

- 1 (a) Define displacement.

.....  
..... [1]

- (b) A small ball is thrown horizontally with a velocity  $v$  at A. It falls through a vertical height of 1.96 m before bouncing off a smooth horizontal table at B as shown in Fig. 1.1. It then bounces to a maximum height at C. Air resistance is negligible.

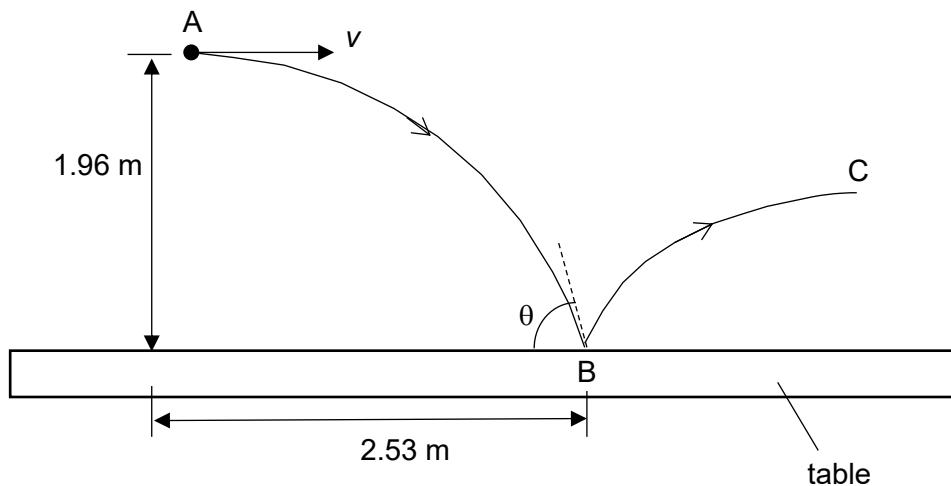


Fig. 1.1

Calculate, for the ball,

- (i) the value of  $v$ ,

$$v = \dots \text{ m s}^{-1} [3]$$

(ii) the vertical component of the velocity  $v_y$  just before it hits the table at B,

$$v_y = \dots \text{ m s}^{-1} [2]$$

(iii) the angle  $\theta$  the ball makes with the horizontal at B.

$$\theta = \dots^\circ [1]$$

(iv) State the magnitude and direction of the acceleration of the ball at C.

$$\text{magnitude and direction} = \dots [1]$$

- (c) On the axes of Fig. 1.2, sketch the variation with time of the vertical component of velocity  $v_y$  of the ball, from A to C if air resistance is **not** negligible. Taking downward as positive.



**Fig. 1.2**