1 **(a)** State two conditions under which the following equation can be used to determine the displacement of an object in motion.

$$s = \frac{1}{2}at^2$$

1. ....

....

2. ....

.... [2]

(b) A ball is thrown with an initial velocity v at angle θ to the horizontal, as shown in Fig. 1.1.
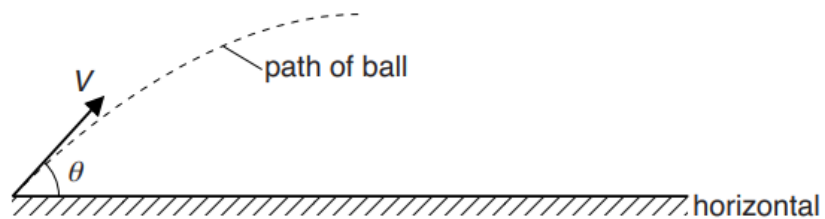

Fig. 1.1

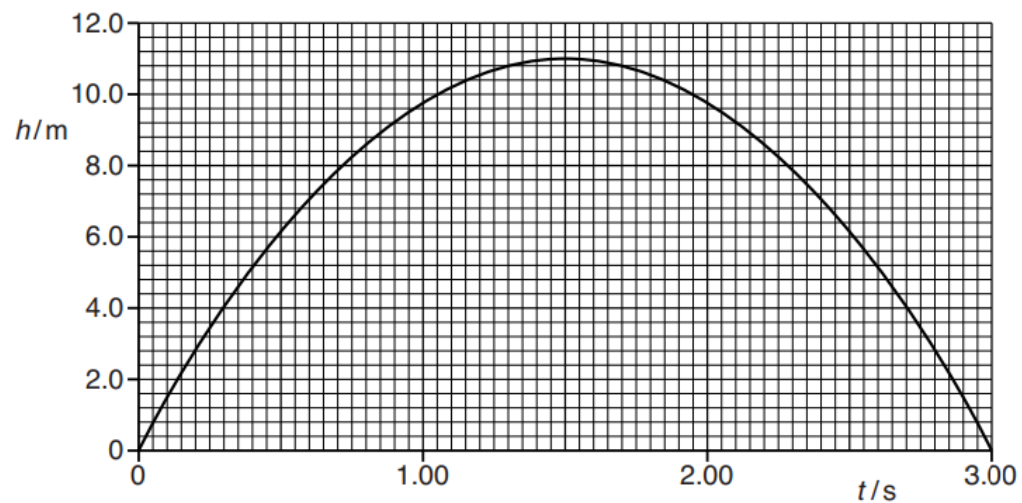The variation with time t of the height h of the ball is shown in Fig. 1.2.

Fig. 1.2

(i) Sketch the vertical component of the velocity of the ball with respect to time in Fig. 1.3.

v / m s^{-1}

t / s

Fig. 1.3

[2]

(ii) Hence, by using **(b)(i)**, find the initial vertical velocity of the ball.

vertical velocity = ...m s^{-1} [1]

(iii) Air resistance acting on the ball is actually not negligible. State and explain the effect of air resistance on the time taken for the ball to reach maximum height.

....

....

.... [2]