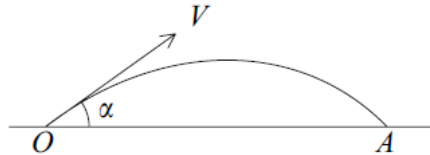


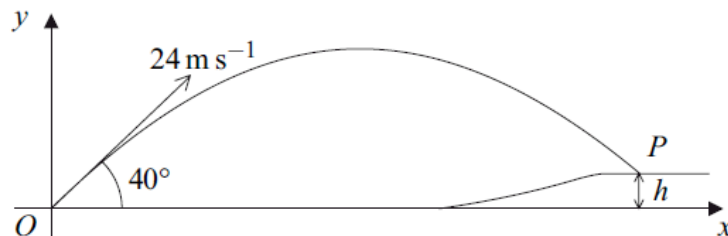
Mechanics 1 Projectiles Questions

- 5 A golf ball is projected from a point O with initial velocity V at an angle α to the horizontal. The ball first hits the ground at a point A which is at the same horizontal level as O , as shown in the diagram.



It is given that $V \cos \alpha = 6u$ and $V \sin \alpha = 2.5u$.

- (a) Show that the time taken for the ball to travel from O to A is $\frac{5u}{g}$. (4 marks)
- (b) Find, in terms of g and u , the distance OA . (2 marks)
- (c) Find V , in terms of u . (2 marks)
- (d) State, in terms of u , the least speed of the ball during its flight from O to A . (1 mark)
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- 7 A golf ball is struck from a point O with velocity 24 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 .



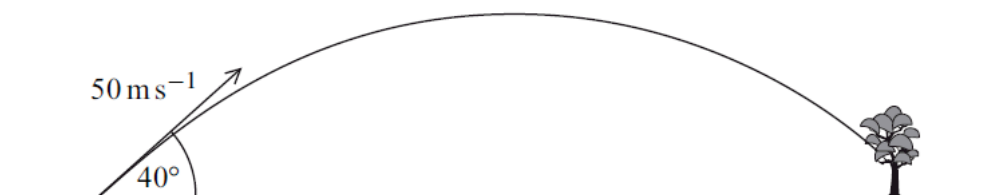
The horizontal distance between O and P is 57 metres.

- (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)
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- 7 A golf ball is struck from a point on horizontal ground so that it has an initial velocity of 50 m s^{-1} at an angle of 40° above the horizontal.

Assume that the golf ball is a particle and its weight is the only force that acts on it once it is moving.

- (a) Find the maximum height of the golf ball. (4 marks)
- (b) After it has reached its maximum height, the golf ball descends but hits a tree at a point which is at a height of 6 metres above ground level.



Find the time that it takes for the ball to travel from the point where it was struck to the tree. (6 marks)

- 7 An arrow is fired from a point A with a velocity of 25 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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