

1. Solve for  $d$  in terms of  $v_i$ ,  $v_f$ , and  $t$ .

$$\bar{v} = \frac{v_i + v_f}{2}$$

$$d = \bar{v}t$$

2. Solve for  $a$  in terms of  $F_A$ ,  $m$ ,  $g$  and  $\mu$ .

$$F_A - F_f = ma$$

$$F_f = \mu F_N$$

$$F_N = mg$$

3. Solve for  $d$  in terms of  $v_i$ ,  $\mu$ ,  $g$  and  $t$ .

$$d = v_i t + \frac{1}{2} a t^2$$

$$-F_f = ma$$

$$F_f = \mu F_N$$

$$F_N = mg$$

4. Solve for  $v_f$  in terms of  $F$ ,  $m$ ,  $v_i$  and  $\Delta t$ .

$$\Delta p = F \Delta t$$

$$\Delta p = m \Delta v$$

$$\Delta v = v_f - v_i$$

5. Solve for  $v$  in terms of  $m$ ,  $g$ ,  $h$  and  $Q$ .

$$E_i = E_f + Q$$

$$E_i = E_p$$

$$E_f = E_k$$

$$E_p = mgh$$

$$E_k = \frac{1}{2} m v^2$$

6. Solve for  $m$  in terms of  $F_T$ ,  $d$ ,  $v_i$ , and  $g$ .

$$v_f^2 = v_i^2 + 2ad$$

$$F_T - F_g = ma$$

$$F_g = mg$$

$$v_i = 0$$