1420 Weekl Assignment Mills, Harry

(1) **The ratio of the change in the central angle θ to the elapsed time t is**

$\frac{d\theta}{dt}$ = angular speed.

(2) The arc length s corresponding to a radius r and a central angle θ is

$s=r\theta$, provided θ is in radians.

(3) The area A of a sector of a circle with radius r and central angle θ (in radians) is

$$\boxed{A=\frac{1}{2}r^2\theta}$$

(4) Two angles coterminal with $\frac{2\pi}{3}$ are

$$\frac{2\pi}{3}+2\pi = \frac{2\pi+6\pi}{3} = \boxed{\frac{8\pi}{3}=\theta_1} \quad \text{and}$$

$$\frac{2\pi}{3}-2\pi = \frac{2\pi-6\pi}{3} = \boxed{-\frac{4\pi}{3}=\theta_2}$$

(5) The complement of $\theta=\frac{\pi}{3}$ is $\boxed{\frac{\pi}{6}}$ b/c $\frac{\pi}{2}-\frac{\pi}{3}=\frac{(3-2)\pi}{6}=\frac{\pi}{6}$

" " " $\theta=\frac{3\pi}{4}$ $\boxed{\nexists.}$

The supplement of $\theta=\frac{\pi}{6}$ is $\pi-\frac{\pi}{6}=\boxed{\frac{5\pi}{6}.}$

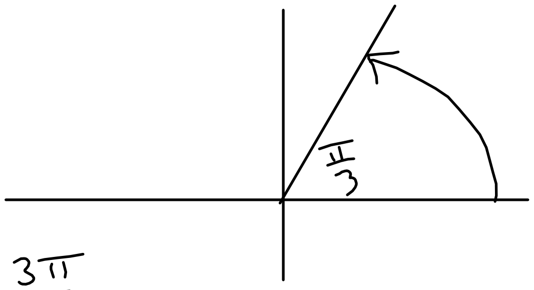
" " " " " $\frac{3\pi}{4}$ is $\pi-\frac{3\pi}{4}=\boxed{\frac{\pi}{4}}$

1420

MILLS_HARRY

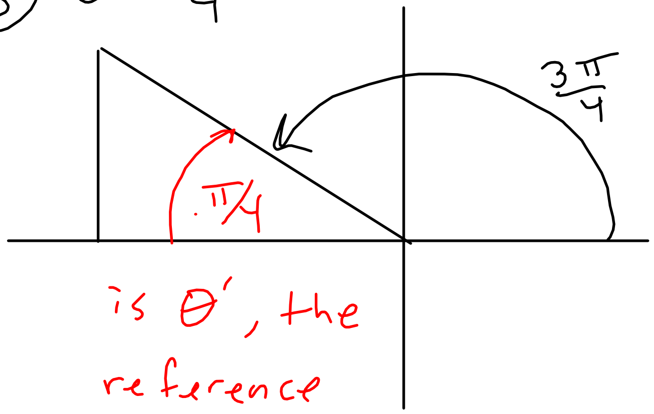
6. we sketch & state the quadrant of each angle;

(a) $\theta = \frac{\pi}{3}$



$\boxed{Q\ I}$

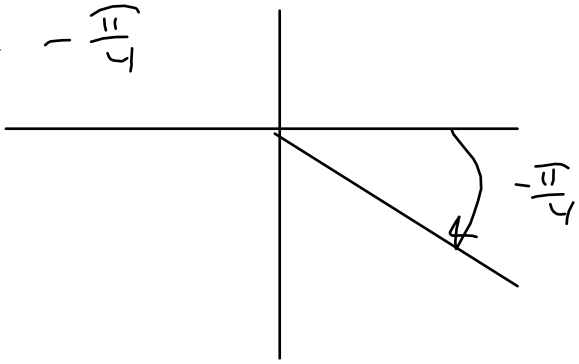
(b) $\theta = \frac{3\pi}{4}$



is θ', the reference angle.

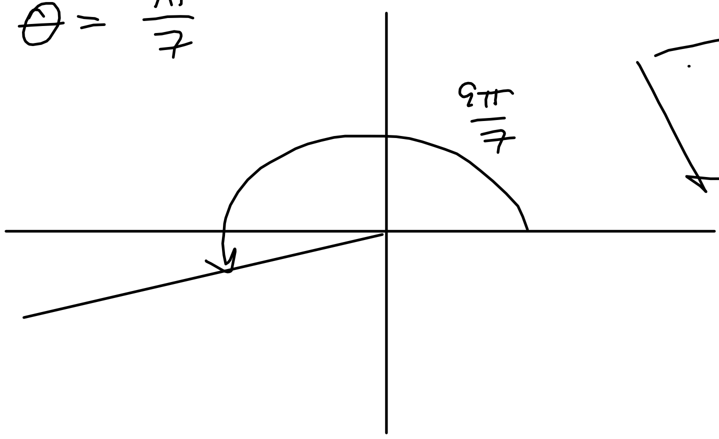
$\boxed{Q\ II}$

(c) $\theta = -\frac{\pi}{4}$



Q IV

(d) $\theta = \frac{9\pi}{7}$

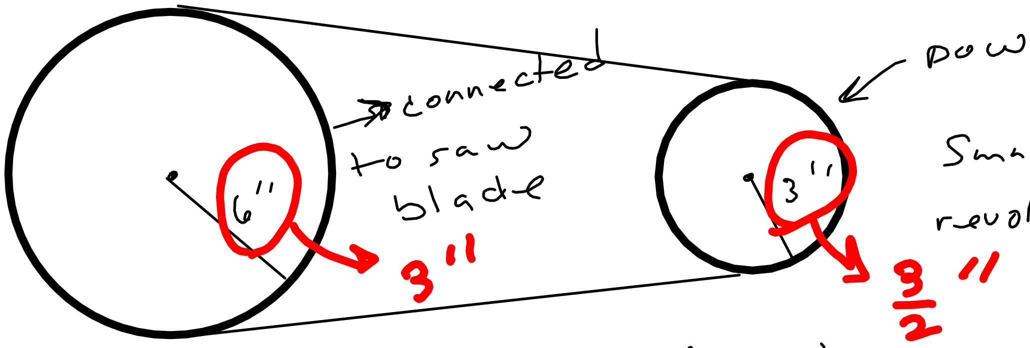


$\boxed{Q\ III}$

1420

MILLS, H.

(7)



Smaller pulley revolves @ 1000 $\frac{\text{rev}}{\text{min}}$

we're

(a) We find angular speed (velocity) in radians per minute of each per minute

powered pulley: $\left(\frac{1000 \text{ rev}}{\text{min}}\right)\left(\frac{2\pi \text{ radians}}{\text{rev}}\right) = \boxed{2000\pi \ \frac{\text{radians}}{\text{min}}}$

$\approx 6283.185308 \ \frac{\text{radians}}{\text{min}}$

saw pulley: $\left(\frac{1000 \text{ rev. powered wheel}}{\text{min}}\right)\left(\frac{3 \text{ revs saw}}{6 \text{ revs power}}\right)\left(\frac{2\pi \text{ rad}}{\text{rev}}\right)$

3/2   3

$= \boxed{1000\pi \ \frac{\text{radians}}{\text{min}}}$

Same answer but using radius is classier

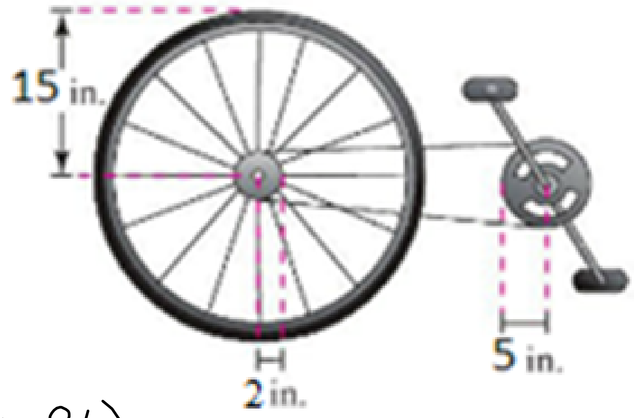
(b) Revolutions / min of saw is $\left(\frac{1000 \text{ revs power}}{\text{min}}\right)\left(\frac{3 \text{ revs saw}}{6 \text{ '' power}}\right)$

$= \boxed{500 \text{ rpm}}$

1420 **Mills, Harry**

8. The radii of the pedal sprocket, wheel sprocket, and the wheel of the bicycle i the figure are 5", 2", and 15", respectively.

If a cyclist is pedaling at a rate of 1.4 revolutions per second, ..,



(a) The speed of the bicycle in ft/sec is

$$\left(\frac{1.4 \text{ revs front}}{\text{sec}}\right)\left(\frac{5 \text{ revs rear}}{2 \text{ revs front}}\right)\left(\frac{2\pi \text{ radians}}{1 \text{ rev}}\right)\left(15 \text{ in}\right)\left(\frac{1 \text{ ft}}{12 \text{ in}}\right)$$

$$= \left(\frac{14}{10}\right)\left(\frac{5}{2}\right)(2\pi)(15)\left(\frac{1}{12}\right)\frac{\text{ft}}{\text{sec}} = \boxed{\frac{35\pi}{4}\ \frac{\text{ft}}{\text{s}}} \approx 27.48893572$$

$$\left(\frac{\overset{7}{\cancel{14}}}{\underset{\underset{1}{\cancel{2}}}{\cancel{10}}}\right)\left(\frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{2}}}\right)(\overset{1}{\cancel{2}}\pi)(\overset{5}{\cancel{15}})\left(\frac{1}{\underset{4}{\cancel{12}}}\right) \quad \text{(scratch)} \qquad \approx \boxed{27.5\ \frac{\text{ft}}{\text{s}}}$$

(b) The above is $\left(\frac{35\pi}{4}\ \frac{\text{ft}}{\text{se}}\right)\left(\frac{1 \text{ mi}}{5280 \text{ ft}}\right)\left(\frac{3600 \text{ sec}}{1 \text{ hr}}\right) \approx 18.74245617$

$$\approx \boxed{18.7\ \frac{\text{mi}}{\text{hr}}}$$

Reference: 1 radian is about 57.29577950° .

Looks like 60° when just eyeballing it.