1 A ball is thrown horizontally from the top of a building, as shown in Fig. 1.1.

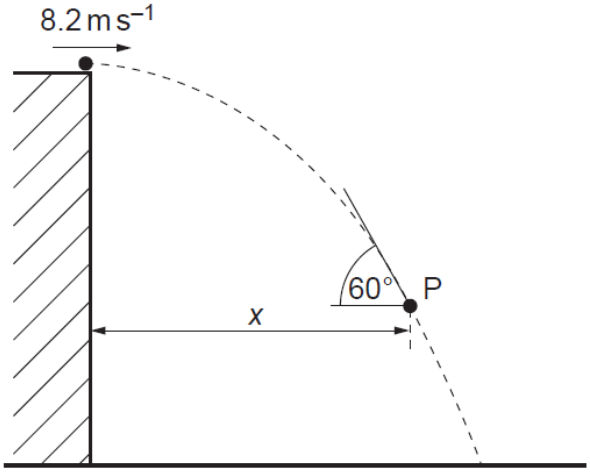

Fig. 1.1

The ball is thrown with a horizontal speed of 8.2 m s^{-1}. The side of the building is vertical. At point P on the path of the ball, the ball is at a distance *x* from the building and is moving at an angle of 60° to the horizontal. Air resistance is negligible.

(a) For the ball at point P,

(i) show that the vertical component of its velocity is 14.2 m s^{-1},

[2]

(ii) determine the vertical distance through which the ball has fallen,

vertical distance = ... m [2]

(iii) determine the horizontal distance *x*.

distance *x* = ... m [2]

(b) The path of the ball in **(a)**, with an initial horizontal speed of 8.2 m s^{-1}, is shown again **i**n Fig. 1.2.

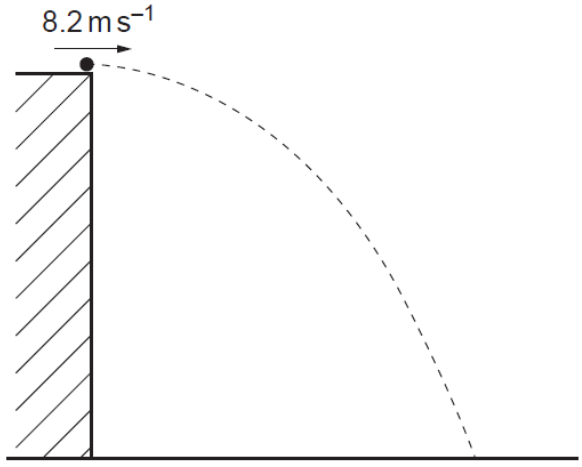

Fig. 1.2

On Fig. 1.2, sketch the new path of the ball for the ball having an initial horizontal speed

(i) greater than 8.2 m s^{-1} and with negligible air resistance. Label this path G. [2]

(ii) equal to 8.2 m s^{-1} but with air resistance. Label this path A. [2]

(c) State and explain in which case, **b(i) or b(ii)**, the ball will reach the bottom of the building first.

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[2]

[Total: 12]

[Turn over