1 **(a)** A hard ball is dropped vertically downwards.

Fig. 1.1 shows the speed–time graph for the ball from when it is dropped until it hits the ground.

Air resistance is ignored.

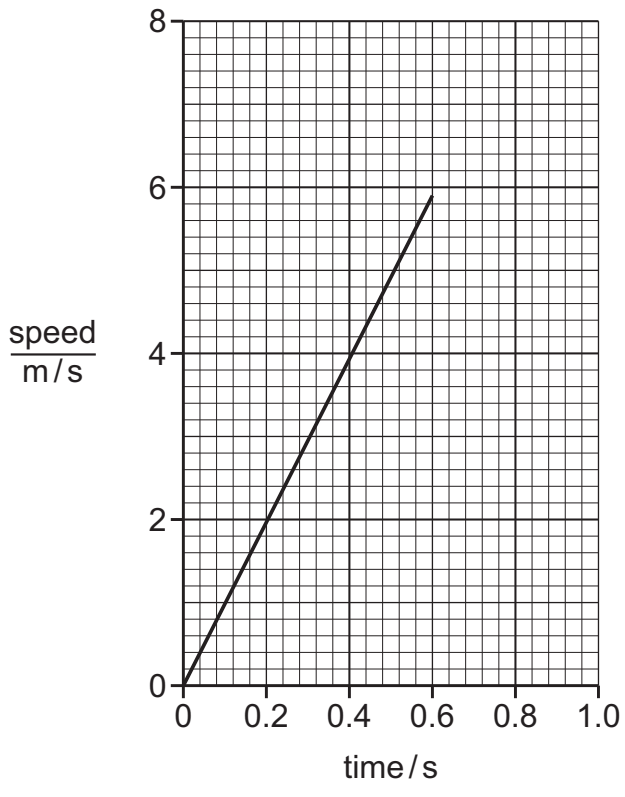

Fig. 1.1

(i) Describe the motion of the ball in Fig. 1.1.

.....

..... [1]

(ii) Show that the distance travelled by the ball is 1.8 m.

[2]

(iii) The mass of the ball is 0.54 kg. Calculate the gravitational potential energy stored in the ball immediately before it is dropped.

gravitational potential energy = ... [2]

(iv) Determine the kinetic energy of the ball when it has fallen half way to the ground.

kinetic energy = ... [1]

(b) The same ball is dropped from an aeroplane. Air resistance acts on the ball.

Explain how the vertical motion of the ball changes, from when it is dropped to just before it hits the ground.

Use the idea of forces in your answer.

.....

.....

.....

..... [3]

(c) A soft ball is dropped by a student so that it bounces on the ground.

Fig. 1.2 shows the height–time graph for the ball. The height is measured from the ground.

The ball bounces four times.

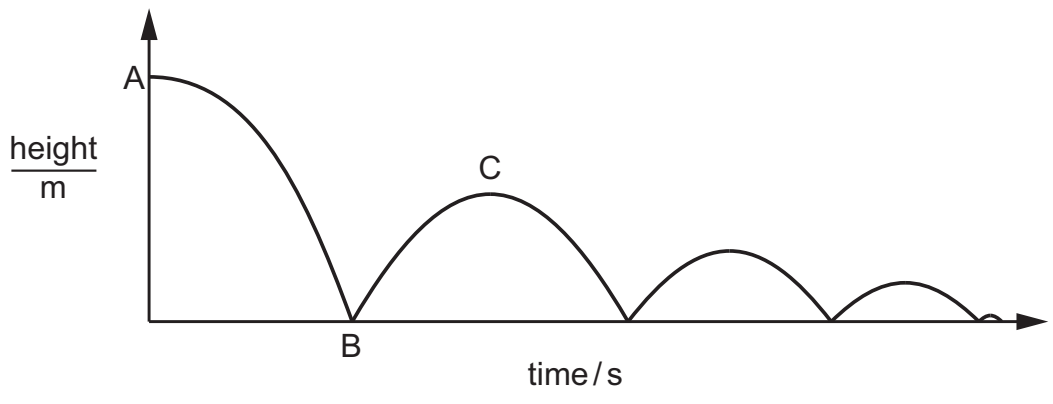

Fig. 1.2

Explain why the change in height of the ball between B and C is less than the change in height between A and B.

.....

.....

.....

..... [2]

[Total: 11]