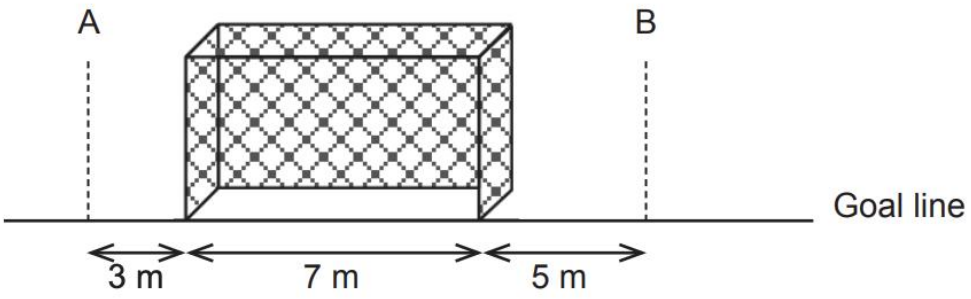
Question 2 **(6 marks)**

Michelle is a soccer goalkeeper and has built a machine to help her practise. The machine will shoot a soccer ball randomly along the ground at or near a goal that is seven metres wide. The machine is equally likely to shoot the ball so that the centre of the ball crosses the goal line anywhere between point A three metres left of the goal, and point B five metres right of the goal, as shown in the diagram below.



Michelle sets up a trial run without anyone in the goals. Assume the goal posts are of negligible width.

Let the random variable X be the distance the centre of the ball crosses the goal line to the right of point A.

(a) Complete the graphical representation of the probability density function for the random variable X. (2 marks)

(b) What is the probability that the machine shoots a ball so that its centre misses the goal to the left? (1 mark)

(c) What is the probability that the machine shoots a ball so that its centre is inside the goal? (1 mark)

(d) If the machine shoots a ball so that its centre misses the goal, what is the probability that the ball's centre misses to the right? (2 marks)