

ANSWERS

Extra Review Questions: Simple Forces

1) ① Find a

$$F_{\text{net}} = F_f$$

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

$$a = \frac{F_{\text{net}}}{m}$$

$$= \frac{9500 \text{ N}}{0.055 \text{ kg}}$$

$$a = 172727 \text{ m/s}^2$$

② $a = 172727 \text{ m/s}^2$

$$v_f = 0$$

$$v_i = 250 \text{ m/s}$$

$$\Delta d = ?$$

$$v_f^2 = v_i^2 + 2a\Delta d$$

$$\Delta d = \frac{-v_i^2}{2a}$$

$$= -\frac{(250 \text{ m/s})^2}{2(172727 \text{ m/s}^2)}$$

$$= \underline{\underline{0.18 \text{ m}}}$$

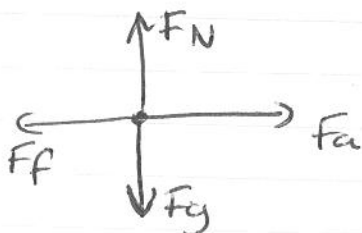


$$\textcircled{2} F_g = F_a + F_N$$

$$F_N = F_g - F_a$$
$$= 147 \text{ N} - 100 \text{ N}$$
$$= \underline{\underline{47 \text{ N}}}$$

$$\textcircled{1} F_g = mg$$
$$= (15 \text{ kg})(9.8 \frac{\text{m}}{\text{s}^2})$$
$$= 147 \text{ N}$$

3)



$$\begin{aligned} \textcircled{1} F_g &= mg \\ &= (25 \text{ N})(9.8 \text{ m/s}^2) \\ &= 245 \text{ N} \end{aligned}$$

$$\begin{aligned} \textcircled{2} F_{\text{net}} &= ma \\ &= (25 \text{ kg})(1.8 \text{ m/s}^2) \\ &= 45 \text{ N} \end{aligned}$$

$$\textcircled{3} F_N = F_g = 245 \text{ N}$$

$$\begin{aligned} \textcircled{4} F_{\text{net}} &= F_a - F_f \\ F_f &= F_a - F_{\text{net}} \\ &= 120 \text{ N} - 45 \text{ N} \\ &= 75 \text{ N} \end{aligned}$$

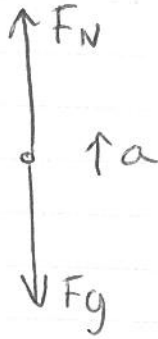
$$\begin{aligned} \textcircled{5} F_f &= \mu F_N \\ \mu &= \frac{F_f}{F_N} \\ &= \frac{75 \text{ N}}{245 \text{ N}} \\ &= \underline{\underline{0.31}} \end{aligned}$$

$$\begin{aligned} 4) \text{ Say } F &= 20 \text{ N} \\ a &= 4.0 \text{ m/s}^2 \\ \text{so } m &= 5 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{Now if } F &= 20 \text{ N} \\ 2m &= 10 \text{ kg} \\ a &= \frac{F}{m} = \frac{20 \text{ N}}{10 \text{ kg}} = \underline{\underline{2 \text{ m/s}^2}} \end{aligned}$$

5)

+↑

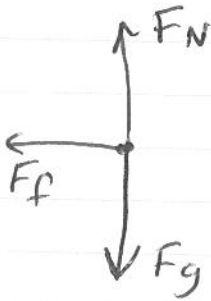


$$\begin{aligned} \textcircled{1} F_g &= mg \\ &= (58.0 \text{ kg})(9.8 \text{ m/s}^2) \\ &= 568.4 \text{ N} \end{aligned}$$

$$\begin{aligned} \textcircled{2} F_{\text{net}} &= ma \\ &= (58.0 \text{ kg})(1.10 \text{ m/s}^2) \\ &= 63.8 \text{ N} \end{aligned}$$

$$\begin{aligned} \textcircled{3} F_{\text{net}} &= F_N - F_g \\ F_N &= F_{\text{net}} + F_g \\ &= 63.8 \text{ N} + 568.4 \text{ N} \\ &= \underline{\underline{632.2 \text{ N}}} \end{aligned}$$

6)



$$\begin{aligned} \textcircled{1} F_{\text{net}} &= ma \\ &= (45 \text{ kg})(0.53 \text{ m/s}^2) \\ &= 23.85 \text{ N} \\ &= F_f \end{aligned}$$

$$\begin{aligned} \textcircled{2} F_f &= \mu F_N \\ \mu &= \frac{F_f}{F_N} \\ &= \frac{23.85 \text{ N}}{441 \text{ N}} \\ &= \underline{\underline{0.054}} \end{aligned}$$

$$\begin{aligned} F_g &= mg \\ &= (45 \text{ kg})(9.8 \frac{\text{m}}{\text{s}^2}) \\ &= 441 \text{ N} \end{aligned}$$

7)



$$\begin{aligned} \textcircled{1} F_g &= mg \\ &= (0.50 \text{ kg})(9.8 \text{ m/s}^2) \\ &= 4.9 \text{ N} \end{aligned}$$

$$\begin{aligned} \textcircled{2} F_{\text{net}} &= ma \\ &= (0.5 \text{ kg})(8.5 \text{ m/s}^2) \\ &= 4.25 \text{ N} \end{aligned}$$

$$\begin{aligned} \textcircled{3} F_{\text{net}} &= F_g - F_{\text{air}} \\ F_{\text{air}} &= F_g - F_{\text{net}} \\ &= 4.9 \text{ N} - 4.25 \text{ N} \\ &= \underline{\underline{0.65 \text{ N}}} \end{aligned}$$

8)



$$\begin{aligned} \textcircled{1} F_g &= mg \\ &= (3.00 \text{ kg})(9.8 \text{ m/s}^2) \\ &= 29.4 \text{ N} \end{aligned}$$

$$\begin{aligned} \textcircled{2} F_{\text{net}} &= ma \\ &= (3.0 \text{ kg})(2.80 \text{ m/s}^2) \\ &= 8.4 \text{ N} \end{aligned}$$

$$\begin{aligned} \textcircled{3} F_{\text{net}} &= T - F_g \\ T &= F_{\text{net}} + F_g \\ &= 29.4 \text{ N} + 8.4 \text{ N} \\ &= \underline{\underline{37.8 \text{ N}}} \end{aligned}$$