

COOPERATIVE GROUP REVIEW - SOLUTIONS

1. KINEMATICS:

$$v_i = 0$$

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

$$t = 0.59 \text{ s}$$

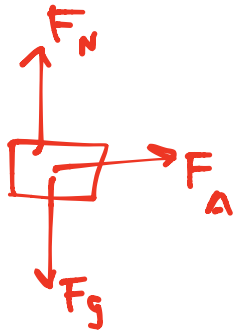
$$a = ?$$

$$v_f = v_i + at$$

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

$$= \frac{26.3}{0.59}$$

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



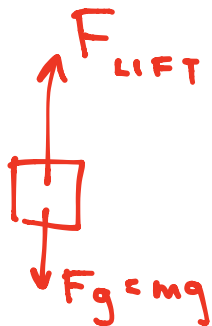
$$F_{\text{NET}} = ma$$

$$= (873)(44.58)$$

$$= 38915 \text{ N}$$

$$3.9 \times 10^4 \text{ N}$$

2.



$$F_{\text{NET}} = ma$$

$$F_{\text{LIFT}} - F_g = ma$$

$$F_{\text{LIFT}} - mg = ma$$

$$F_{\text{LIFT}} = ma + mg$$

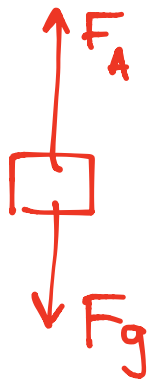
$$= m(a + g)$$

$$= 4500(2.0 + 9.8)$$

$$= 53100 \text{ N}$$

$$5.3 \times 10^4 \text{ N UP}$$

3.

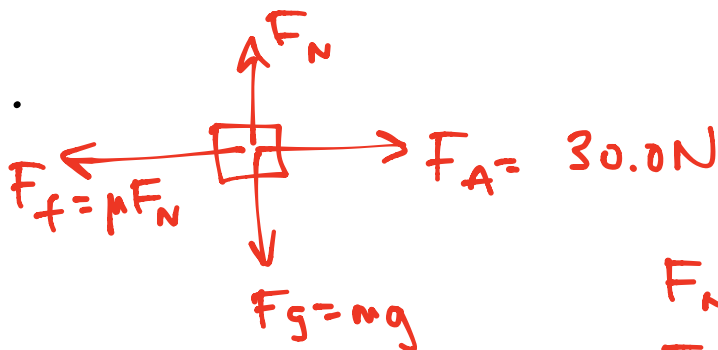


$$\begin{aligned}
 F_{\text{NET}} &= ma \\
 F_A - F_g &= ma \\
 F_A - mg &= ma \\
 F_A &= ma + mg \\
 &= m(a + g) \\
 &= 20.0(5.0 + 9.8) \\
 &= 296 \text{ N}
 \end{aligned}$$

SACK WILL RIP IF $F_A > 250 \text{ N}$

NO, THE SACK WILL RIP.

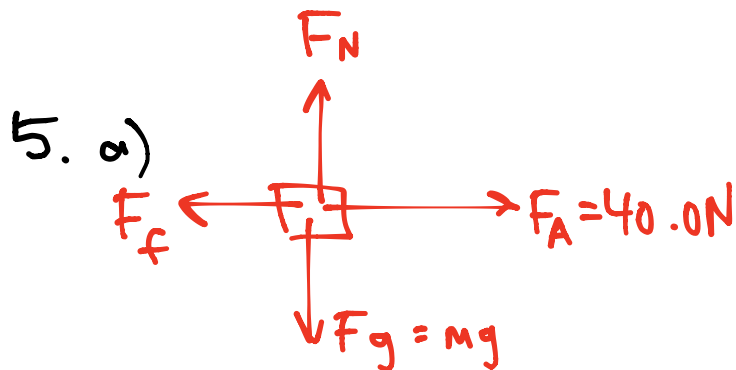
4.



$$\begin{aligned}
 F_N &= F_g \quad \text{UP/DOWN BALANCED} \\
 F_N &= mg
 \end{aligned}$$

$$\begin{aligned}
 F_{\text{NET}} &= ma \quad \alpha = 0 \quad \text{CONSTANT VELOCITY} \\
 F_A - F_f &= 0 \\
 F_A &= F_f \\
 &= \mu F_N \\
 &= \mu mg
 \end{aligned}$$

$$\begin{aligned}\mu &= \frac{F_A}{mg} \\ &= \frac{30.0}{(12.0)(9.8)} \\ &= 0.26\end{aligned}$$



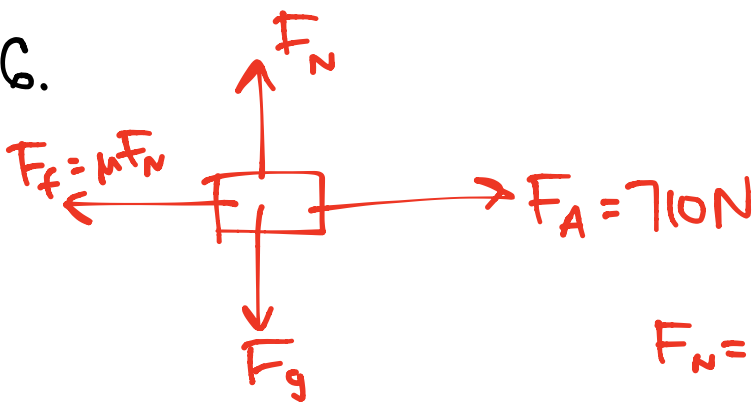
$$\begin{aligned}F_{NET} &= ma \\ F_A - F_f &= ma \\ F_f &= F_A - ma \\ &= 40.0 - (5.0)(6.0) \\ &= 10.0 \text{ N}\end{aligned}$$

b)

$$\begin{aligned}F_N &= F_g \quad \text{UP/DOWN} \\ &\quad \text{BALANCED} \\ F_N &= mg\end{aligned}$$

$$\begin{aligned}F_f &= \mu F_N \\ &= \mu mg \\ \mu &= \frac{F_f}{mg} \\ &= \frac{10.0}{(5.0)(9.8)} \\ &= 0.20\end{aligned}$$

6.



$$F_N = F_g \quad \text{UP/DOWN BALANCED}$$

$$F_N = mg$$

$$F_{\text{NET}} = ma$$

$$F_A - F_f = ma$$

$$F_A - \mu F_N = ma$$

$$F_A - \mu mg = ma$$

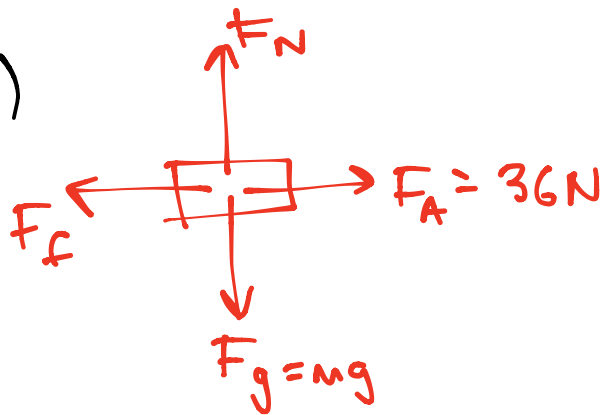
$$a = \frac{F_A - \mu mg}{m}$$

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

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

(IN THE DIRECTION OF THE PUSH)

7. a)



$$\begin{aligned} \text{weight} = F_g &= mg \\ &= (5.5)(9.8) \\ &= 53.9 \text{ N} \end{aligned}$$

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

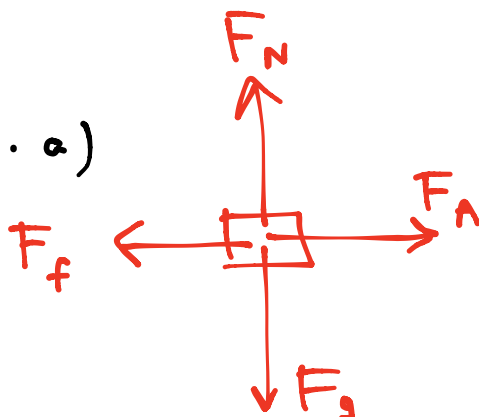
$a = 0$ CONSTANT VELOCITY
 $F_{\text{NET}} = ma$
 $F_A - F_f = 0$

$$\begin{aligned} F_A &= F_f \\ &= \mu F_N \\ &= \mu mg \end{aligned}$$

$$\begin{aligned} \mu &= \frac{F_A}{mg} \\ &= \frac{36}{(5.5)(9.8)} \end{aligned}$$

$$= 0.67$$

8. a)



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

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

$$F_{NET} = ma$$
$$F_A - F_f = 0$$

$a=0$
SEE NOTE

$$F_A = F_f$$

$$= \mu_s F_N$$

$$= \mu_s mg$$

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

$$= 147 \text{ N}$$

150 N 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:

$$t = 5.00 \text{ s}$$

$$v_i = 0$$

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

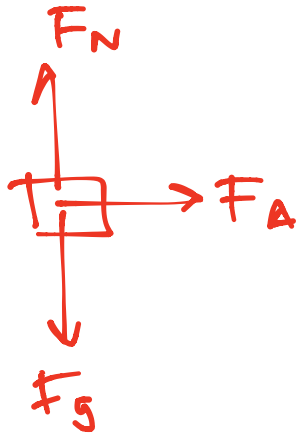
$$a = ?$$

$$v_f = v_i + at$$

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

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

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



$$F_{\text{NET}} = ma$$

$$= (970)(5.0)$$

$$= 4850 \text{ N}$$

4900 N Right

(IN THE DIRECTION
IT IS MOVING)

10. KINEMATICS:

$$v_i = 0$$

$$v_f = 320 \frac{\text{m}}{\text{s}}$$

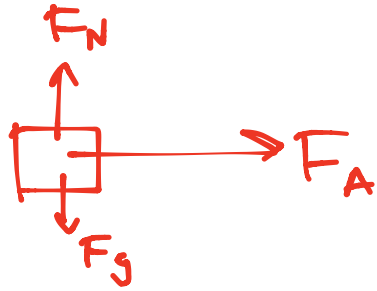
$$d = 0.82 \text{ m}$$

$$a = ?$$

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

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

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



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

$$F_{\text{NET}} = ma$$

$$F_A = ma$$

$$= (0.005)(62439)$$

$$= 312\text{N}$$

312N (OUT OF
THE BARREL OF THE RIFLE)