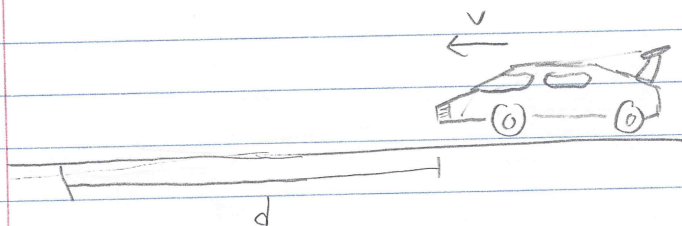
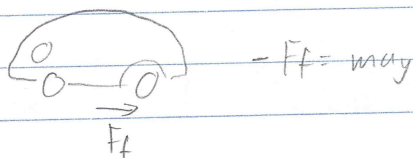


20-P-MOM-DX-22

A team of engineers is performing experiments on the driver of a new sports car. To follow regulations, the car must be able to stop completely from a starting velocity of $v = 15 \text{ m/s}$ in $d = 50 \text{ m}$. Assuming the wheels lock up, determine the coefficient of friction and how long it takes for the car to come to a stop.



Solution: $mv_i + \int_{t_i}^{t_f} F dt = mv_f$



$$a_y = \frac{-v_i^2}{2d} = -7.25 \text{ m/s}^2$$

$$-F_f = ma_y = \mu N = \mu mg \quad \mu = \frac{ma_y}{mg} = \frac{a_y}{g} = 0.74$$

$$mv_i + F_f t = mv_f = 0$$

$$mv_i + (-\mu mg)t = 0$$

$$t = \frac{v_i}{\mu g} = 6.67 \text{ s}$$