

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

4 Forces

Exercise F, Question 7

Question:

A sledge of mass 12 kg is on level ground.

(a) A horizontal force of 10 N will keep the sledge moving at a constant speed. Find the value of the coefficient of friction.

(b) A girl of mass 25 kg sits on the sledge. Find the least horizontal force required to keep the sledge moving at a constant speed.

Solution:

(a) Resolving horizontally

$$F_1 = 10$$

Resolving vertically

$$R_1 = 117.6$$

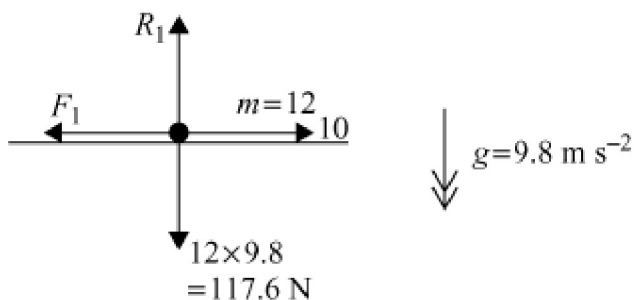
Limiting friction

$$F_1 = \mu R_1$$

$$\therefore 10 = \mu \times 117.6$$

$$\mu = \frac{10}{117.6} = 0.085034\dots$$

$$\mu = 0.0850 \text{ (3 s.f.)}$$



(b) Horizontally $P = F_2$

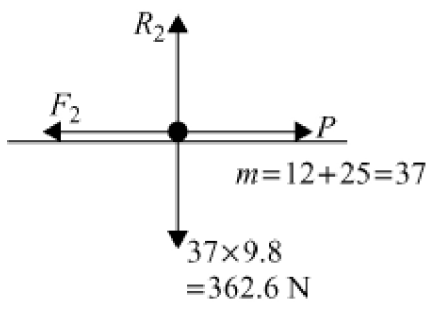
Vertically $R_2 = 362.6$

Limiting friction $F_2 = 0.085034 \times R_2$

$$\therefore P = 0.085034 \times 362.6$$

$$P = 30.833$$

$$P = 30.8 \text{ N (3 s.f.)}$$



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