3.

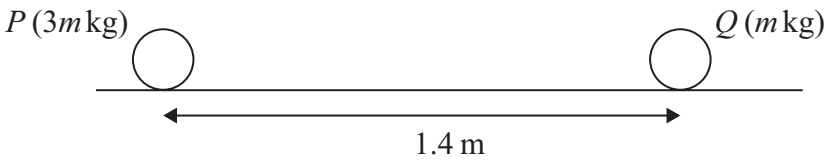


Figure 1

A particle P of mass $3m$ kg and a particle Q of mass m kg are at rest on a rough horizontal surface. The distance between P and Q is 1.4 m, as shown in Figure 1.

An impulse of magnitude λ N s is now applied to P in the direction PQ. Immediately after the impulse is applied, the speed of P is $5\,\text{m s}^{-1}$

(a) Find λ in terms of m.

(2)

Immediately before P collides with Q, the speed of P is $2.5\,\text{m s}^{-1}$
The coefficient of friction between P and the surface is μ

(b) Find the value of μ

(7)

Immediately after P collides with Q, the speed of Q is $2.1\,\text{m s}^{-1}$

(c) Find the speed of P immediately after the collision.

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 3 continued

Question 3 continued

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 3 continued

(Total for Question 3 is 12 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA