measure
counter clockwise

$s = $ arc length

Angular position

Center

$$\theta \text{(radians)} = \frac{S}{r} = \frac{\text{arclength}}{\text{radius}}$$

So, an angle of 1 radian
has an arclength, $s = r$

✳ where is this in degrees?
57.3
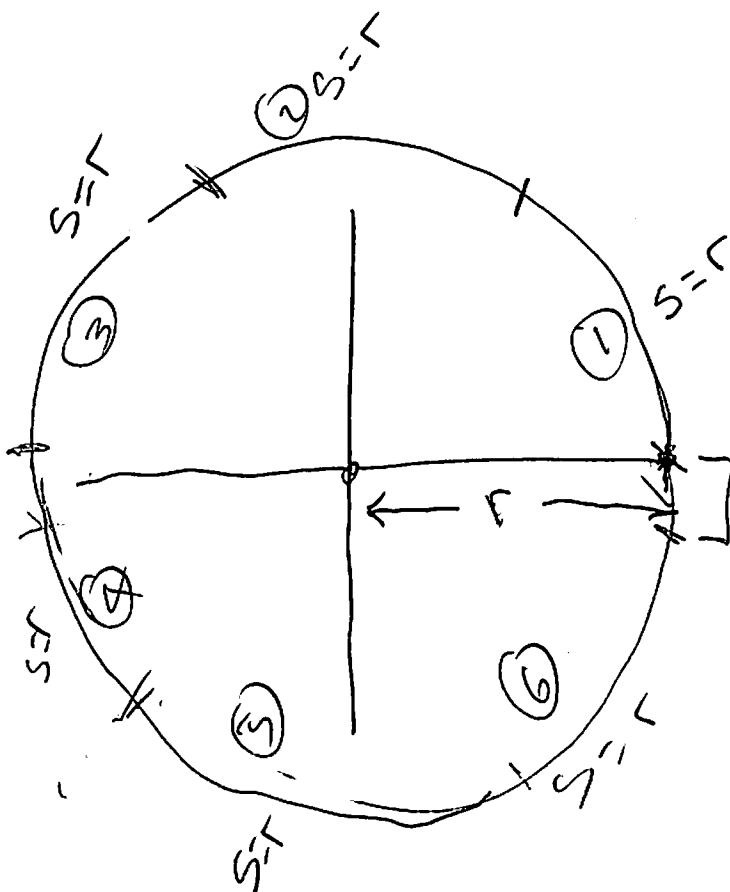
leftover (0.28)

$$C = 2\pi = 360°$$
$$= \frac{44}{7} = 6.28$$

$$\text{Circum} = \frac{S}{\underset{\text{radius}}{r}} = \frac{2\pi r}{r} = 2\pi \text{ rad}$$

travel length

Uniform Linear motion

o   o   o   o   o   o   o   o   o   o:
0 1 2 3 4 0 1 7 3 4

$$\Delta X_1$$
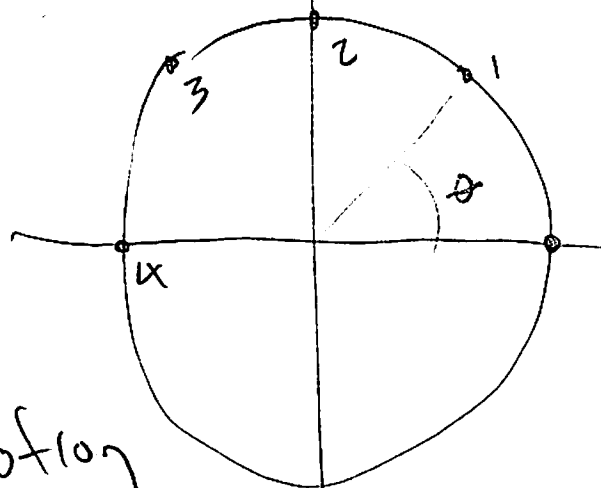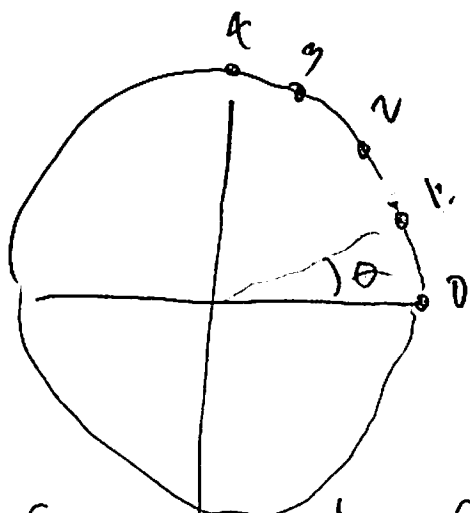
$$\Delta X_2 = 2\Delta X_1$$

$$\Delta X = displacement$$

Uniform Circular motion

$$\text{angular velocity } \omega = \frac{\text{angular disp}}{\text{time interval}} = \frac{\Delta \theta}{\Delta t}$$
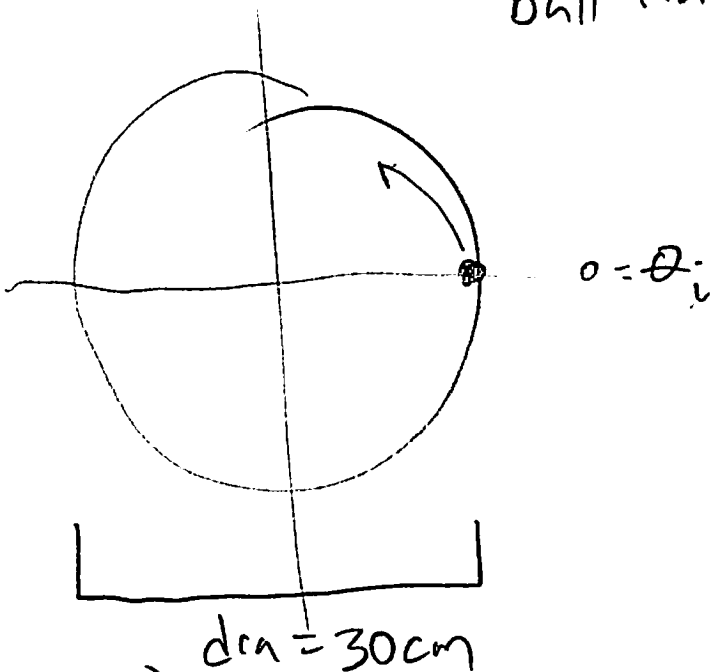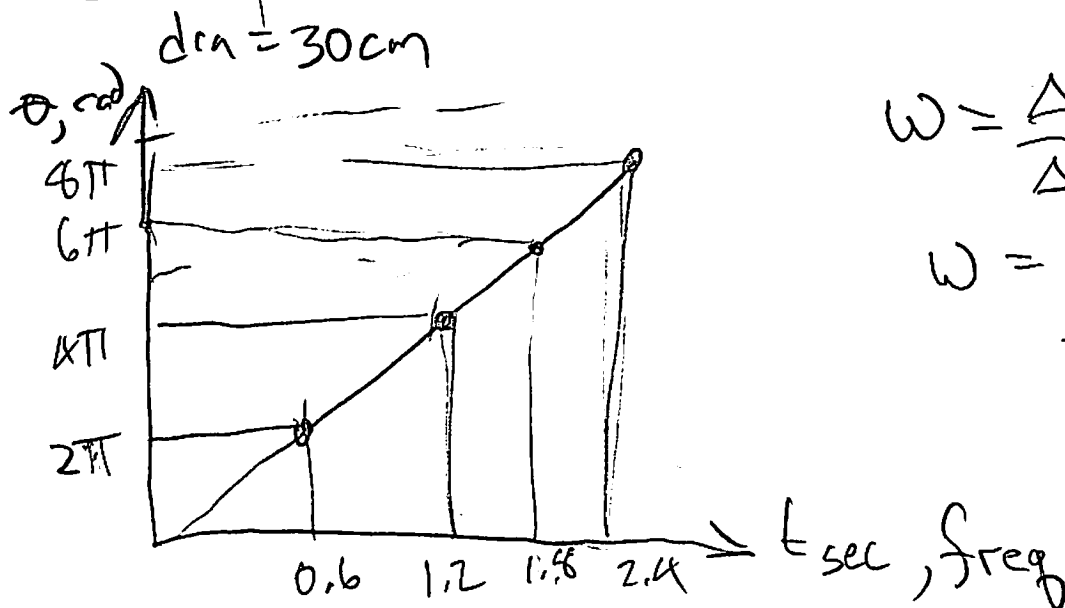
Omega

$$\text{linear velocity } v = \frac{\text{linear disp}}{\text{time interval}} = \frac{\Delta X}{\Delta t}$$

Roulette Wheel

ball travels 2 revolutions
in 1.2 sec

What is its angular
velocity?

What is the position
@ $t = 2.0$ sec?

$0 = \theta_i$

dia $= 30$cm

$$\omega = \frac{\Delta \theta}{\Delta t} = \frac{4\pi \text{ rad}}{1.2 \text{ sec}}$$

$$\omega = \frac{4(22)}{(1.2)(7)} = 10.47 \text{ rad}$$

rad $= 57.3°$

$$\omega = \frac{600°}{sec}$$

θ, rad

8π
6π

4π

2π

0.6   1.2   1.8   2.4 $\rightarrow$ t sec , freq

Angular
Position @ $t = 2.0$ sec

$$\theta_f = \theta_i + \omega \Delta t$$
$$\theta_f = \cancel{0} + 10.47 \frac{rad}{sec} \cdot 2.0 \text{ sec} = 20.94 \text{ rad}$$

Feb 21 2017

rev	π rad	rad
1	2π rad	6.28 rad
2	4π rad	12.56 rad
3	6π rad	18.84 rad
4	8π rad	25.12 rad

position 20.94 rad

$$\frac{20.94 \text{ rad}}{2\pi} = 3.33 \times 2\pi \text{(rad)}$$
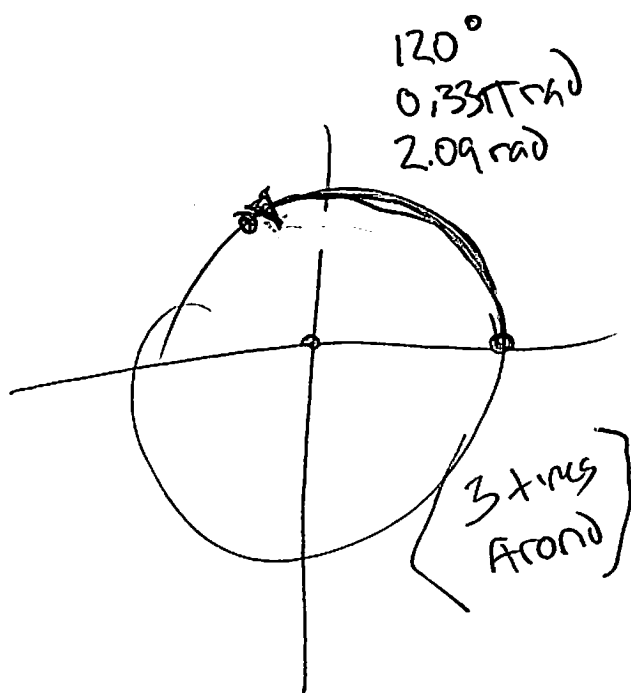
$$= 3 \times 2\pi \text{ rad} + 0.33 \times 2\pi$$

$$= 3 \text{ revolutions} + 0.33 \text{ revs}$$

$$= 3 \text{ revs} + 0.33 \cdot 2 \cdot \frac{22}{7} \text{ rad}$$

$$= 3 \text{ revs} + 2.09 \text{ rad}$$

$$= 3 \text{ revs} + 2.09 \times \frac{57.3°}{\text{rad}}$$

$$= 3 \text{ revs} + 120°$$

120°
0.33π rad
2.09 rad

3 times
Around

Roulette Wheel
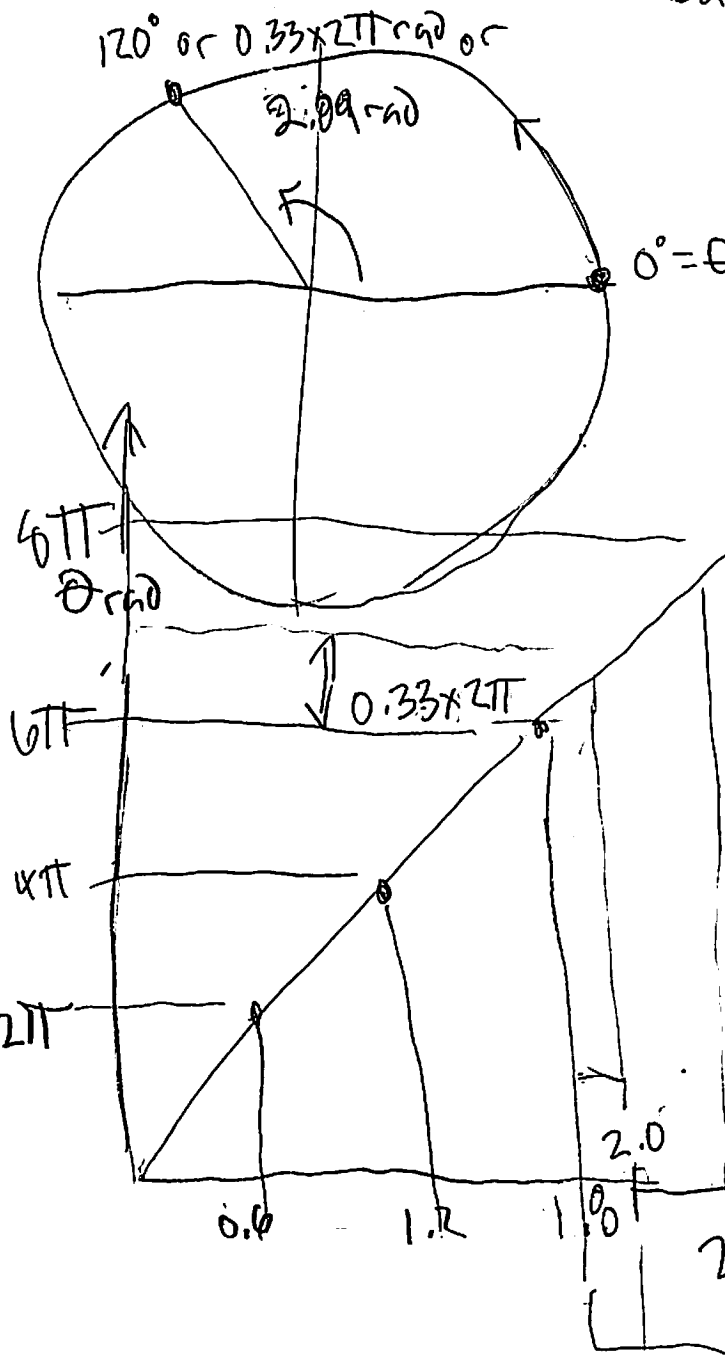
120° or 0.33×2π rad or

2.09 rad

0° = θ_i

ball 2 revs in 1.2 sec

$2 \cdot 2\pi$ in 1.2 sec

$2 \cdot 2 \cdot \dfrac{22}{7}$ in 1.2 sec

$\dfrac{88}{7}$ revs in 1.2 sec

$2 \cdot 360°$ in 1.2 sec

$$\omega = \frac{\Delta\theta}{\Delta t} = \frac{4\pi \text{ rad}}{1.2 \text{ sec}}$$

$$= \frac{4(3.14) \text{ rad}}{1.2 \text{ sec}}$$

$$\underline{\omega = 10.47 \text{ rad}/\text{sec}}$$

6π
θ rad

6π

0.33×2π

4π

2π

0.0   1.2   1.0 2.0

2.4

freq is

At 2 sec
where is it?

0.6 sec

2.0 sec