

# Sangam Skm College Nadi

**Year 13**

## Physics

### Worksheet 2

#### Solutions:

$$\begin{aligned}
 1. \text{ i. } f_k &= \mu_k mg \cos \theta & a &= \frac{m_2 g - m_1 g \sin \theta - f_k}{m_1 + m_2} \\
 &= 0.35 \times 4 \times 9.8 \times \cos 30^\circ & &= \frac{9 \times 9.8 - 4 \times 9.8 \sin 30^\circ - 11.88}{4 + 9} \\
 &= 11.88 \text{ N} & &= 4.36 \text{ ms}^{-2}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii. } T &= m_2 g - m_2 a \\
 &= 9 \times 9.8 - 9 \times 4.36 \\
 &= 48.93 \text{ N}
 \end{aligned}$$

$$\begin{aligned}
 2. \text{ i. } f_k &= \mu_k mg & \sum F &= m_2 g - f_k \\
 &= 0.15 \times 3 \times 9.8 & &= 7 \times 9.8 - 4.41 \\
 &= 4.41 \text{ N} & &= 64.19 \text{ N}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii. } a &= \frac{\sum F}{m_1 + m_2} = \frac{64.19}{3 + 7} = 6.419 = 6.42 \text{ ms}^{-2} \\
 \text{iii. } T &= m_2 g - m_2 a \\
 &= 7 \times 9.8 - 7 \times 6.419
 \end{aligned}$$

$$T = 23.67 \text{ N}$$

$$\begin{aligned}
 3. \text{ i. } v_f^2 &= v_i^2 + 2ad & \text{ii. } & T = mg + ma \\
 0 &= 7^2 + 2a \times 12 & & = 800 \times 9.8 + 800 \times -2.04 \\
 a &= -2.04 \text{ ms}^{-2} & & T = 6208 \text{ N}
 \end{aligned}$$

$$\begin{aligned}
 \text{iii. } & \begin{array}{c} \text{Diagram of a person standing in a box} \\ \text{W} = mg \quad R \quad a \end{array} & ma &= R - W \\
 & R &= W + ma \\
 & & = 60 \times 9.8 + 60 \times -2.04
 \end{aligned}$$

$$R = 465.6$$

