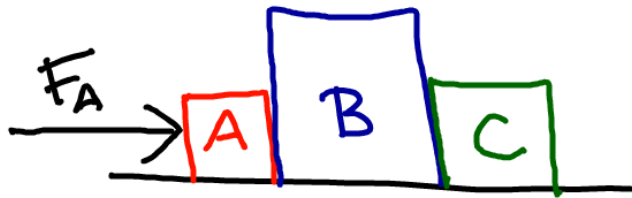


Contact Forces between blocks



$$m_A = 1 \text{ kg}$$

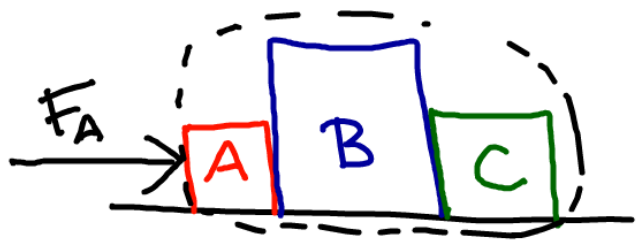
$$m_B = 4 \text{ kg}$$

$$m_C = 3 \text{ kg}$$

$$F_A = 16 \text{ N}$$

- 1) Find acceleration of the system
- 2) Find the contact force between block A and block B, and between block B and C

Level: AP Physics, 1st year introductory physics



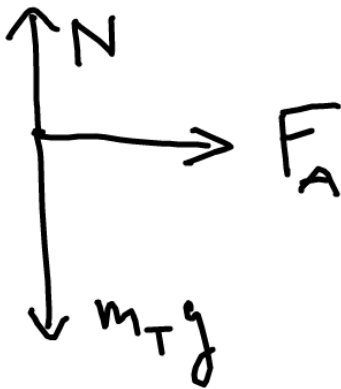
$$m_A = 1 \text{ kg}$$

$$m_B = 4 \text{ kg}$$

$$m_C = 3 \text{ kg}$$

1) Find acceleration?

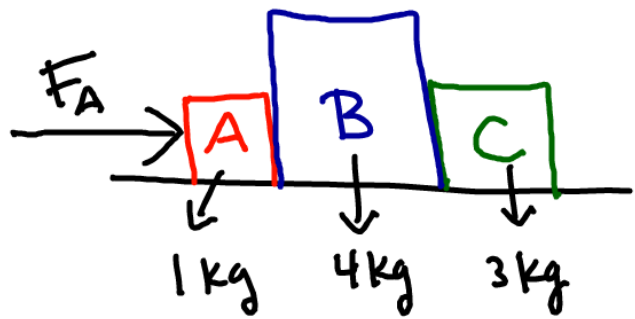
$$m_T = m_A + m_B + m_C = 8 \text{ kg}$$



$$\sum F_x = m_T a$$

$$F_A = m_T a$$

$$a = \frac{F_A}{m_T} = \frac{F_A}{m_A + m_B + m_C} = \frac{16}{8} = 2 \text{ m/s}^2$$

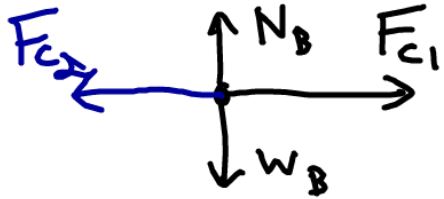


2) Find contact forces between blocks A and B, and B and C?

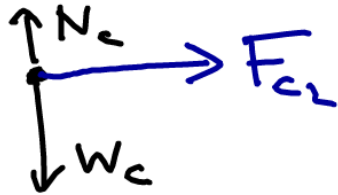
Block A



Block B



Block C



\rightarrow ve

$$F_A - F_{C1} = m_A a \quad (1)$$

$$F_{C1} - F_{C2} = m_B a \quad (2)$$

$$F_{C2} = m_C a \quad (3)$$

$$F_A = (m_A + m_B + m_C) a$$

$$a = \frac{F_A}{m_A + m_B + m_C}$$

$$1) F_A - F_{c1} = m_A a$$

$$F_A = 16 \text{ N}$$

$$2) F_{c1} - F_{c2} = m_B a *$$

$$m_A = 1 \text{ kg}$$

$$m_B = 4 \text{ kg}$$

$$3) F_{c2} = m_C a$$

$$m_C = 3 \text{ kg}$$

$$* F_{c2} = \frac{m_C F_A}{m_A + m_B + m_C}$$

$$* F_{c1} = F_A - m_A a = F_A - \frac{m_A F_A}{m_A + m_B + m_C} = \frac{m_B + m_C}{m_A + m_B + m_C} F_A$$

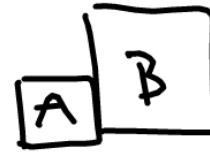
$$F_{c1} > F_{c2}$$

$$F_{c2} = \frac{3 \cdot 16}{8} = 6 \text{ N}$$

$$F_{c1} = \frac{(4+3)}{8} \cdot 16 = 14 \text{ N}$$

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

$$F_{c1} = \frac{m_B + m_C}{m_A + m_B + m_C} \cdot F_A$$



$$F_{c2} = \frac{m_C}{m_A + m_B + m_C} \cdot F_A$$



$$\frac{F_{c1}}{F_{c2}} = \frac{m_B + m_C}{m_C} = 1 + \frac{m_B}{m_C}$$

$$m_B = \phi$$