COOPERATIVE GROUP REVIEW - SOLUTIONS

1. KINEMATICS:

$v_i = 0$

$v_f = 26.3\ \frac{m}{s}$

$t = 0.59s$

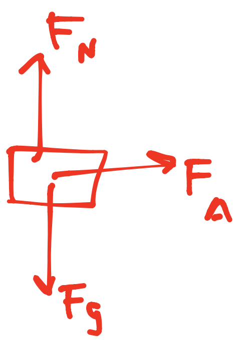
$a = ?$

$v_f = \cancel{v_i}^{\,0} + at$

$a = \frac{v_f}{t}$

$= \frac{26.3}{0.59}$

$= 44.58\ \frac{m}{s^2}$



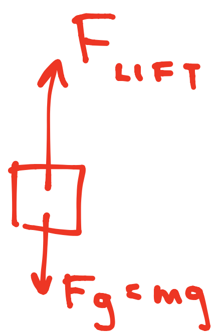
$F_{NET} = ma$

$= (873)(44.58)$

$= 38\,915\ N$

$3.9 \times 10^4\ N$

2.



$F_{NET} = ma$

$F_{LIFT} - F_g = ma$

$F_{LIFT} - mg = ma$

$F_{LIFT} = ma + mg$

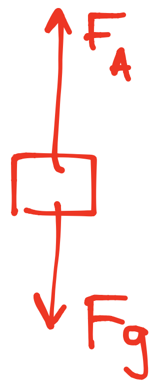
$= m(a+g)$

$= 4500(2.0 + 9.8)$

$= 53100 N$

$5.3 \times 10^4\ N$ UP

3.

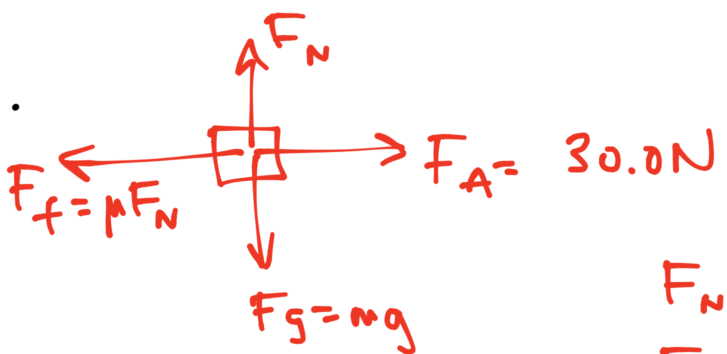


$$F_{NET} = ma$$
$$F_A - F_g = ma$$
$$F_A - mg = ma$$
$$F_A = ma + mg$$
$$= m(a+g)$$
$$= 20.0(5.0+9.8)$$
$$= 296\ N$$

SACK WILL RIP IF $F_A > 2500\ N$

YES, THE SACK WILL HOLD.

4.



$$F_N = F_g$$ UP/DOWN BALANCED
$$F_N = mg$$

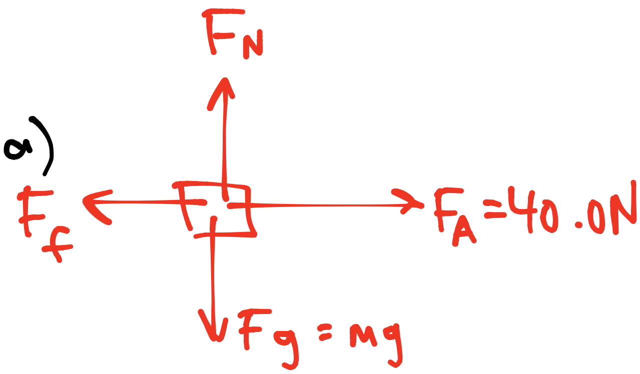
$$F_{NET} = ma$$ (a = 0, CONSTANT VELOCITY)
$$F_A - F_f = 0$$
$$F_A = F_f$$
$$= \mu F_N$$
$$= \mu mg$$

$$\mu = \frac{F_A}{mg}$$

$$= \frac{30.0}{(12.0)(9.8)}$$

$$= 0.26$$

5. a)



$$F_{NET} = ma$$

$$F_A - F_f = ma$$

$$F_f = F_A - ma$$

$$= 40.0 - (5.0)(6.0)$$

$$= 10.0\ N$$

b)

$$F_N = F_g$$

UP/DOWN BALANCED

$$F_N = mg$$

$$F_f = \mu F_N$$

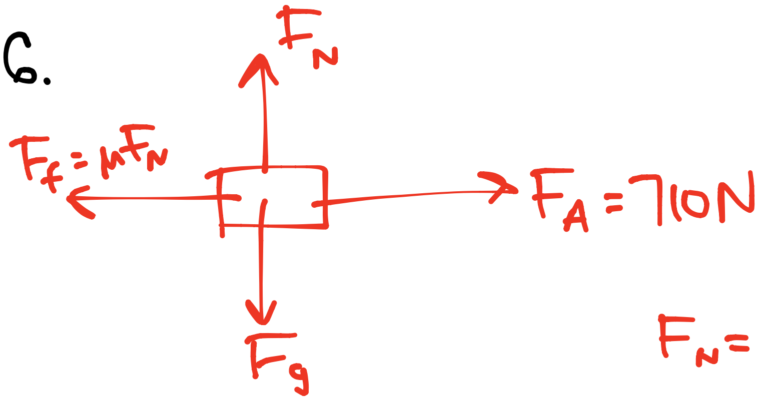
$$= \mu mg$$

$$\mu = \frac{F_f}{mg}$$

$$= \frac{10.0}{(5.0)(9.8)}$$

$$= 0.20$$

6.



$$F_N = F_g$$

UP/DOWN BALANCED

$$F_N = mg$$

$$F_{NET} = ma$$

$$F_A - F_f = ma$$

$$F_A - \mu F_N = ma$$

$$F_A - \mu mg = ma$$

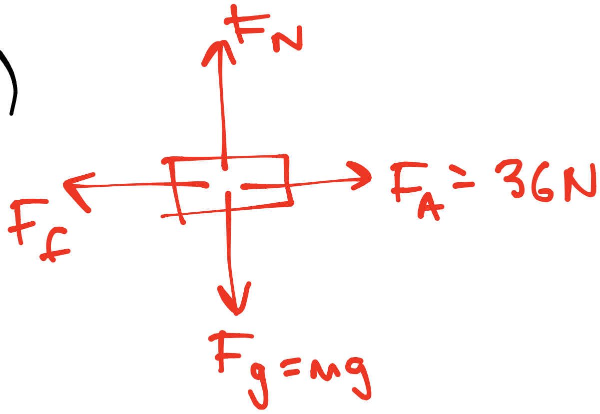
$$a = \frac{F_A - \mu mg}{m}$$

$$= \frac{710 - (0.20)(225)(9.8)}{225}$$

$$= 1.2 \frac{m}{s^2} \text{ Right}$$

(IN THE DIRECTION OF THE PUSH)

7. a)



weight $= F_g = mg$

$= (5.5)(9.8)$

$= 53.9N$

b) $F_N = F_g$ UP/DOWN BALANCED

$F_N = mg$

$a = 0$ CONSTANT VELOCITY

$F_{NET} = m\cancel{a}$

$F_A - F_f = 0$

$F_A = F_f$

$= \mu F_N$

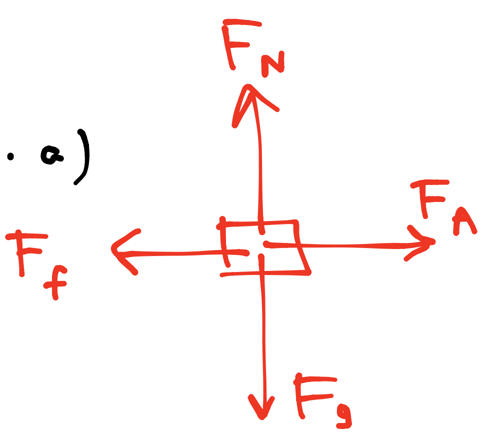
$= \mu mg$

$\mu = \dfrac{F_A}{mg}$

$= \dfrac{36}{(5.5)(9.8)}$

$= 0.67$

8. a)



$F_N = F_g$ UP/DOWN BALANCED

$F_N = mg$

$$F_{NET} = ma \quad a = 0 \text{ SEE NOTE}$$

$$F_A - F_f = 0$$

WHEN CONSIDERING THE SCENARIO WHERE AN OBJECT JUST STARTS TO MOVE, USE μ_s AND $a=0$

$$F_A = F_f$$

$$= \mu_s F_N$$

$$= \mu_s mg$$

$$= (0.30)(50.0)(9.8)$$

$$= 147\text{ N}$$

150N RIGHT

b)

$$F_{NET} = ma$$

$$F_A - F_f = ma$$

$$F_A - \mu_k F_N = ma$$

$$F_A - \mu_k mg = ma$$

$$F_A = ma - \mu_k mg$$

$$= (50.0)(3.0) - (0.10)(50.0)(9.8)$$

$$= 101\text{ N}$$

100 N RIGHT

9. KINEMATICS:

$t = 5.00\,s$

$v_i = 0$

$v_f = 25\,\frac{m}{s}$

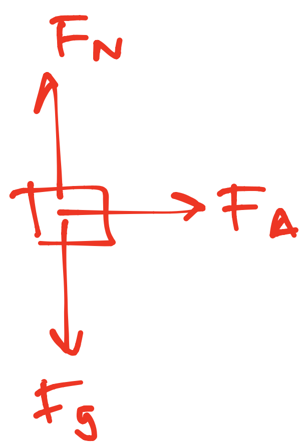
$a = ?$

$$v_f = \cancelto{0}{v_i} + at$$

$$a = \frac{v_f}{t}$$

$$= \frac{25}{5.00}$$

$$= 5.0\,\frac{m}{s^2}$$



$$F_{NET} = ma$$

$$= (970)(5.0)$$

$$= 4850\,N$$

4900 N RIGHT (IN THE DIRECTION IT IS MOVING)

10. KINEMATICS:

$V_i = 0$

$V_f = 320\,\frac{m}{s}$

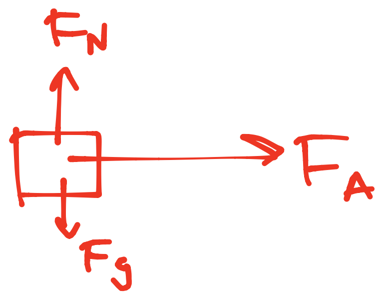
$d = 0.82\,m$

$a = ?$

$$v_f^2 = \cancelto{0}{v_i^2} + 2ad$$

$$a = \frac{v_f^2}{2d}$$

$$= \frac{(320)^2}{2(0.82)}$$



$= 62439 \frac{m}{s^2}$

$F_{NET} = ma$

$F_A = ma$

$= (0.005)(62439)$

$= 312N$

310N (OUT OF THE BARREL OF THE RIFLE)