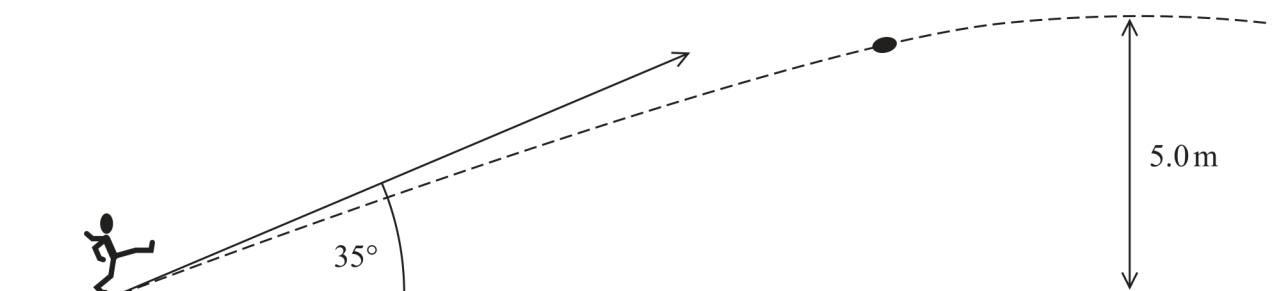13 A rugby player kicks a ball off the ground at an angle of 35.0° to the horizontal as shown. The ball reaches a maximum height of 5.0 m before returning to the ground.

(a) Show that the initial speed of the ball is about $17\,\mathrm{m\,s^{-1}}$.
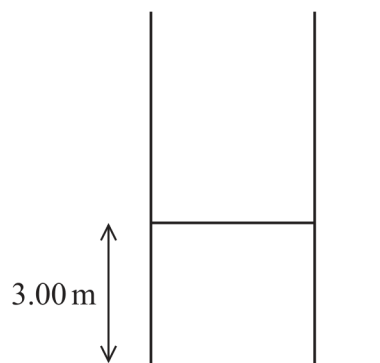
(3)

(b) After travelling a horizontal distance of 22.0 m the ball reaches the goal.

3.00 m

To score, the ball must be more than 3.00 m above the ground when it reaches the goal.

Deduce whether an initial speed of $17.0\,\mathrm{m\,s^{-1}}$ is sufficient to score.

(5)

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(Total for Question 13 = 8 marks)