

Add 2 equations:

$$10a = 3g$$

$$\Rightarrow a = \frac{3g}{10}$$

$$= 2.94 \text{ m/s}^2$$

$$u = 0, \quad a = 2.94, \quad s = 3.3075$$

$$v^2 = u^2 + 2as$$

$$\Rightarrow v^2 = 2(2.94)(3.3075)$$

$$\Rightarrow v = 4.41 \text{ m/s}$$

$$t = \frac{v - u}{a}$$

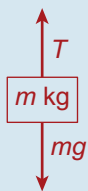
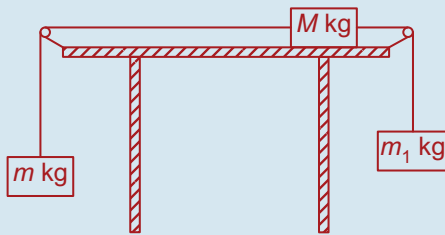
$$= \frac{4.41 - 0}{2.94}$$

$$= 1.5 \text{ s}$$

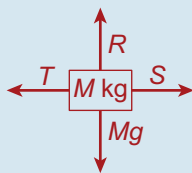
- (ii) 7 kg mass now 3.3075 m from the edge of the table and moves at a constant speed of 4.41 m/s.

$$\text{Time} = \frac{\text{distance}}{\text{speed}} = \frac{3.3075}{4.41} = 0.75 \text{ s}$$

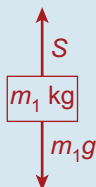
Q. 12.



$$T - mg = ma \quad \text{Equation 1}$$



$$S - T = Ma \quad \text{Equation 2}$$



$$m_1g - S = m_1a \quad \text{Equation 3}$$

Add 3 equations:

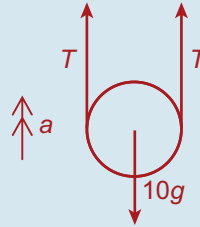
$$m_1a + Ma + ma = m_1g - mg$$

$$\Rightarrow a(m_1 + M + m) = (m_1 - m)g$$

$$\Rightarrow a = \left( \frac{m_1 - m}{m_1 + m + M} \right) g$$

## Exercise 5D

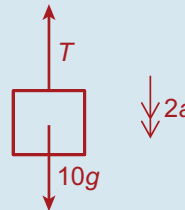
Q. 1. (i) Pulley A:



$$2T - 10g = 10a$$

$$\Rightarrow T - 5g = 5a \quad \text{Equation 1}$$

Particle B:



$$10g - T = 10(2a)$$

$$\Rightarrow 10g - T = 20a \quad \text{Equation 2}$$

Adding equations 1 and 2 gives

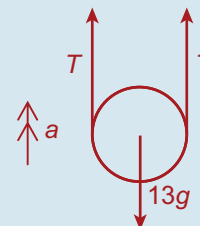
$$5g = 25a$$

$$\Rightarrow a = \frac{g}{5} \text{ m/s}^2$$

- (ii)  $T - 5g = 5a$

$$\Rightarrow T = 5\left(\frac{g}{5}\right) + 5g = 6g \text{ N}$$

Q. 2. (i) Pulley A:



$$2T - 13g = 13a \quad \text{Equation 1}$$