



JURONG PIONEER JUNIOR COLLEGE
9478 H2 PHYSICS/8867 H1 PHYSICS

MOTION AND FORCES ASSIGNMENT

Data: $g = 9.81 \text{ m s}^{-2}$

Formulae: $s = ut + \frac{1}{2}at^2$; $v^2 = u^2 + 2as$

- 1** A tennis ball is dropped from shoulder height and bounces three times before it is caught. On each bounce, the tennis ball rises to a lower maximum height.

- (a)** Taking ground as the reference for position and upward motion to be positive, sketch
- (i)** the displacement-time graph, [1]
 - (ii)** the velocity-time graph, [2]
 - (iii)** the acceleration-time graph. [2]

Indicate clearly the times (t_1 , t_2 , t_3) at which the ball hits the ground.
Briefly describe any other important features of the graphs.
State any assumption(s) made.

- (b)** Describe how the height of release of the ball can be determined from any parts of your graphs in **(a)**. [1]

- 2** A tennis ball of mass 0.16 kg is moving with a speed of 35 m s^{-1} horizontally to the left.

- (a)** Calculate the momentum of the ball? [1]
- (b)** The ball is now struck by a racket and it travels away from the racket in the opposite direction to that of its approach. The graph in Fig. 1.1 shows the force which acts on the tennis ball during its period of contact t_1 to t_2 with the racket.

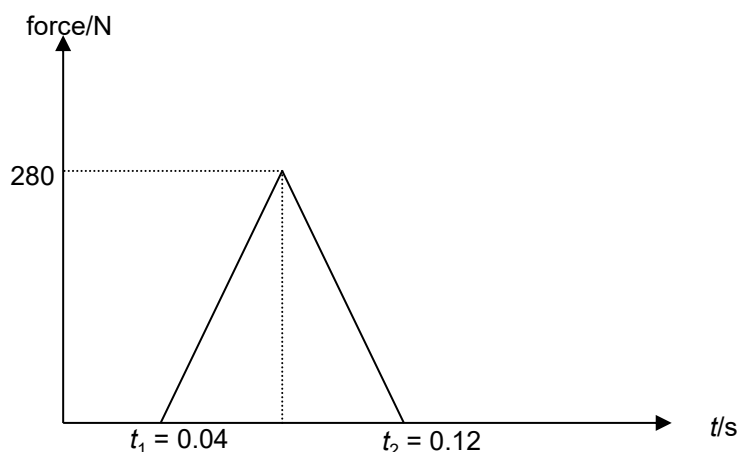


Fig. 1.1

Calculate

- (i)** the change in momentum of the ball, [2]
- (ii)** the average force applied to the ball during its contact with the racket, [1]
- (iii)** the speed of the ball after it has been struck by the racket. [2]