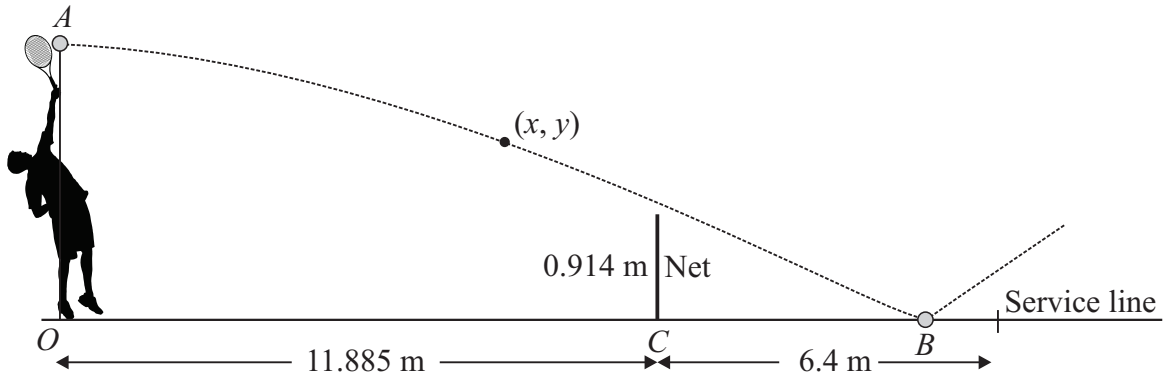


SAMPLE PAPER 4: PAPER 1

QUESTION 7 (50 MARKS)



Question 7 (a)

Height of player + arm span above head = 1.85 m + 0.8 m = 2.65 m

$$y = 3.3 - 13t - 4.9t^2$$

$$t = 0: y = 3.3 \text{ m}$$

Height above base of racket = 3.3 - 2.65 = 0.65 m

Question 7 (b)

$$y = 3.3 - 13t - 4.9t^2$$

$$y = 0: 4.9t^2 + 13t - 3.3 = 0$$

$$t = \frac{-13 \pm \sqrt{13^2 - 4(4.9)(-3.3)}}{2(4.9)} = 0.23 \text{ s}$$

Question 7 (c)

$$x = 70t$$

$$t = 0.23: x = 70(0.23) = 16.1 \text{ m}$$

Distance from baseline to far serve line = 11.885 m + 6.4 m = 18.285 m

Ball is in as 16.1 m < 18.285 m

Question 7 (d)

$$x = 70t$$

$$x = 11.885: 11.885 = 70t \Rightarrow t = 0.17 \text{ s}$$

Question 7 (e)

$$y = 3.3 - 13t - 4.9t^2$$

$$t = 0.17 \text{ s}: y = 3.3 - 13(0.17) - 4.9(0.17)^2 = 0.948 \text{ m}$$

Yes, it will clear the net.

Question 7 (f) (i)

$$y = 3.3 - 13t - 4.9t^2$$

$$y = 0.914: 0.914 = 3.3 - 13t - 4.9t^2$$

$$4.9t^2 + 13t - 2.386 = 0$$

$$t = \frac{-13 \pm \sqrt{13^2 - 4(4.9)(2.386)}}{2(4.9)} = 0.172 \text{ s}$$

Question 7 (f) (ii)

$$x = bt$$

$$t = 0.172: 11.885 = b(0.172) \Rightarrow b = 69.1$$