

# Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

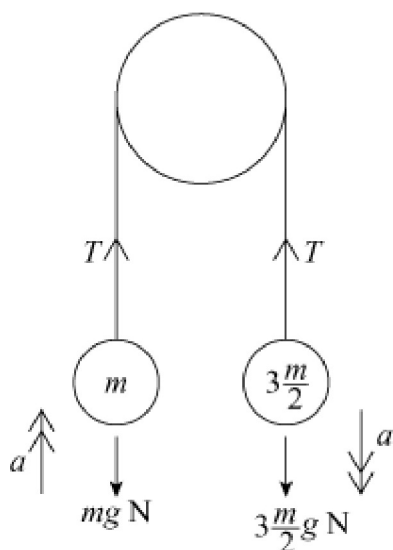
## 6 Connected particles

### Exercise A, Question 4

#### Question:

Two particles of mass  $m$  and  $\frac{3m}{2}$  are connected by a light, inextensible string that passes over a smooth pulley. Find the acceleration of the particles and the tension in the string in terms of  $m$  and  $g$ .

#### Solution:



Using  $F = ma$ ,

$$\text{for } m \text{ particle } T - mg = ma \quad [1]$$

$$\text{for } \frac{3m}{2} \text{ particle } \frac{3m}{2}g - T = \frac{3m}{2}a$$

$$\text{Adding } \frac{mg}{2} = \frac{5m}{2}a$$

$$\therefore a = \frac{g}{5}$$

Acceleration is  $\frac{g}{5} \text{ m s}^{-2}$

Substituting into equation [1]

$$T - mg = m \frac{g}{5}$$

$$T = \frac{6}{5}mg$$

Tension is  $\frac{6}{5}mg \text{ N}$

