Section B

Answer **one** question from this section.

6 A ball is thrown from the ground and follows the path shown in Fig. 6.1. The ground is horizontal. The effect of air resistance is negligible.

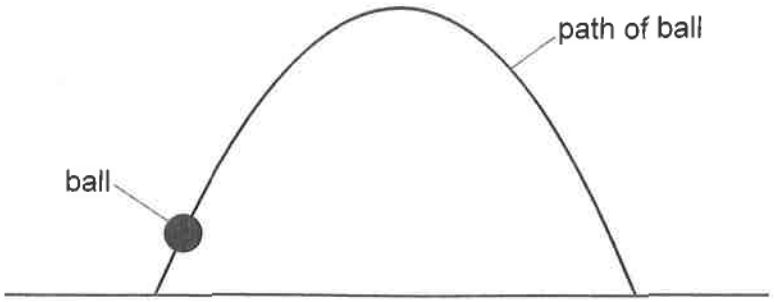

Fig. 6.1 (not to scale)

(a) (i) Describe the variation in the vertical velocity and the vertical acceleration of the ball throughout the path.

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..... [3]

(ii) Describe the variation in the horizontal velocity and the horizontal acceleration of the ball throughout the path.

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.....

..... [2]

(b) (i) The initial velocity of the ball is $14.0\,m\,s^{-1}$ at an angle of 30.0° to the horizontal.

Calculate the horizontal distance travelled by the ball before hitting the ground.

horizontal distance = ... m [4]

(ii) The ball is now thrown at the same speed and angle from a cliff edge. The cliff height is 68.0 m.

Calculate the extra horizontal distance travelled by the ball before hitting the ground when thrown from the cliff edge.

extra horizontal distance = ... m [5]

(c) When the ball in Fig. 6.1 hits the ground, it continues to travel along the ground for a short distance *L* before coming to rest. Assume that the ball is sliding.

(i) On Fig. 6.2, draw and label all the forces acting on the ball during this time.

[2]

Fig. 6.2

(ii) Explain, in terms of energy, why the ball comes to rest.

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..... [2]

(iii) The ball is thrown at the same speed but at an angle of 15° to the horizontal.

State and explain how this affects distance *L*.

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..... [2]

[Total: 20]