

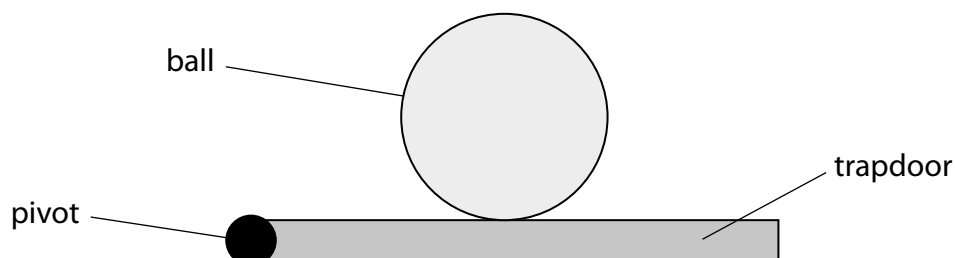
2 This question is about the motion of a ball.

(a) A ball is at rest on a trapdoor.

Complete the diagram to show the forces acting on the ball.

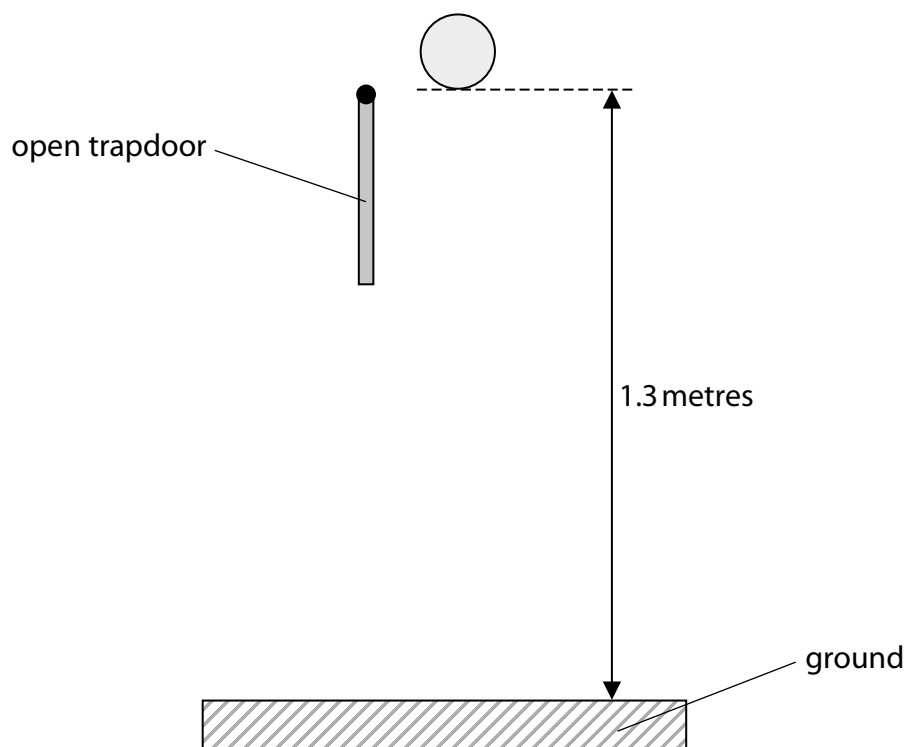
Label the forces.

(3)



(b) The trapdoor swings open and the ball falls to the ground.

The ball does not bounce when it hits the ground.



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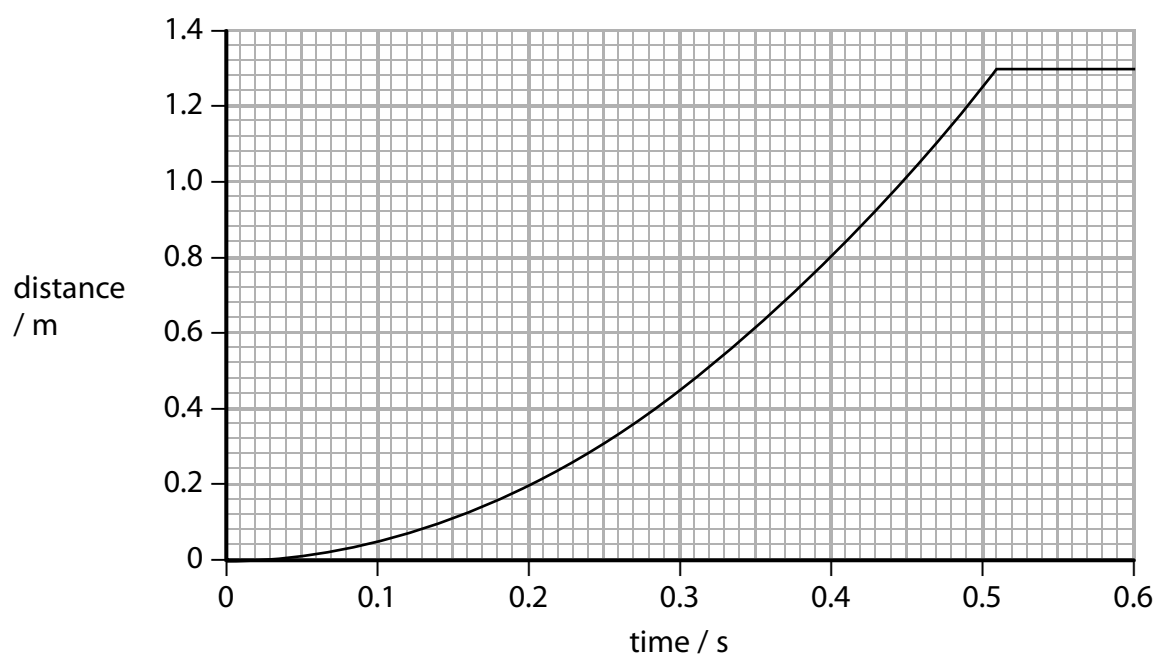
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Show that the final speed of the ball at the instant before it hits the ground is about 5 m/s.

(3)

(c) The graph shows how the distance travelled by the ball changes with time.



(i) Determine the time taken for the ball to hit the ground.

(1)

(ii) State the equation relating average speed, distance moved and time taken. (1)

(iii) Calculate the average speed of the ball after 0.40 s. (1)

average speed = m/s

(iv) Explain how the graph shows that the ball accelerates when it falls. (3)

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(Total for Question 2 = 12 marks)

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