

Section A

Answer **all** the questions in the spaces provided.

1 Figure 1.1 below shows a ball of mass 150 g, attached to an elastic cord, being thrown vertically upwards, with a velocity 5.7 m s^{-1} , from the ground. The cord has a spring constant of 45 N m^{-1} . Initially the cord is unstretched but after a while it becomes stretched. The cord obeys Hooke's law and air resistance is ignored.

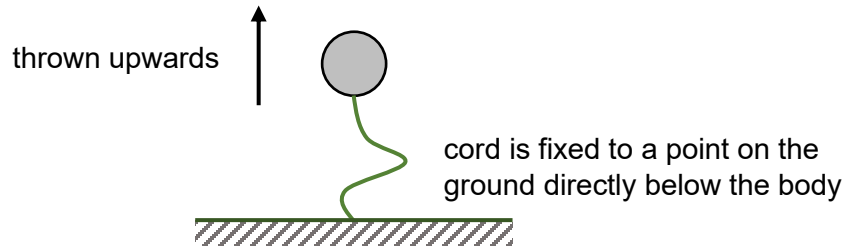


Figure 1.1

- (a) Given that the maximum height reached by the ball is 1.12 m, calculate the extension of the elastic cord. Explain your working. [3]

- (b) Hence, determine the length of the unstretched cord. [1]

- (c) Sketch, on Figure 1.2, the variation with displacement of the kinetic energy K , gravitational potential energy G and the elastic potential energy E when the mass moves from the ground to maximum height. Label your graphs clearly and indicate on the scale with values from parts (a) and (b). [4]



Figure 1.2

- (d) The ball, still attached with the elastic cord, is now being swirled into a vertical circle shown in Figure 1.3.

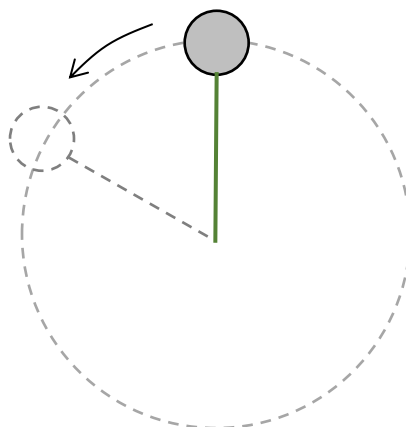


Figure 1.3

Discuss whether any work is done by the tension, in the cord, acting on the ball. [2]