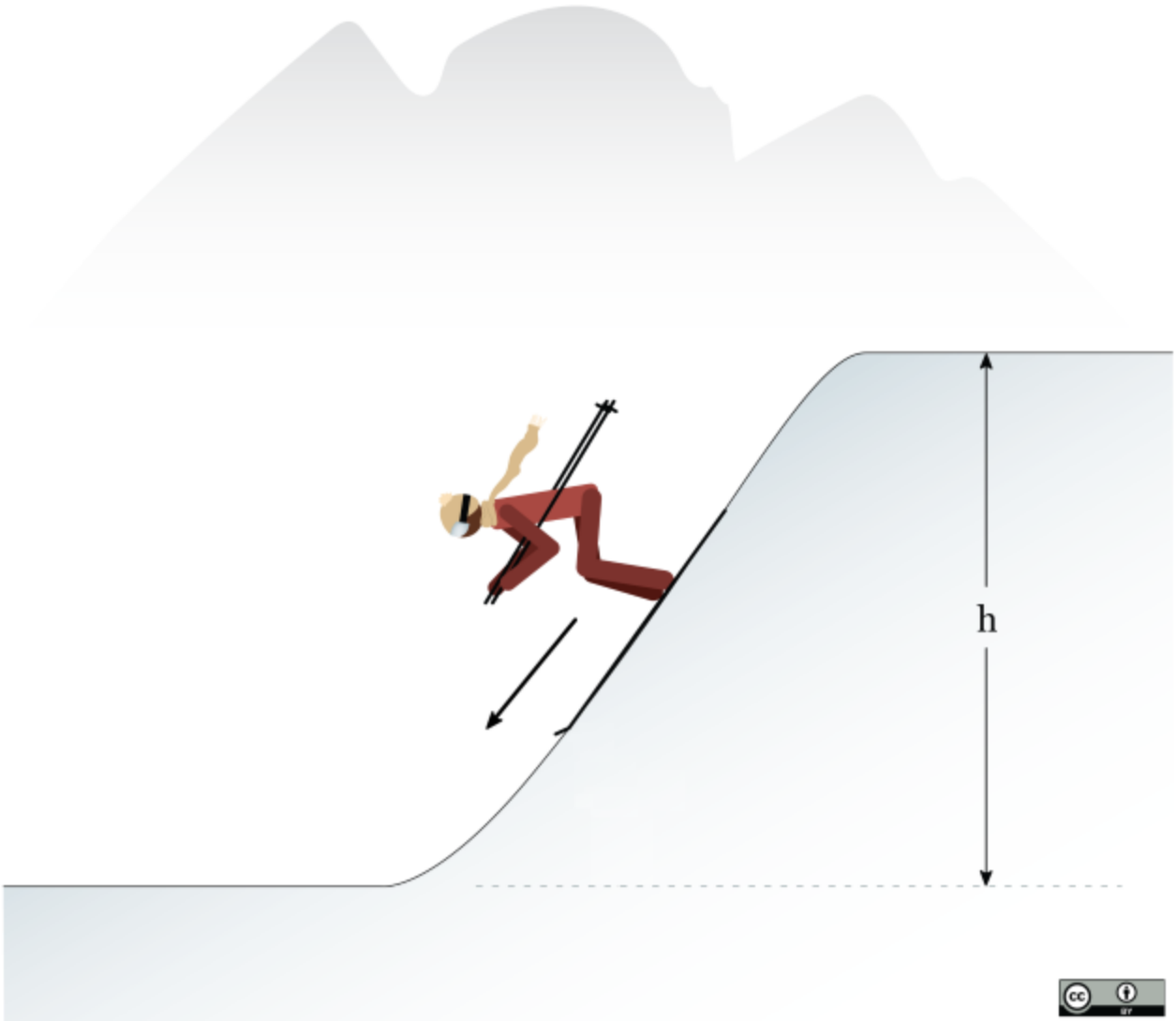
21-P-WE-GD-016



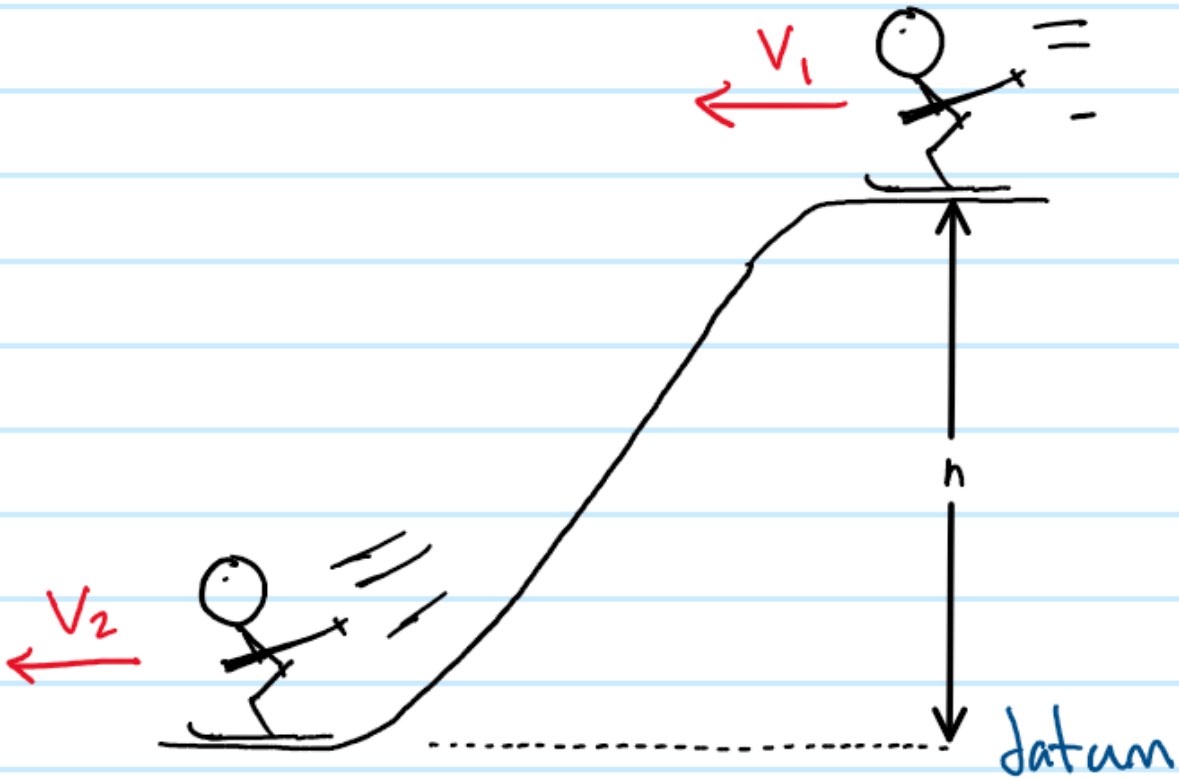
A m kg skier begins descending a smooth ramp at v_1 m/s. If the skier reaches the bottom of the ramp at v_2 m/s, how high is the ramp (h)?

What is the normal reaction on the skier exerted by the curve at the bottom of the ramp if $\rho = 3h$?

(Assume $g = 9.81\ m/s^2$)

given v_1, v_2, g, m

find h



Conservation of Energy

$$T_1 + V_1 + \cancel{\Sigma U_{1\to 2}}^{\,0} = T_2 + V_2$$

$$\tfrac{1}{2}\cancel{m}v_1^2 + \cancel{m}gh = \tfrac{1}{2}\cancel{m}v_2^2 + \cancel{m}g(0)$$

$$h = \frac{1}{2g}(v_2^2 - v_1^2)$$

Force Equilibrium

$$\Sigma F_y = ma = N - mg$$

$$N = ma + mg$$

$$a = \frac{v_2^2}{\rho} = \frac{v_2^2}{3h}$$

$$N = m\left(\frac{v_2^2}{3h} + g\right)$$

FBD