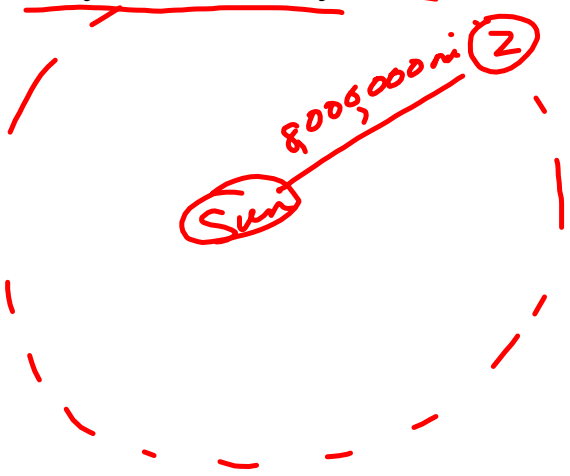
(1) Planet Z is 8,000,000 miles away from the sun. If it is moving through space at 25000 mph, how long is its year in days?



$v = \frac{25000\ mi}{1\ hr.} \cdot \frac{24\ hr}{1\ day} = 600000\ mi/day$

$r = 8000000\ mi$

$v = r \cdot w$

$\frac{600000\ mi/day}{8000000} = \frac{8000000\ w}{8000000}$

$\frac{.075\ rad}{1\ day} = w$

$t = ?$ when $\theta = 2\pi$ rad.

$w = \frac{\theta}{t}$

$w = \frac{2\pi\ rad}{t}$

$\frac{.075\ rad}{1\ day} = \frac{2\pi}{t}$

$\frac{2\pi}{.075} = t$

$v = r \cdot w$

$w = \frac{\theta}{t}$

83.78 days = t

(42) (a) $\omega = ?$

$v = 17000$ mph

$r = 3960 + 200$

4160 mi

$v = r \cdot \omega$

$17000 \text{ mph} = 4160 \text{ mi} \cdot \omega$

$\omega = \frac{\theta}{t}$

$\omega = \frac{17000 \text{ mi/hr}}{4160 \text{ mi}} = 4.1 \text{ rad/hr}$

(b) $\omega = 4$ rad/hr.

$r = ?$

$v = 17000$ mph

$v = \omega \cdot r$

$17000 \text{ mi/hr} = (4 \text{ rad/hr})\, r$

$r - 3960 = 290$ mi

(2) If a sprinkler waters a sector of lawn with radius of 10 ft and arc length of 25 ft, what is the area of the sector of lawn being watered?

$\theta = \frac{s}{r}$

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

$\omega = \frac{\theta}{t}$

$v = r \cdot \omega$

$* \theta = \frac{s}{r}$

$\theta = \frac{25}{10}$

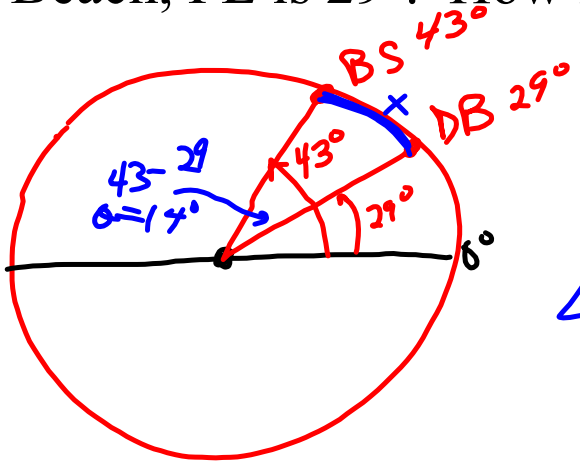
$\theta = 2.5$ radians

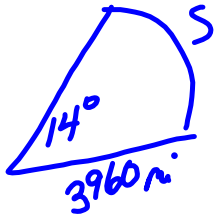
$A = \frac{1}{2}\theta^* r^2$

$\frac{1}{2}(2.5)(10)^2$

125 ft^2

(3) The diameter of the Earth is about 7920 miles. The latitude of Ballston Spa is 43° and the latitude of Daytona Beach, FL is 29°. How far apart are they?





$\theta = \frac{s}{r}$

$\left(\frac{14}{180}\right) = \frac{s}{3960}$

$s = 967.61$ mi

(4) A truck is traveling at 50 mph and has 24 in. tires. How fast are the tires rotating in rps?

(5) Mr. Smith has entered an agenda throwing contest. Mr. Smith can spin in a circle at 3.5 rps. If the agenda is 7.75 inches long and his arms are 2.5 feet, how fast (in mph) is he launching the agenda?

$\theta = 80 \cdot \frac{\pi}{180}$ rad.