

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

4 Forces

Exercise F, Question 3

Question:

A particle of weight 10 N is at rest on a rough horizontal plane. The particle is pulled by a light, inextensible string, inclined at an angle of 20° to the plane. If the tension in the string is 5 N, find the least value of the coefficient of friction correct to three significant figures.

Solution:

Resolving vertically

$$R + 5 \sin 20^\circ = 10$$

$$\therefore R = 10 - 5 \sin 20^\circ = 8.2898\dots$$

Resolving horizontally

$$F = 5 \cos 20^\circ$$

$$\text{i.e. } F = 4.6984\dots$$

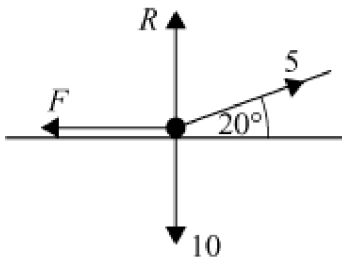
$$\therefore \text{For equilibrium, } F \leq \mu \times R$$

$$4.6984\dots \leq \mu \times 8.2898$$

$$\frac{4.6984\dots}{8.2898\dots} \leq \mu$$

$$\text{i.e. } \mu \geq 0.56676\dots$$

i.e. least value of μ is 0.567 (3 s.f.)



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