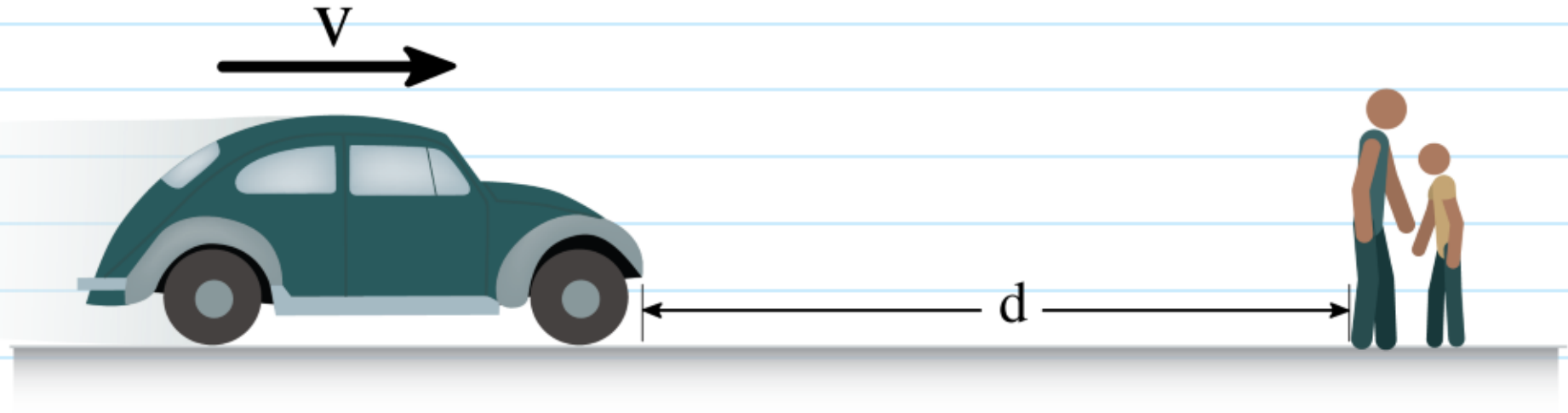


21-P-WE-GD-007



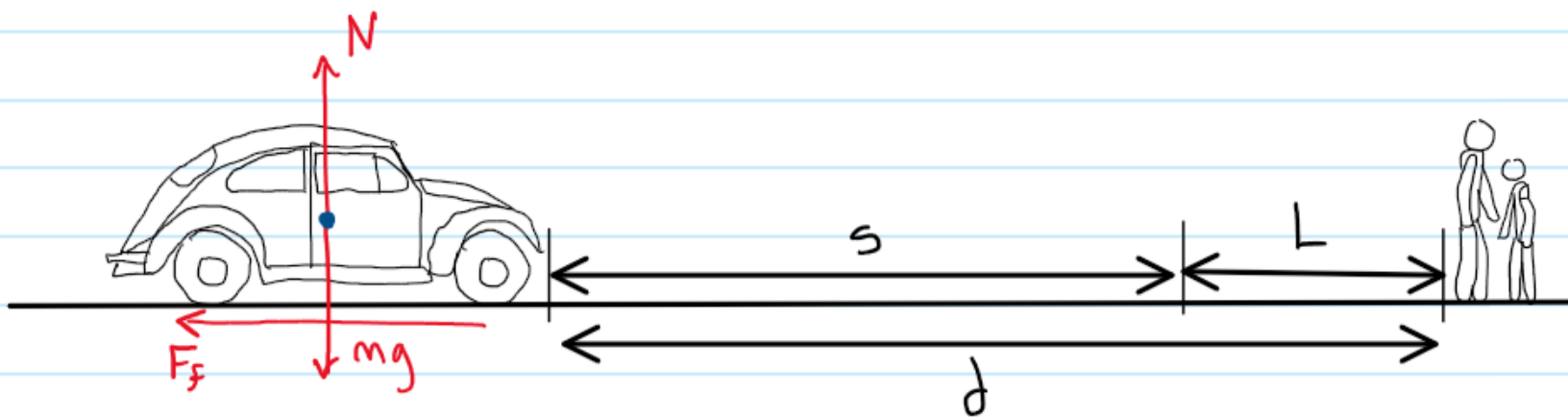
A car is travelling at  $V$  when the driver notices two people standing in the road. The driver slams on the brakes and skids to a stop  $L$  m away. If the coefficient of kinetic friction between the tires and the road is  $\mu$ , how far away was the driver when they started braking?

given

$v, L, \mu$

find

$s, d$



Force Equilibrium

$$\sum F_y = 0 = N - mg \rightarrow N = mg$$

$$\sum F_x = ma_x = -F_f = -\mu N$$

Work Energy

$$T_1 + \sum U_{1 \rightarrow 2} = T_2^{\rightarrow 0}$$

$$\frac{1}{2}mv^2 - \mu Ns = 0$$

$$\rightarrow s = \frac{\cancel{\mu}v^2}{2\cancel{\mu}g}$$

distance when driver started braking

$$d = L + s$$

$$\underline{d = L + \frac{v^2}{2g}}$$