

4

(a)

A force F is acting on a body of mass m that causes it to move with a velocity v . Given that the body started from rest, show that the kinetic energy E_k of the body is given by

$$E_k = \frac{1}{2}mv^2$$

[3]

(b)

Fig. 4.1 below shows a vertical semi-circular path which has a radius of 2.0 m centred at **O**. A point object of mass 3.0 kg is released from rest at **P**. The path exerts a constant frictional force on the object and it reaches point **Q** where it comes to rest momentarily. The angular displacement between **P** and **Q** with respect to **O** is 145° .

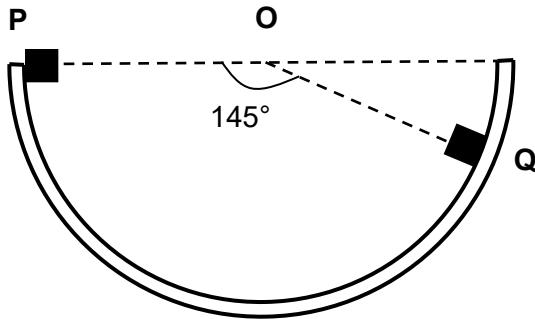


Fig. 4.1

(i)

Calculate the frictional force exerted by the track on the object.

frictional force = N [3]

(ii)

Calculate the kinetic energy of the object at the lowest point on the track.

kinetic energy = J [2]

[Total: 8]