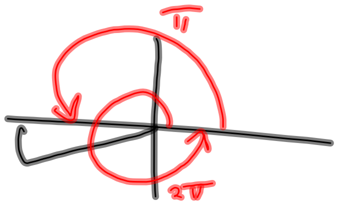
Home work questions.

15, 41 , 60, 53, 19



π + a smidge

$\pi + \frac{\pi}{6} = \frac{7\pi}{6}$

(15) Coterminal with $\frac{\pi}{6}$

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

$\frac{\pi}{6} - 2\pi =$

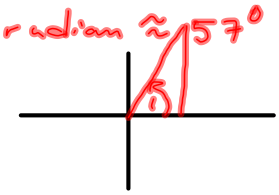
(19) Comp & Supp.

1

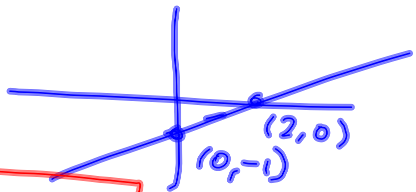
$1 + 2\pi$

$1 - 2\pi$ are coterminal.

1 radian ≈ 57^0 sorta $\qquad 0 < 1 < \frac{\pi}{2}$



Perfect pic for 1 radian



Comp. $\alpha + \beta = \frac{\pi}{2}$ $\quad$ & $\alpha, \beta > 0$ $\quad$ $\frac{\pi}{2} \approx 1.57$

$1 + \beta = \frac{\pi}{2}$

.5707963268 Lame ≈ $\boxed{\beta = \frac{\pi}{2} - 1}$ Exact is exactly right.

π/2−1	.5707963268
π−1	2.141592654

Supp. $\alpha + \beta = \pi$

$1 + \beta = \pi$

2.14159 2654 Lame ≈ $\boxed{\beta = \pi - 1}$ exact.

#54 Find central angle

$\sqrt{2}$

$r = 14$ ft, $s = 8$ ft.

What's the relationship between r, s & θ (in radians)?

$$\theta = \frac{\text{arc length}}{\text{radius}} = \frac{s}{r}$$

$$= \frac{8}{14} = \frac{4}{7} \text{ radians !}$$

$s = r\theta$ gets used more.

Jan 22-8:35 AM

60 Real-life. Calculator required.

#59 gives you angle θ* & radius r

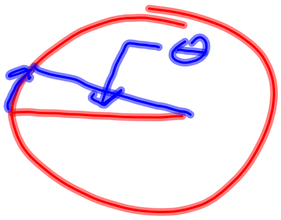
* Actually $\theta = \theta_1 - \theta_2$

#60 gives you radius r and arc length s

$$\theta = \frac{s}{r} = \frac{400}{6378} = \boxed{\frac{200}{3189}}$$

$$\approx \left(\frac{200}{3189}\right)\left(\frac{180^\circ}{\pi \text{ radians}}\right) \approx 3.5933^\circ$$

```
π/2-1
      .5707963268
π-1
      2.141592654
200/3189*180/π
       3.59333832
```



Arc Length $s = r\theta$

How far does a wheel with a diameter of 26 inches travel if it revolves $5\frac{1}{2}$ times?

$5\frac{1}{2} = 5 + \frac{1}{2} = \frac{11}{2}$

$s = r\theta$, $r = 13$ in

$\theta = ?$

$\theta = \left(\frac{11}{2} \text{ revolutions}\right)\left(\frac{2\pi \text{ radians}}{1 \text{ revolution}}\right)$

$= 11\pi$ radians

radians

$s = r\theta = (11\pi)(13 \text{ in}) = 143\pi$ in.

A little hinky in the units, when I go from θ to s. I think of radians as a pure # when taking this step.

Makes sense, since

$\theta = \frac{s}{r} = \frac{\text{distance units}}{\text{distance units}} =$ unitless number.

Jan 22-8:47 AM

Linear and Angular speeds

Linear speed $= \dfrac{\text{arc length change}}{\text{time change}}$

$= \dfrac{\Delta s}{\Delta t} = \dfrac{r\Delta\theta}{\Delta t} \longrightarrow s = r\theta \Longrightarrow \Delta s = r\,\Delta\theta$

How fast ~~and~~ are you moving, if your 26" tires are spinning @ 500 rpm?

$\dfrac{\Delta\theta}{\Delta t} = \left(\dfrac{500 \text{ rev}}{\text{min}}\right)\left(\dfrac{2\pi \text{ rads}}{1 \text{ rev}}\right)$ = angular speed.

$= 1000\pi \ \dfrac{\text{radians}}{\text{min}}$

$\dfrac{\Delta s}{\Delta t} = \dfrac{r\Delta\theta}{\Delta t} = (13 \text{ in})\left(1000\pi \ \dfrac{\text{rads}}{\text{min}}\right)$

$= 13000\pi \ \dfrac{\text{in}}{\text{min}}$

$= \left(13000\pi \ \dfrac{\cancel{\text{in}}}{\cancel{\text{min}}}\right)\left(\dfrac{1 \cancel{\text{ft}}}{12 \cancel{\text{in}}}\right)\left(\dfrac{60 \cancel{\text{ min}}}{1 \text{ hr}}\right)\left(\dfrac{1 \text{ mi}}{5280 \cancel{\text{ ft}}}\right)$

$= \dfrac{(13000\pi)(60)}{(12)(5280)} \ \dfrac{\text{mi}}{\text{hr}}$

Jan 22-8:57 AM