

1. A small ball is projected vertically upwards from a point A which is 19.6 m above the ground. The ball strikes the ground, for the first time, 4 s later.

The motion of the ball is modelled as that of a particle moving freely under gravity.

- (a) Use the model to find the speed of the ball as it hits the ground for the first time.

(3)

The ball rebounds from the ground with a vertical speed of 14.7 m s^{-1} and next comes to instantaneous rest at the point B .

- (b) Use the model to find the height of B above the ground.

(2)

In a refined model of the motion of the ball, the effect of air resistance is included and this refined model is now used to find the speed of the ball as it hits the ground for the first time

- (c) How would this new value of the speed of the ball as it hits the ground for the first time compare with the value found using the initial model in part (a)?

(1)

(Total 6 marks)