

Motion of a Projectile

Question Paper 5

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Motion of a Projectile
Sub Topic	
Booklet	Question Paper 5

Time Allowed: 54 minutes

Score: /45

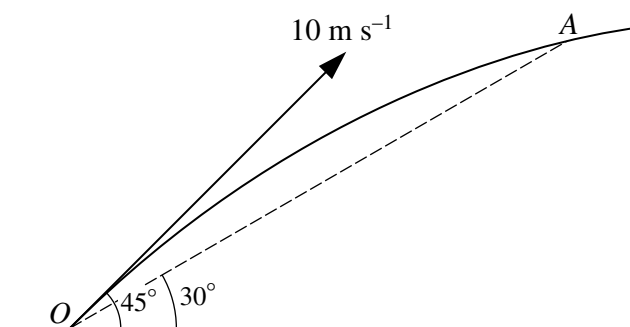
Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 A particle P is projected with speed 25 m s^{-1} at an angle of 45° above the horizontal from a point O on horizontal ground. At time t s after projection the horizontal and vertically upward displacements of P from O are x m and y m respectively.
- (i) Express x and y in terms of t and hence show that the equation of the path of P is $y = x - 0.016x^2$. [4]
- (ii) Calculate the horizontal distance between the two positions at which P is 2.4 m above the ground. [2]
- 2 A particle is projected with speed 15 m s^{-1} at an angle of 40° above the horizontal from a point on horizontal ground. Calculate the time taken for the particle to hit the ground. [2]
- 3 A particle P is projected from a point O on horizontal ground. 0.4 s after the instant of projection, P is 5 m above the ground and a horizontal distance of 12 m from O .
- (i) Calculate the initial speed and the angle of projection of P . [6]
- (ii) Find the direction of motion of the particle 0.4 s after the instant of projection. [3]
- 4 A particle P is projected with speed 26 m s^{-1} at an angle of 30° below the horizontal, from a point O which is 80 m above horizontal ground.
- (i) Calculate the distance from O of the particle 2.3 s after projection. [4]
- (ii) Find the horizontal distance travelled by P before it reaches the ground. [3]
- (iii) Calculate the speed and direction of motion of P immediately before it reaches the ground. [4]

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A particle P is projected from a point O with initial speed 10 m s^{-1} at an angle of 45° above the horizontal. P subsequently passes through the point A which is at an angle of elevation of 30° from O (see diagram). At time t s after projection the horizontal and vertically upward displacements of P from O are x m and y m respectively.

- (i) Write down expressions for x and y in terms of t , and hence obtain the equation of the trajectory of P . [3]
- (ii) Calculate the value of x when P is at A . [3]
- (iii) Find the angle the trajectory makes with the horizontal when P is at A . [4]

6 A particle P is projected with speed 26 m s^{-1} at an angle of 30° above the horizontal from a point O on a horizontal plane.

- (i) For the instant when the vertical component of the velocity of P is 5 m s^{-1} downwards, find the direction of motion of P and the height of P above the plane. [4]
- (ii) P strikes the plane at the point A . Calculate the time taken by P to travel from O to A and the distance OA . [3]