

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

4 Forces

Exercise E, Question 14

Question:

A particle of weight 10 N is suspended from a fixed point by a light inextensible string. A horizontal force of 5 N also acts on the particle. Find the tension in the string and the angle between the string and the vertical.

Solution:

Since the particle is in equilibrium

$$\begin{aligned} T + (-5i) + (-10j) &= 0 \\ \text{i.e. } T &= 5i + 10j \\ |T| &= \sqrt{5^2 + 10^2} \\ |T| &= 11.180 \\ \text{i.e. } |T| &= 11.2 \text{ N (3 s.f.)} \\ \text{and } \tan \alpha &= \frac{5}{10} \\ \alpha &= 26.565...^\circ \end{aligned}$$

i.e. at 26.6° (3 s.f.) with the vertical.

