1 A girl holds a rubber ball out of a window of a tall building. The mass of the ball is 0.20 kg. The ball is at rest 10 m above a concrete path.

(a) Calculate the gravitational potential energy of the ball relative to the concrete path.

gravitational potential energy = ... [2]

(b) The girl releases the ball and it falls towards the path. The ball strikes the path and bounces vertically upwards.

Fig. 1.1 shows the ball falling towards the path.

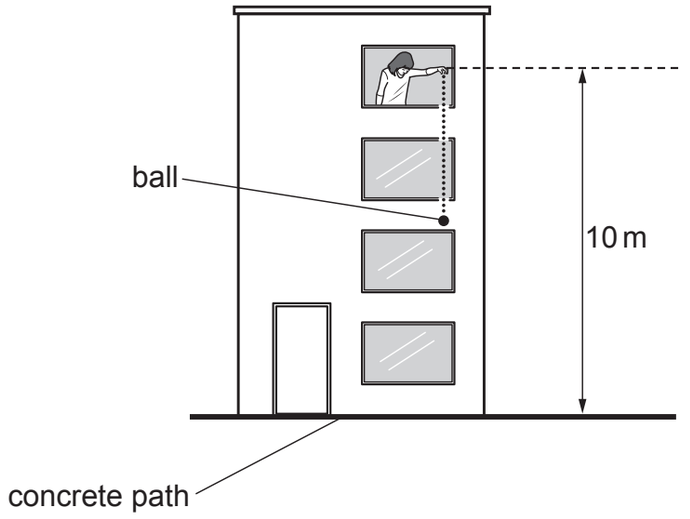

Fig. 1.1

The speed of the ball immediately **before** it strikes the path is 14 m / s.

The speed of the ball immediately **after** it strikes the path is 12 m / s.

(i) Calculate the kinetic energy of the ball immediately **after** it strikes the concrete path.

kinetic energy = ... [2]

(ii) Show that the change in momentum of the ball when it bounces off the path is 5.2 kg m / s.

[3]

(iii) The ball is in contact with the path for 0.25 s.

Calculate the average resultant force on the ball when it is in contact with the path.

force = ... [2]

[Total: 9]