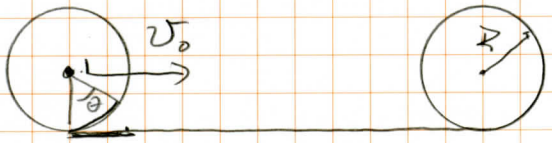
URONE 9.5

9.5) DURING A PANIC STOP, A CAR DECELERATES AT $7\ m/s^2$.
a) WHAT IS α FOR 0.280m RADIUS TIRES?
b) FOR $\omega_0 = 95\ RAD/s$, HOW MANY REVOLUTIONS BEFORE TIRES STOP?
c) HOW LONG DOES IT TAKE?
D) HOW FAR DOES THE CAR TRAVEL?
e) WHAT WAS THE CAR'S INITIAL SPEED?

LOOK AT A TIRE:



$s = R\theta$

a) $s = R\theta \Rightarrow v = R\omega \Rightarrow a = R\alpha$

$$\alpha = \frac{a}{R} = \frac{-7}{0.280} = \boxed{-25\ RAD/s^2 = \alpha}$$

b) USE KINEMATICS: $\omega^2 = \omega_0^2 - 2\alpha(\theta - \theta_0)$ ($\omega = 0$, $\theta_0 = 0$)

$$\Rightarrow \theta = \frac{\omega_0^2}{2\alpha} = \frac{(95)^2}{2(25)} = 180.5\ RADIANS$$

CHANGE TO REV'S

$$\theta = 180.5\ RAD\left(\frac{1\ REV}{2\pi\ RAD}\right) = \boxed{28.7\ REVS = \theta}$$

c) APPLY KINEMATICS: $\omega = \omega_0 - \alpha t_{STOP}$ ($\omega = 0$)

$$t_{STOP} = \frac{\omega_0}{\alpha} = \frac{95}{25} = \boxed{3.8\ s = t_{STOP}}$$

d) APPLY $s = r\theta$, $\theta = 180.5$ RADIANS (PART b)

$$s = (0.280)(180.5) = \boxed{50.54\ m = s}$$

e) APPLY $v = R\omega$

$$v_0 = (0.280)(95) = \boxed{26.6\ \tfrac{m}{s} = v_0}$$