SWBAT find the angular and linear velocity for a given problem.

Agenda:

- Warm - Up
- Angular/Linear Velocity Lesson
- Practice
- Exit Card

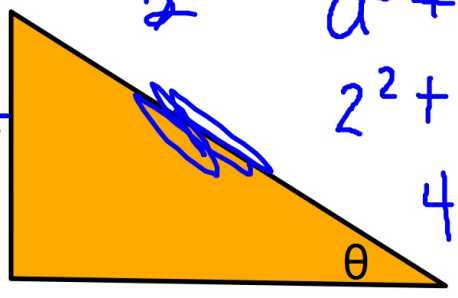
2.4 – Angular Motion HW

Page 357 #44 and 45

Page 366 #1 – 18 odd, 49 – 54 all and 61, 62

Warm - Up

Given the following triangle, find the six trig ratios.



$\csc\theta = \frac{2\sqrt{10}}{2} = \sqrt{10}$

$a^2 + b^2 = c^2$

$2^2 + 6^2 = c^2$

$4 + 36 = 40$

$c^2 = \sqrt{40}$

$c = 2\sqrt{10}$

$\sin = \frac{2}{2\sqrt{10}} \quad \frac{\sqrt{10}}{\sqrt{10}}$

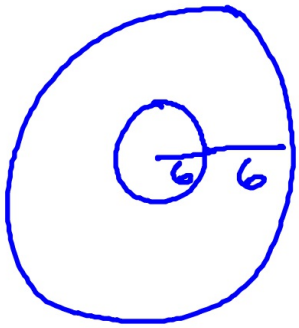
$\sin\theta = \frac{\sqrt{10}}{10}$

$\tan\theta = \frac{2}{6} = \frac{1}{3} \quad \cot\theta =$

$\cos\theta = \frac{6}{\sqrt{40}} = \frac{\sqrt{40}}{\sqrt{40}} = \frac{6\sqrt{40}}{40} = \frac{3\sqrt{40}}{20}$

$\sec\theta = \frac{2\sqrt{10}}{6} = \frac{\sqrt{10}}{3}$

HW) #38



$C = 2\pi r$

$\frac{37.7}{2\pi} = \frac{2\pi r}{2\pi}$

$6 = r$

$2\pi(12)$

$C = 24\pi$

31) $s = 40$

$r = ?$

$\theta = 20^\circ$

$s = \frac{\pi \cdot \theta}{180}$

$40 = \frac{\pi r(20)}{180}$

$\frac{7200 = \pi r 20}{20\pi}$

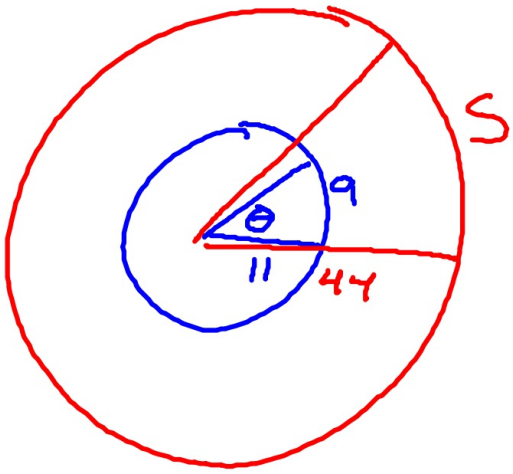
$114.6 = r$

33)

$S = r\theta$

$9 = 11\theta$

$\frac{9}{11} = \theta$



$S = r\theta$

$S = 44\left(\frac{9}{11}\right)$

$S = 36$

Angular/Linear Velocity

Angular velocity is measured in things like revolutions per minute.
Linear velocity is measured in things like miles per hour.

Example #1: A truck has wheels that are 36inches in diameter. If the wheels are rotating at 630 rpm (revolutions per minute), find the truck speed in miles per hour.

$$\frac{630\ rev}{1\ min} \cdot \frac{60\ min}{1\ hr} \cdot \frac{2\pi\ rad}{1\ rev} \cdot \frac{18\ in}{1\ rad} \cdot \frac{1\ ft}{12\ in} \cdot \frac{1\ mi}{5280\ ft}$$

67.47 mph

Example #2: A bicycle racer with a 13 in radius wheel is traveling at a speed of 44ft/sec, how many revolutions per minute are her wheels making?

$$\frac{44\text{ft}}{1\text{sec}} \cdot \frac{60\text{sec}}{1\text{min}} \cdot \frac{12\text{in}}{1\text{ft}} \cdot \frac{1\text{rad}}{13\text{in}} \cdot \frac{1\text{rev}}{2\pi\text{rad}}$$

$$387.85\ \text{rev/min}$$

Example #3: Find the speed of a vechile in miles per hour when 26 in diameter tires are traveling at 800 revolutions per minute.

$$\frac{800\text{rev}}{1\text{min}} \cdot \frac{60\text{min}}{1\text{hr}} \cdot \frac{2\pi\text{rad}}{1\text{rev}} \cdot \frac{13\text{in}}{1\text{rad}} \cdot \frac{1\text{ft}}{12\text{in}} \cdot \frac{1\text{m}}{5280\text{ft}}$$

$$61.87\ \text{mph}$$

Example #4: The second hand on a clock makes one revolution in one minute. What is the linear velocity, in centimeters per second, of a point on the tip of the second hand, if the second hand is 12 cm from center to tip?

Example #5: A Merry-Go-Round travels at an angular velocity of 10 revolutions per minute. What is the linear velocity, in feet per minute, of a person that is sitting 7 feet from the center of the Merry-Go-Round?

Exit Card

A figure skater is spinning with her arms outstretched at an angular velocity of 15 radians per second. What is the angular velocity of the spin in revolutions per minute.