b>0$



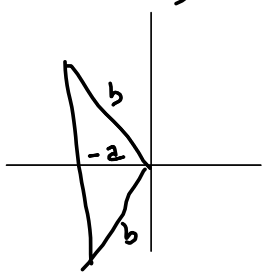
$\sin\theta = -\frac{a}{b}$



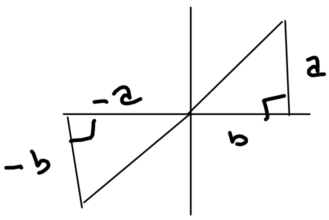
$\cos\theta = \frac{a}{b}$



$\cos\theta = -\frac{a}{b}$

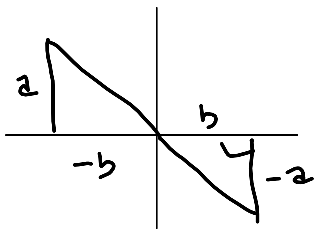


$\tan\theta = \frac{a}{b}$

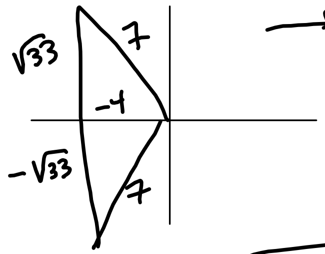


$\cancel{\tan\left(-\frac{a}{b}\right)}$ No!

$\tan\theta = -\frac{a}{b}$



$\sec\theta = -\frac{7}{4} \implies \cos\theta = -\frac{4}{7}$



~~Find the other 5 trigs~~

$\sin\theta =$ $\quad \csc\theta$

$\cos\theta = -\frac{4}{7}$

$\tan\theta =$ $\quad \cot\theta$

$\sqrt{7^2 - 4^2} = \sqrt{49-16} = \sqrt{33}$

$\sqrt{7^2 - (-4)^2}$

No. we're just solving the equation.

$\cos\theta = -\frac{4}{7}$ has 2 solutions between 0 & 2π ($0°$ & $360°$)

Now, solve

$\sec\theta = -\frac{7}{4}$

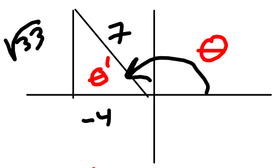
$\cos\theta = -\frac{4}{7}$

Use the $\cos^{-1}$ key OR use arccosine

$\arccos\left(-\frac{4}{7}\right) \approx 2.17904190571 \approx \boxed{2.1790 \approx \theta}$

$\therefore \approx 124.849904579^\circ \approx \boxed{124.8499^\circ \approx \theta}$

we just found this possibility:



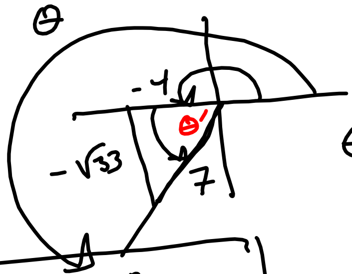
$\theta' = \pi - \theta$

$= \pi - 2.17\ldots$

$\theta' \approx 0.96255074788$

Your Calculator Can't "see"

this one:



$$\boxed{\begin{array}{c}\theta \approx 2.1790 \text{ or } 124.8499^\circ \\ \text{or} \\ \theta \approx 4.1041 \text{ or } 235.1501^\circ\end{array}}$$

what is this one?

Same referenceangle

$\theta = \pi + \theta'$

$= \pi + .962\ldots$

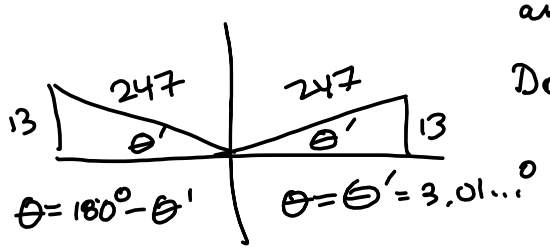
≈ 4.10414340147

$\approx 235.150095421^\circ$

$\approx \boxed{235.1501^\circ}$ or

$\approx \boxed{4.1041}$

$\sin\theta = \frac{13}{247}$



$\arcsin\left(\frac{13}{247}\right) \approx 3.01696130982°$

Do this one in degrees mode

arcsine gives me one of 'em

What's the other one?

$\approx 176.98303869°$

$\approx \boxed{176.9831° \approx \theta}$

To get radians, convert

$(176.98303869°)\left(\frac{\pi}{180°}\right) \approx 3.08893674533 \approx \boxed{3.0889 \approx \theta}$ Radians

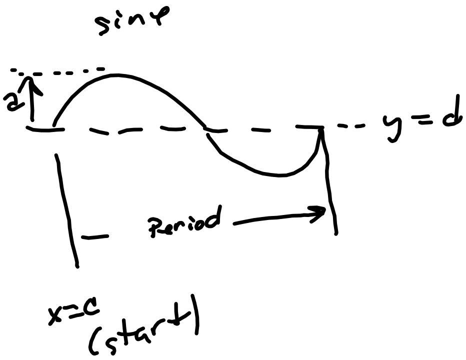
$\arcsin\left(\frac{13}{247}\right) \approx 3.01696130982°$

radians

$\boxed{\theta \approx 0.0526559082616}$

$\boxed{\approx 3.0170°}$.

Monday, we'll talk about modeling with sine and cosine.



y=d is midline

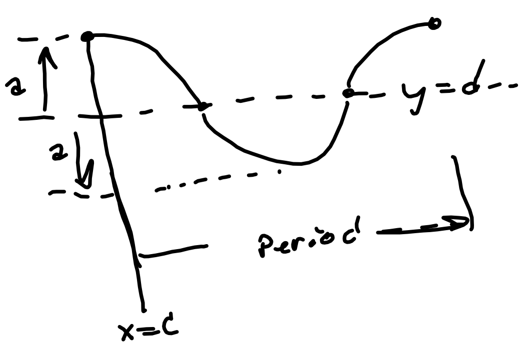
$y = a\sin(b(x-c)) + d$

amplitude

Relates to period

x=c starts

cosine



$a\cos(b(x-c)) + d$

Tricky part is finding b.

sine & cosine have period 2π

So if sine func has period 365.

we want $\sin(bx)$ to have $bx = 2\pi$ when $x = 365$

$b \cdot 365 = 365b = 2\pi$

$b = \frac{2\pi}{365}$

$a\cos\left(\frac{2\pi}{365}(x-c)\right) + d.$

$a\sin\left(\frac{2\pi}{365}(x-c)\right) + d$

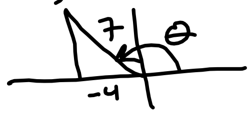
Desmos Transcript:

Calculator in degrees mode:

$\arccos\left(-\frac{4}{7}\right)$

$= 124.849904579$

Solving $\cos\theta = -\frac{4}{7}$ in degrees



Calculator sees only this one

$2.17904190571 \cdot \frac{180}{\pi}$

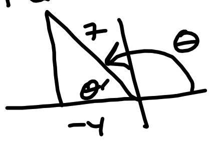
$= 124.849904579$

Convert to radians

$\pi - 2.17904190571$

$= 0.96255074788$

Find the reference angle θ'



$\pi + 0.96255074788$

$= 4.10414340147$

Use ref. angle to find the other sol'n.

$4.10414340147 \cdot \frac{180}{\pi}$

$= 235.150095421$

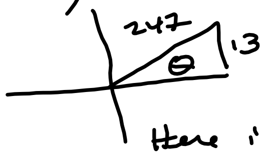
Convert radians to degrees.

Then we switched to degrees mode:

$\arcsin\left(\frac{13}{247}\right)$

$= 3.01696130982$

Solving $\sin\theta = \frac{13}{247}$



Calculator finds this one

Here in QI, $\theta = \theta'$

$180 - 3.01696130982$

$= 176.98303869$

Find the other sol'n using reference angle

$180° - \theta'$ (degrees)

$(\pi - \theta'$ if radians$)$

$176.98303869 \cdot \frac{\pi}{180}$

$= 3.08893674533$

Convert to radians

$3.01696130982 \cdot \frac{\pi}{180}$

$= 0.0526559082616$

Convert 1^{st} sol'n to radians

NO ROUNDING UNTIL FINAL ANSWER