

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

4 Forces

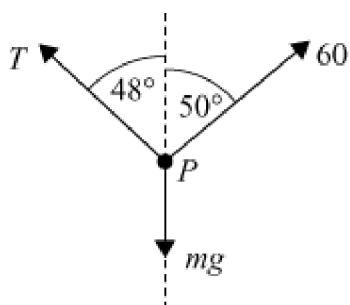
Exercise E, Question 17

Question:

A particle, P , of mass m kg, is held in equilibrium by two strings. One string is inclined at 50° to the vertical and exerts a force of 60 newtons on the particle. The other string exerts a force of magnitude T newtons at an angle of 48° to the vertical. The forces that act on the particle are shown in the diagram below.

(a) Find T .

(b) Find m . [A]



Solution:

(a) Resolving horizontally

$$T \times \sin 48^\circ = 60 \times \sin 50^\circ$$

$$\therefore T = \frac{60 \times \sin 50^\circ}{\sin 48^\circ}$$

$$T = 61.848\dots$$

$$T = 61.8 \text{ N (3 s.f.)}$$

(b) Resolving vertically

$$T \times \cos 48^\circ + 60 \times \cos 50^\circ = 9.8 \times m$$

$$\therefore \frac{[61.848\dots \times \cos 48^\circ + 60 \times \cos 50^\circ]}{9.8} = m$$

$$m = 8.1583\dots$$

$$m = 8.15 \text{ kg (3 s.f.)}$$

