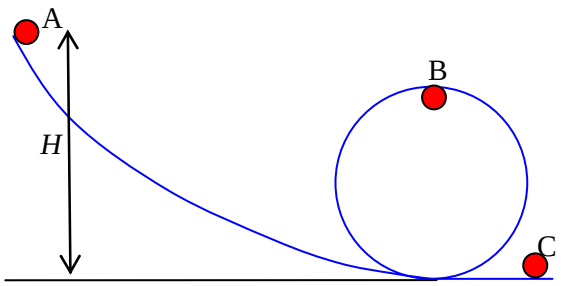
Extension worksheet – Topic 2, Worksheet 3

1 A body is projected vertically upwards. Air resistance is neglected. Sketch a graph to show the variation with time of the kinetic energy of the body from the time of launch until the maximum height is reached. [2]

2 A net force acts on a body while it moves with speed v. Show that the power generated by the force is $P = Fv$. [2]

3 A ball of mass 0.25 kg is released from rest at position A, a height H = 1.20 m from the ground. It rolls down a hill and enters a circular track of radius r = 0.30 m. The ball exits the track and moves along a horizontal track C.



Calculate, for the ball at position B

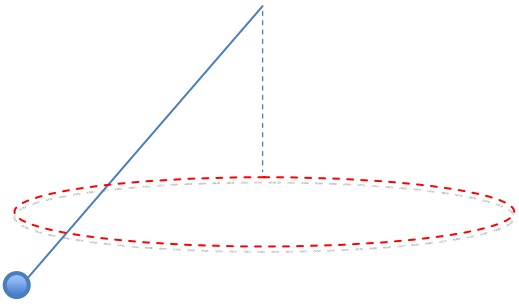
a the speed. [2]

b the acceleration. [2]

c the reaction force from the track. [2]

d Calculate the smallest value of H that will allow the ball to reach C without falling off the circular track. [3]

4 A ball is attached to a string that is tied to the ceiling. The ball moves on a horizontal circle of radius 0.30 m. The string makes an angle of 28° with the vertical.



a Draw arrows to represent the forces on the ball. [2]

b Calculate the speed of the ball. [3]