3 A ball of mass 150 g is at rest on a horizontal floor, as shown in Fig. 3.1.

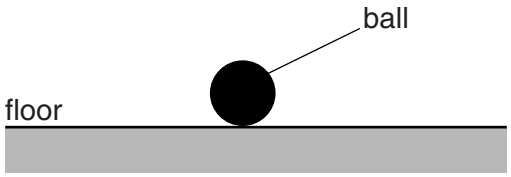

Fig. 3.1

(a) (i) Calculate the magnitude of the normal contact force from the floor acting on the ball.

force = ... N [1]

(ii) Explain your working in **(i)**.

.....

.....

.....[1]

(b) The ball is now lifted above the floor and dropped so that it falls vertically, as illustrated in Fig. 3.2.

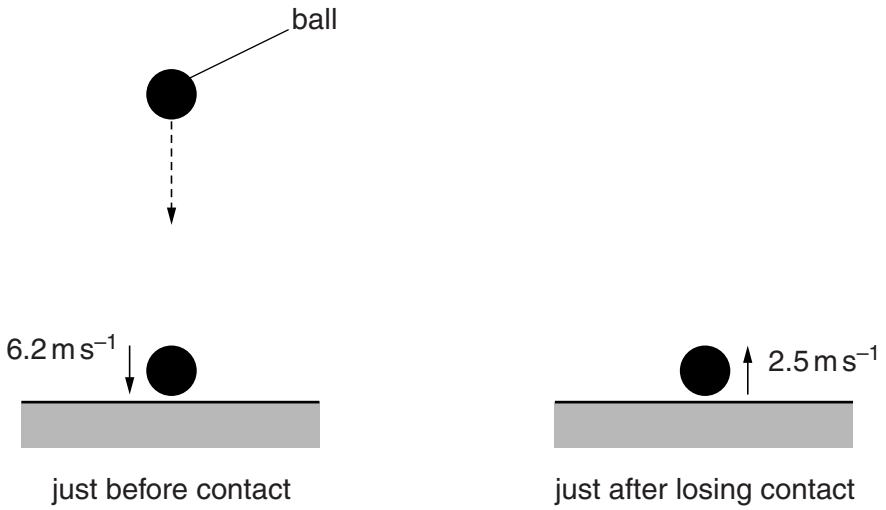

Fig. 3.2

Just before contact with the floor, the ball has velocity 6.2 m s^{-1} downwards. The ball bounces from the floor and its velocity just after losing contact with the floor is 2.5 m s^{-1} upwards. The ball is in contact with the floor for 0.12 s.

(i) State Newton's second law of motion.

.....

.....[1]

(ii) Calculate the average resultant force on the ball when it is in contact with the floor.

magnitude of force = ... N

direction of force .....

[3]

(iii) State and explain whether linear momentum is conserved during the collision of the ball with the floor.

.....

.....

.....

.....[2]

[Total: 8]