3 **(a)** Explain what is meant by *gravitational potential energy* and by *kinetic energy*.

gravitational potential energy: .....

.....

kinetic energy: .....

.....

[2]

(b) A motion sensor is used to measure the velocity of a ball falling vertically towards the ground, as illustrated in Fig. 3.1.

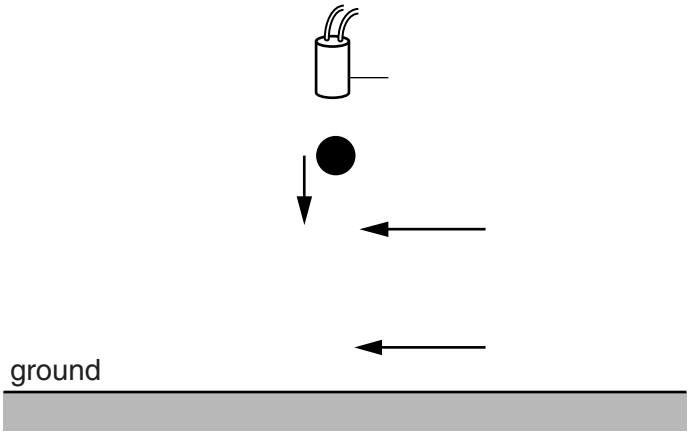

Fig. 3.1

The ball passes through points A and B as it falls. The ball has a mass of 1.5 kg.

The variation with time t of the velocity v of the ball as it falls from A to B is shown in Fig. 3.2.

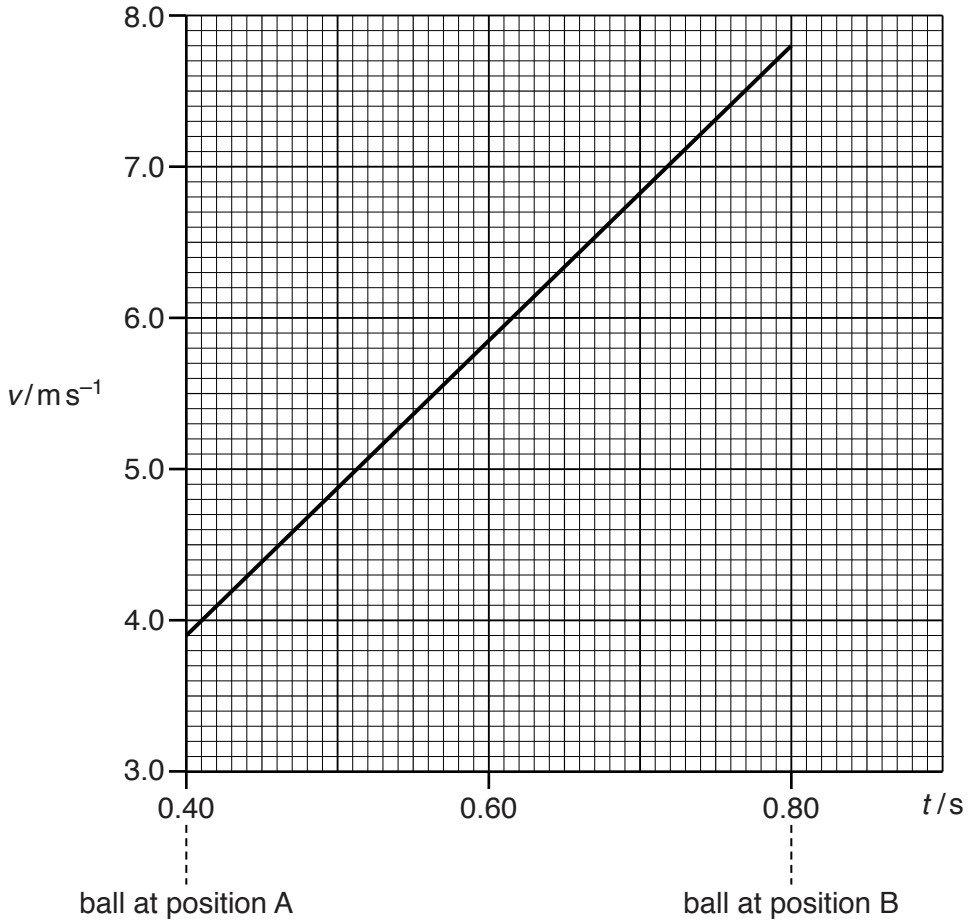

Fig. 3.2

Fig. 3.2 to calculate, for the ball falling from A to B,

(i) the displacement,

displacement = ...m [3]

(ii) the acceleration,

acceleration = ... $m\,s^{-2}$ [2]

(iii) the change in kinetic energy.

change in kinetic energy = ...J [3]

(c) Show that the work done by the gravitational field on the ball in **(b)** as it moves from A to B is equal to the change in kinetic energy.

[2]

[Total: 12]