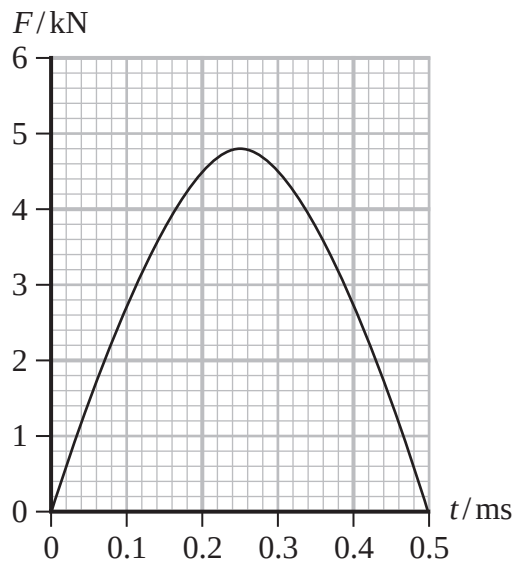
12 In the game of golf a stationary ball is hit by a club. One of the aims of the game is to land the ball on a patch of ground called the green.

The graph shows how the force F exerted by the club on the ball varies with time t as the ball is hit.



(a) State why the area under the graph represents impulse.

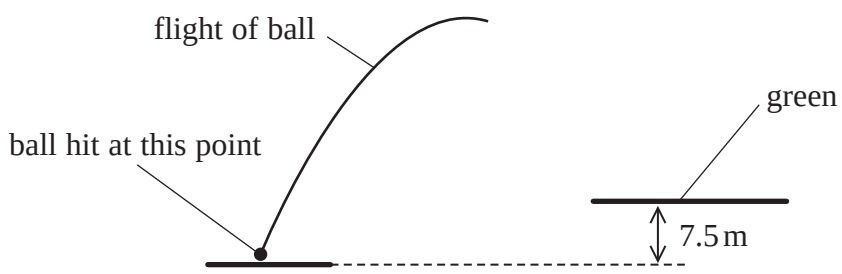
(1)

(b) (i) Show that the velocity of the ball is about $30\,m\,s^{-1}$ immediately after it is hit by the club.

mass of ball = 0.046 kg

(3)

(ii) The ball has a time of flight of 3.5 s before landing. The green is a vertical distance of 7.5 m above the point at which the ball was hit, as shown. The green is about seventy metres away from where the ball is hit.



Deduce whether, if air resistance is ignored, the ball could land on the green after a flight time of 3.5 s.

(5)

(Total for Question 12 = 9 marks)