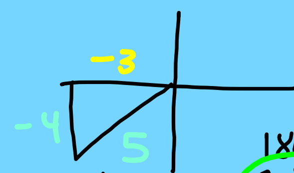
15/ Given $\sin x = \frac{-4}{5} \frac{y}{r}$ & $\pi < x < \frac{3\pi}{2}$

Find $\cos \frac{x}{2}$.

Draw a picture!



$180^\circ < x < 270^\circ$

$90^\circ < \frac{x}{2} < 135^\circ$

$x^2 + 16 = 25$

$x^2 = 9$

$x = \pm 3$

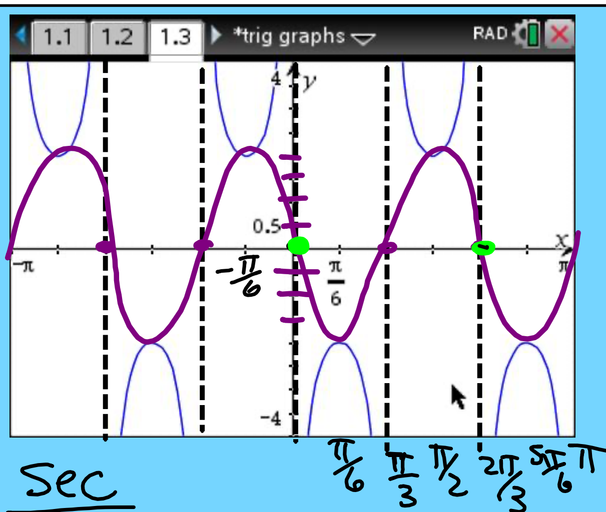
$$\cos \frac{x}{2} = \pm\sqrt{\frac{1+\cos x}{2}}$$

is in Q II.

$$= -\sqrt{\frac{1+\frac{-3}{5}}{2}}$$

$$= -\sqrt{\frac{\frac{\cancel{2}}{5}\cdot\frac{1}{\cancel{2}}}{\cancel{2}}}$$

$$= -\sqrt{\frac{1}{5}} = \frac{-1}{\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}} = -\frac{\sqrt{5}}{5}$$



Sec

amp	per.	p.s.	v.s
2	$\frac{2\pi}{3}$	$-\frac{\pi}{6}$	0

↑ Find 2 peaks/valley R-L

$$y = 2\sec\left(3\left(x+\frac{\pi}{6}\right)\right)$$

$$per = \frac{2\pi}{b} = \frac{2\pi}{\frac{2\pi}{3}} = \frac{\cancel{2\pi}\cdot 3}{\cancel{2\pi}} = 3$$

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

tan x shifts center
cot x shifts asymptote

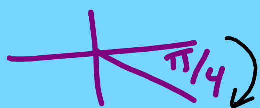
tan/cot $b = \frac{\pi}{per.}$

Inverse Trig Func.

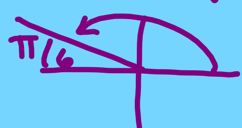
$-\begin{cases}\cos^{-1}x\\ \sec^{-1}x\\ \cot^{-1}x\end{cases}$ | All(+)

$\begin{matrix}\csc^{-1}x\\ \sin^{-1}x\\ \tan^{-1}x\end{cases}$ $-$

$\sin^{-1}\left(\frac{-\sqrt{2}}{2}\right) = -\frac{\pi}{4}$



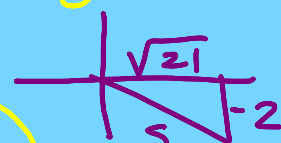
$\cot^{-1}\left(-\sqrt{3}\right) = \frac{5\pi}{6}$



$\cos\left(\underbrace{\text{Arccsc}\left(-\frac{5}{2}\right)}_{\theta}\right)$ $\frac{r}{y}$

$\cos\theta =$

$\frac{x}{r} = \frac{\sqrt{21}}{5}$



$x^2 + 4 = 25$

$x^2 = 21$

e) 1) Use double angle identity

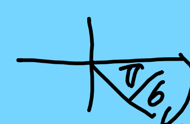
2) Draw a pic.

3) Fill in values.

f) $\sin(A-B)$

Like 20(a)

$\sec^{-1}x + \sin^{-1}\left(-\frac{1}{2}\right) = \frac{\pi}{3}$



$\sec^{-1}x - \pi/6 = \pi/3$

$+\pi/6$

Stop! Check quadrant

$\sec^{-1}x = \frac{\pi}{2}$

$\sec(\pi/2) = x$

$\text{Undef} = x$

21(c) $[0°, 360°)$

$$3\sin 2x + 2\sin^2\left(\frac{x}{2}\right) = 1$$

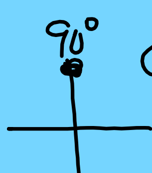
$$3 \cdot 2\sin x\cos x + 2\cdot\left(\sqrt{\frac{1-\cos x}{2}}\right)^2 = 1$$

$$6\sin x\cos x + \cancel{2}\left(\frac{1-\cos x}{\cancel{2}}\right) = 1$$

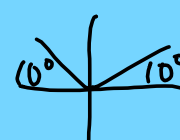
$$6\sin x\cos x + \cancel{1} - \cos x = \cancel{1}$$

$$6\sin x\cos x - \cos x = 0$$

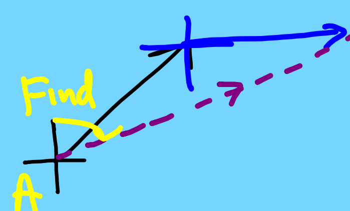
$$\cos x\,(6\sin x - 1) = 0$$



$\cos x = 0$ $\quad \sin x = \frac{1}{6}$



$90°, 270°, 10°, 170°$



Polar Coordinates

(r, θ)

Rectang. Coord

(x, y)

Polar → Rect

$x = r\cos\theta$

$y = r\sin\theta$

Rect. → Polar

(Draw! pic!)

$r = \sqrt{x^2+y^2}$

$\theta = \tan^{-1}(y/x)$

$(-3, 5)$

$9+25=r^2$

$\tan\theta = \frac{5}{-3}$

Use

Polar Form

$r(\cos\theta + i\sin\theta)$

Rect. Form

$x + yi$

$4 - 3i$

$2(\cos 30^\circ + i\sin 30^\circ)\cdot 8(\cos 152^\circ + i\sin 152^\circ)$

$= 16(\cos 182^\circ + i\sin 182^\circ)$

$320-80$

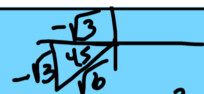
$$\frac{18(\cos 320^\circ + i\sin 320^\circ)}{6(\cos 80^\circ + i\sin 80^\circ)} = 3(\cos 240^\circ + i\sin 240^\circ)$$

$\cancel{60}$

$3\left(-\frac{1}{2} + i\frac{-\sqrt{3}}{2}\right)$

$= -\frac{3}{2} - \frac{3i\sqrt{3}}{2}$

$\left(-\sqrt{3}-i\sqrt{3}\right)^4$



$3+3=r^2$

$\sqrt{6}=r$

$\tan\theta = \frac{-\sqrt{3}}{-\sqrt{3}} = -1$

45°

$\theta = 225^\circ$

$\left[\sqrt{6}\left(\cos 225^\circ + i\sin 225^\circ\right)\right]^4$

$\left(\sqrt{6}\right)^4\left(\cos 900^\circ + i\sin 900^\circ\right)$ 900° coterminal to 180°

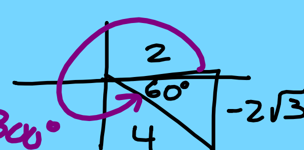
$36\left(\cos 180^\circ + i\sin 180^\circ\right)$

$36\left(-1 + i\,0\right) = \boxed{-36+0i}$

Solve.

$x^3 - \left(2-2i\sqrt{3}\right) = 0$ $\qquad 2-2i\sqrt{3}$

$\left(x^3\right)^{1/3} = \left(2-2i\sqrt{3}\right)^{1/3}$



$x = \left[4\left(\cos 300^\circ + i\sin 300^\circ\right)\right]^{1/3}$ $\qquad \tan\theta = \frac{-\cancel{2}\sqrt{3}}{\cancel{2}}$

$300^\circ \cdot \frac{1}{3}$

$360^\circ \div 3$

120°

1) $4^{1/3}\left(\cos 100^\circ + i\sin 100^\circ\right)$

$+120^\circ$

2) $4^{1/3}\left(\cos 220^\circ + i\sin 220^\circ\right)$

3) $4^{1/3}\left(\cos 340^\circ + i\sin 340^\circ\right)$