

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

6 Connected particles

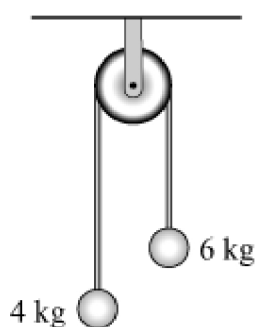
Exercise A, Question 10

Question:

Two particles, of masses 4 kg and 6 kg, are connected by a light, inextensible string that passes over a smooth, light pulley. The two particles are released from rest, with the string taut, as shown in the diagram.

(a) Show that the acceleration of each particle is 1.96 m s^{-2} .

(b) Calculate the tension in the string. [A]



Solution:

(a) Using $F = ma$,

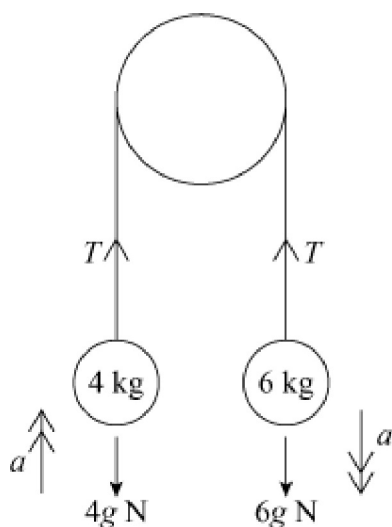
$$\text{for 6 kg particle; } 6g - T = 6a$$

$$\text{for 4 kg particle; } T - 4g = 4a \quad [1]$$

$$\text{Adding } 2g \qquad \qquad = 10a$$

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

\therefore Acceleration of each particle is 1.96 m s^{-2}



$$\begin{aligned} \text{From [1], } T &= 4g + 4a \\ \text{(b)} \quad &= \frac{24g}{5} \end{aligned}$$

or 47.04 N

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