7 An arrow is fired from a point A with a velocity of $25\,\text{m s}^{-1}$, at an angle of $40°$ above the horizontal. The arrow hits a target at the point B which is at the same level as the point A, as shown in the diagram.

(a) State **two** assumptions that you should make in order to model the motion of the arrow.

(2 marks)

(b) Show that the time that it takes for the arrow to travel from A to B is 3.28 seconds, correct to three significant figures.

(4 marks)

(c) Find the distance between the points A and B.

(2 marks)

(d) State the magnitude and direction of the velocity of the arrow when it hits the target.

(2 marks)

(e) Find the minimum speed of the arrow during its flight.

(2 marks)

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7 A golf ball is struck from a point O with velocity $24\,\text{m s}^{-1}$ at an angle of $40°$ to the horizontal. The ball first hits the ground at a point P, which is at a height h metres above the level of O.
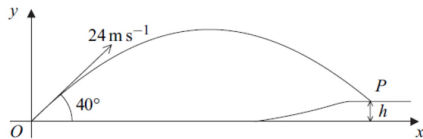
The horizontal distance between O and P is 57 metres.

(a) Show that the time that the ball takes to travel from O to P is 3.10 seconds, correct to three significant figures.

(3 marks)

(b) Find the value of h.

(3 marks)

(c) (i) Find the speed with which the ball hits the ground at P.

(5 marks)

(ii) Find the angle between the direction of motion and the horizontal as the ball hits the ground at P.

(2 marks)

3)

$20\,\text{m/s}$

$30°$

Find the time to hit the floor and the horizontal distance travelled.

50m