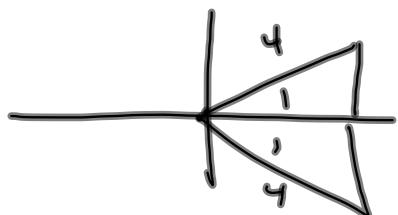


①  $\sec \theta = 4$  and  $\sin \theta < 0$

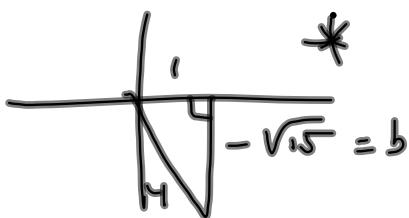


$$1^2 + b^2 = 4^2$$

$$b^2 = 15$$

$$b = \pm\sqrt{15}$$

$$\text{p.i.c } \sin \theta = -\sqrt{15}$$



$$\sin \theta = -\frac{\sqrt{15}}{4} \quad \csc \theta = -\frac{\sqrt{15}}{4}$$

$$\cos \theta = \frac{1}{4} \quad \sec \theta = 4$$

$$\tan \theta = -\sqrt{15} \quad \cot \theta = -\frac{1}{\sqrt{15}}$$

②

$$4\cos^2 x - 3 = 0$$

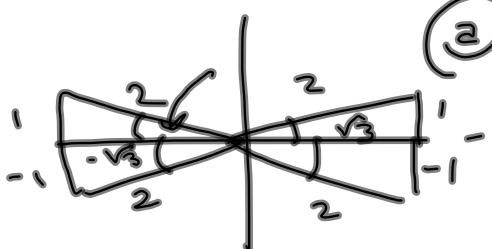
$$\cos^2 \theta = \frac{3}{4}$$

$$\cos \theta = \pm \sqrt{\frac{3}{4}} = \pm \frac{\sqrt{3}}{2}$$

$$4u^2 - 3 = 0$$

$$u^2 = \frac{3}{4}$$

$$u = \pm \sqrt{\frac{3}{4}} = \pm \frac{\sqrt{3}}{2}$$



②

$$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$30^\circ, 150^\circ, 210^\circ, 330^\circ$$

③

$$\frac{\pi}{6} + 2n\pi$$

$$30^\circ + 360^\circ n \quad \forall n \in \mathbb{Z}$$

$$\frac{5\pi}{6} \quad ..$$

$$50^\circ + 360^\circ n$$

$$\frac{7\pi}{6} \quad ..$$

$$210^\circ + 360^\circ n$$

$$\frac{11\pi}{6} \quad ..$$

$$330^\circ + 360^\circ n$$

$$\frac{\pi}{6} + n\pi$$

$$30^\circ + 180^\circ n$$

$$\frac{5\pi}{6} + n\pi$$

$$150^\circ + 180^\circ n$$

③  $2x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{13\pi}{6}, \frac{15\pi}{6}$

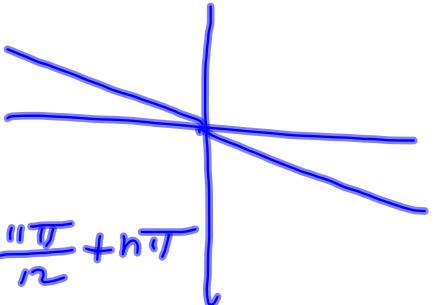
②  $x = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}, \frac{25\pi}{12}$

Solutions in  $[0, 2\pi]$

$$\begin{matrix} 1, 80 \\ 1, 95 \\ 3, 75 \end{matrix}$$

#2  $30^\circ + 360^\circ n$

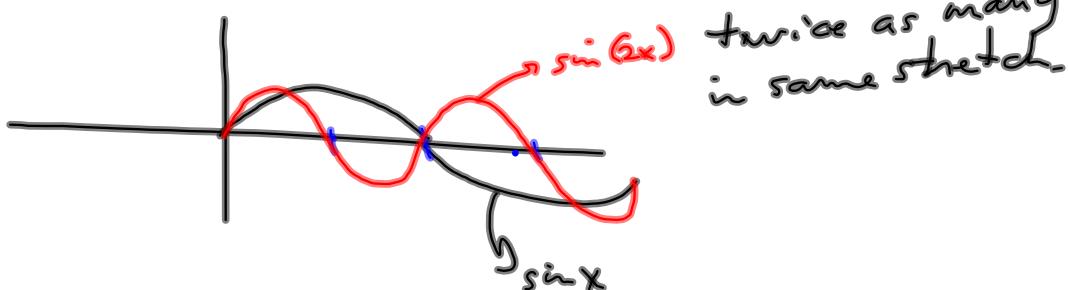
#3  $15^\circ + 180^\circ n = 15^\circ, 195^\circ, \cancel{315^\circ}$



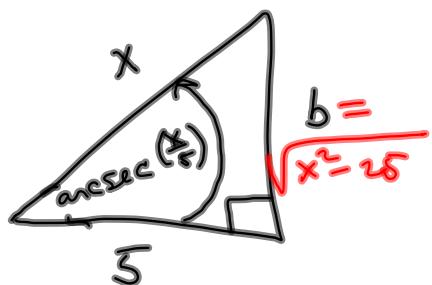
③b  $\frac{\pi}{12} + n\pi, \frac{5\pi}{12} + n\pi, \frac{7\pi}{12} + n\pi, \frac{11\pi}{12} + n\pi$

Just divide  
#2 by 2       $\frac{\pi}{12} + \frac{n\pi}{2}$  covers both

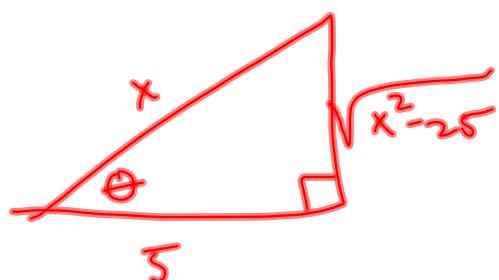
Added comments  
when looking for  $x$  in  $[0, 2\pi]$ ,  
that means  $2x$  in  $[0, 4\pi]$



$$④ \tan(\sec^{-1}\left(\frac{x}{5}\right)) = \tan \theta = \frac{\sqrt{x^2-25}}{5}$$



$$\begin{aligned} 5^2 + b^2 &= x^2 \\ b^2 &= x^2 - 25 \\ b &= \pm \sqrt{x^2 - 25} \\ \text{Take the positive.} \end{aligned}$$



$$\cos x - 1 = \sin x$$

$$(\cos x - 1)^2 = \sin^2 x$$

$$\cos^2 x - 2\cos x + 1 = \sin^2 x = 1 - \cos^2 x$$

$$2\cos^2 x - 2\cos x = 0$$

$$2\cos x (\cos x - 1) = 0$$

$$\cos x = 0$$



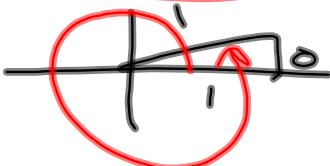
$$x = \frac{\pi}{2}, \frac{3\pi}{2}$$

$$90^\circ, 270^\circ$$

$$\cos x - 1 = 0$$

$$\cos x = 1$$

$$x = 0, 2\pi$$

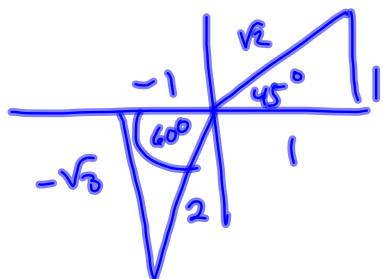


$$\frac{19\pi}{12} = \frac{12\pi}{12} + \frac{7\pi}{12}$$

No help

$$\left(\frac{19\pi}{12}\right)\left(\frac{180^\circ}{\pi}\right) = 285^\circ \quad \frac{7\pi}{12} = \frac{3\pi}{12} + \frac{4\pi}{12}$$

$$= 240^\circ + 45^\circ$$



$$\sin \frac{19\pi}{12} = \sin\left(\frac{4\pi}{3}\right) \cos\left(\frac{\pi}{4}\right) + \sin\left(\frac{\pi}{4}\right) \cos\left(\frac{4\pi}{3}\right)$$

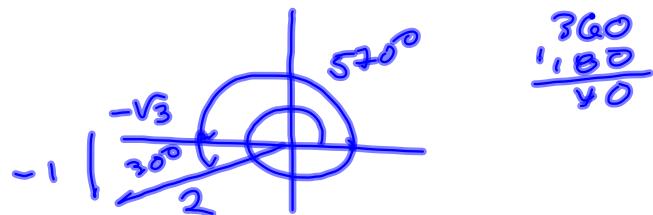
$$\sin(240^\circ) \cos(45^\circ) + \cos(240^\circ) \sin(45^\circ)$$

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

$$= \boxed{\frac{-\sqrt{3}-1}{2\sqrt{2}}} \quad = \frac{-\sqrt{6}-\sqrt{2}}{4}$$

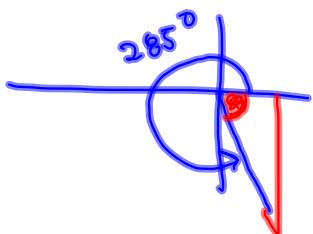
$\frac{19\pi}{12}$  sucks, but  $\frac{\frac{19\pi}{6}}{2}$  is manageable

$$\frac{19\pi}{6} = 570^\circ$$



$\sin(285^\circ)$  is NEGATIVE

Locate it:



$$\sin(285^\circ) = -$$

$$\begin{aligned}
 & \frac{1 - \cos(570^\circ)}{2} \\
 &= -\sqrt{\frac{1 - (-\frac{\sqrt{3}}{2})}{2}} = -\sqrt{\frac{2 + \sqrt{3}}{2}} \\
 &= -\sqrt{\frac{2 + \sqrt{3}}{4}} \\
 &= \frac{-\sqrt{2 + \sqrt{3}}}{2} \\
 &= \frac{-\sqrt{6} - \sqrt{2}}{4}
 \end{aligned}$$

$$\frac{-\sqrt{2+\sqrt{3}}}{2} = \frac{-\sqrt{6}-\sqrt{2}}{4}$$

; if

$$\frac{-2\sqrt{2+\sqrt{3}}}{4} = \frac{-\sqrt{6}-\sqrt{2}}{4}$$

$$(2\sqrt{2+\sqrt{3}})^2 = (\sqrt{6} + \sqrt{2})^2$$

$\Rightarrow$

$$\begin{aligned}\sqrt{12} \\ = \sqrt{4 \cdot 3} \\ = \sqrt{6} \sqrt{2} \\ = \approx \sqrt{3}\end{aligned}$$

$$4(2+\sqrt{3}) = \sqrt{6}^2 + 2\sqrt{6}\sqrt{2} + \sqrt{2}^2$$

$$4(2+\sqrt{3}) = 6 + 2\sqrt{12} + 2$$

$$8+4\sqrt{3} = 6 + 2 \cdot 2\sqrt{3} + 2$$

$$= 8+4\sqrt{3}$$

So their squares are the same,

$$A^2 = B^2$$

$\Rightarrow A = \pm B$ , But we know

A & B are same sign so

ditch the "-,"

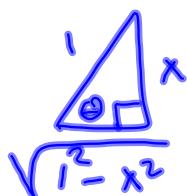
$$\sin(\arcsin(x) + \arccos(x))$$

$$= \sin(\arcsin(x)) \cos(\arccos(x)) + \sin(\arccos(x)) \cos(\arcsin(x))$$

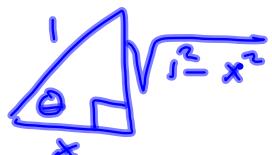
$\sin(u+v) = \sin u \cos v + \sin v \cos u$   
 $\sin \frac{3}{4}$  is gah bridge.

$\sin \theta = \frac{3}{4}$  is what you mean.

$$\theta = \arcsin(x)$$



$$\theta = \arccos(x)$$



$$= \underline{\sin(\arcsin(x))} \cos(\arccos(x)) + \sin(\arccos(x)) \cos(\arcsin(x))$$

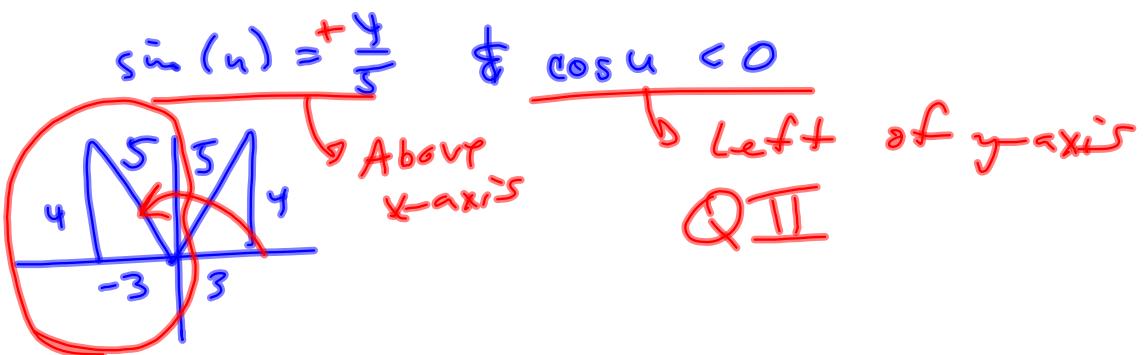
$$x \cdot x + \sqrt{1-x^2} \sqrt{1-x^2}$$

$$x^2 + (1-x^2) = 1$$

$$(\sqrt{1-x^2})(\sqrt{1-x^2}) = 1-x^2$$

$$\sqrt{(1-x^2)(1-x^2)} = \boxed{|1-x^2|} = 1-x^2$$

if  $1-x^2$  is under  $\sqrt$ , then  
it's assumed  $1-x^2 \geq 0$



$$\begin{aligned}\sin(2u) &= 2\sin u \cos u = 2\left(\frac{4}{5}\right)\left(-\frac{3}{5}\right) \\ &= -\frac{24}{25}\end{aligned}$$

$$\cos(2u) = 1 - 2\sin^2 u = 1 - 2\left(\frac{16}{25}\right) = \frac{25-32}{25} = -\frac{7}{25}$$

$$= \cos^2 u - \sin^2 u = \left(-\frac{3}{5}\right)^2 - \left(\frac{4}{5}\right)^2 = \frac{9-16}{25} = -\frac{7}{25}$$

$$\tan(2u) = \frac{\sin(2u)}{\cos(2u)} = \frac{-\frac{24}{25}}{-\frac{7}{25}} = \left(-\frac{24}{25}\right)\left(\frac{25}{7}\right) = \frac{24}{7}$$

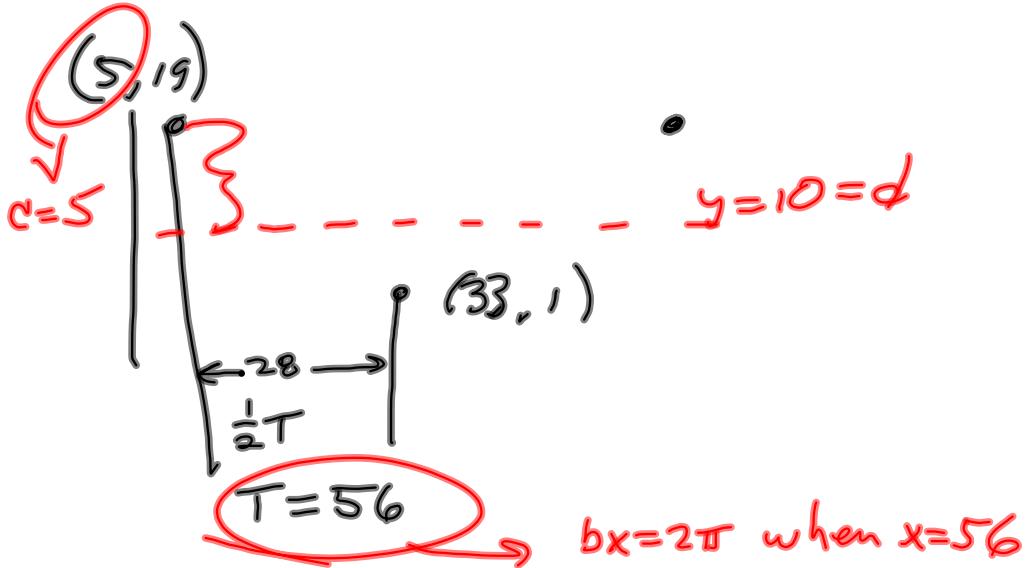
⑨

$$s = r \theta$$

$$= (9)(900)\left(\frac{\pi}{180}\right) = 45\pi$$

$$\approx 141.3716694$$

31



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

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

$$9 \cos\left(\frac{\pi}{28}(x-5)\right) + 10$$

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

B2

$$A = \frac{1}{2}r^2\theta \rightarrow \theta \text{ in radians}$$

$$= \frac{1}{2}(15)^2(50^\circ)\left(\frac{\pi}{180^\circ}\right)$$

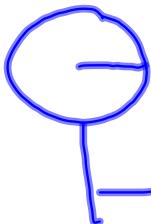
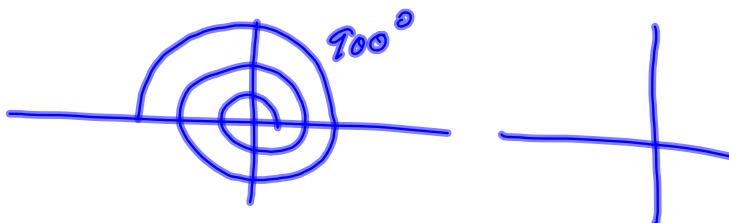
$$= \frac{125\pi}{4} \approx 98.1748$$

Students are confusing arc length with finding coterminal angles.

#9

$900^\circ$  is coterminal with

$\frac{900^\circ}{360^\circ} = 2.5$  times around circle.  
coterminal with  $\underline{\underline{180^\circ}}$



want the  
distance the  
wheel rolled.



$180^\circ$  is its  
final  
alignment.