

The net force is acting along north.

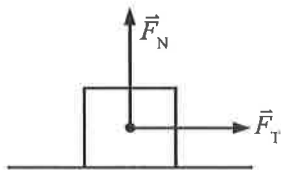
$$\begin{aligned}\vec{F}_{\text{net}} &= m\vec{a} \\ \vec{a} &= \frac{\vec{F}_{\text{net}}}{m} \\ &= \frac{1.1 \times 10^2 \text{ N north}}{1.0 \times 10^1 \text{ kg}} \\ &= 1.1 \times 10^1 \text{ m/s}^2 \text{ north}\end{aligned}$$

$$\begin{aligned}12. \quad F_{\text{net}} &= ma \\ &= (7.0 \text{ kg})(2.3 \text{ m/s}^2) \\ &= 16 \text{ N}\end{aligned}$$

$$\begin{aligned}13. \quad F_{\text{net}} &= ma \\ a &= \frac{F_{\text{net}}}{m} \\ &= \frac{1.80 \times 10^4 \text{ N}}{1.5 \times 10^3 \text{ kg}} \\ &= 1.2 \times 10^1 \text{ m/s}^2 \\ v^2 &= v_0^2 + 2ad \\ 0 &= (24.0 \text{ m/s})^2 + 2(1.2 \times 10^1 \text{ m/s}^2)d \\ d &= 24.0 \text{ m}\end{aligned}$$

$$\begin{aligned}14. \quad \vec{F}_{\text{net}} &= \vec{F}_{\text{fr}} = m\vec{a} \\ a &= \frac{\vec{F}_{\text{fr}}}{m} \\ &= \frac{-2.5 \times 10^4 \text{ N}}{1.2 \times 10^3 \text{ kg}} \\ &= -21 \text{ m/s}^2 \\ \vec{a} &= \frac{\vec{v} - \vec{v}_0}{t} \\ -21 \text{ m/s} &= \frac{\vec{v} - 20.0 \text{ m/s}}{0.50 \text{ s}} \\ \vec{v} &= +9.6 \text{ m/s} \\ &= 9.6 \text{ m/s east}\end{aligned}$$

15.

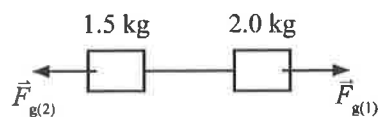


$$\begin{aligned}F_{\text{net}} &= F_T = F_g = mg \\ &= (1.5 \text{ kg})(9.81 \text{ m/s}^2) \\ &= 14.7 \text{ N}\end{aligned}$$

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

$$\begin{aligned}\text{Therefore,} \\ a &= \frac{F_{\text{net}}}{m} \\ &= \frac{14.7 \text{ N}}{2.5 \text{ kg}} \\ &= 5.9 \text{ m/s}^2\end{aligned}$$

16.



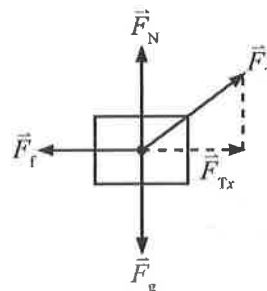
$$\begin{aligned}F_{\text{net}} &= F_{g(1)} - F_{f(2)} \\ &= m_1g - m_2g \\ &= (2.0 \text{ kg})(9.81 \text{ m/s}^2) - (1.5 \text{ kg})(9.81 \text{ m/s}^2) \\ &= 4.9 \text{ N}\end{aligned}$$

$$\begin{aligned}F_{\text{net}} &= ma \\ a &= \frac{F_{\text{net}}}{m} \\ &= \frac{4.9 \text{ N}}{3.5 \text{ kg}} \\ &= 1.4 \text{ m/s}^2\end{aligned}$$

a) Acceleration of the 1.5 kg mass is 1.4 m/s^2

b) Acceleration of the 2.0 kg mass is -1.4 m/s^2

17.



$$\begin{aligned}F_{\text{Tx}} &= F_T (\cos 42.0^\circ) \\ &= (60.0 \text{ N})(\cos 42.0^\circ) \\ &= 44.6 \text{ N}\end{aligned}$$

$$\begin{aligned}F_g &= mg \\ m &= \frac{F_g}{g} \\ &= \frac{125 \text{ N}}{9.81 \text{ m/s}^2} \\ &= 12.7 \text{ kg}\end{aligned}$$