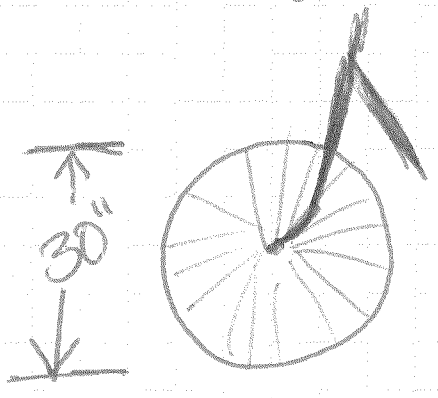
Ex Angular and Linear Velocity

a) messengers tire rotates at 140 rev/minutes
Find Angular Velocity in radians.

$\omega = \frac{\theta}{t}$ $\quad \theta = \text{rev} \cdot 2\pi = 140 \cdot 2\pi = 280\pi$

$$\boxed{\omega = \frac{280\pi}{1 \text{ minute}}}$$



b) Linear Velocity

tire turns at 2.5 rev/s
Find Linear Velocity in miles per hour.

$V = \frac{s}{t}$ $\quad s = 2\pi r n$ $\quad n = \text{revolutions}$

$= 2\pi \cdot 15 \cdot 2.5 = 75\pi$

$$V = \frac{75\pi \text{ in}}{1 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ ft}}{12 \text{ inch}} \cdot \frac{1 \text{ mile}}{5280 \text{ ft}}$$

$$\frac{75\pi \cdot 60 \cdot 60 \text{ miles}}{(12 \cdot 5280) \text{ hrs}} \approx \boxed{13.4 \text{ mi/hr}}$$

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HW: 41-42, 65-66

4.2 Angular Velocity

Linear speed (velocity) → $V = \frac{d}{t}$

rate at which an object moves on a circular path.

distance travelled is Circumference · number of revolutions

arc length $s = r\theta$

Linear speed $V = \frac{s}{t}$ $mi/hr, m/s, km/h$

angular speed (velocity)

rate an object rotates around a fixed point

revolutions / minute

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

(radians) θ revolutions · 2π