Projectile Questions for A-level Physics

Basic Concepts

1. A stone is thrown at an angle of 30° with an initial velocity of 15 ms^{-1}. Calculate the horizontal and vertical components of its velocity.

2. A football is kicked with a velocity of 20 ms^{-1} at an angle of 60° to the horizontal. Calculate the time of flight before the football hits the ground.

3. A projectile is launched at a speed of 25 ms^{-1} at an angle of 45°. Calculate the range of the projectile (assuming no air resistance).

4. A ball is thrown horizontally at 10 ms^{-1} from a cliff that is 20 meters high. How long does it take for the ball to reach the ground?

5. A rock is thrown vertically with a speed of 18 ms^{-1}. How high does it go before it starts falling back down?

Intermediate Questions

6. A projectile is launched at a speed of 30 ms^{-1} at an angle of 37° from the horizontal. Calculate both the total time of flight and the range.

7. A tennis ball is served with an initial velocity of 40 ms^{-1} at an angle of 20° to the horizontal. Calculate the maximum height reached by the ball.

8. A projectile is fired from the ground with an initial velocity of 25 ms^{-1} at an angle of 35°. If the projectile is in the air for 3.2 seconds, calculate its range.

9. A projectile is fired horizontally from a height of 50 meters with an initial speed of 20 ms^{-1}. Calculate its speed just before it hits the ground.

10. A projectile is launched at an angle of 30° and reaches a maximum height of 45 meters. What was its initial velocity?

11. A cannonball is launched with an initial velocity of 80 ms^{-1} at an angle of 40°. Calculate both the time taken to reach its maximum height and the speed at that point.

Advanced Applications

12. An airplane flying horizontally at 120 ms^{-1} releases a package from a height of 500 m. How far horizontally from the point of release does the package land?

13. A projectile is launched with a speed of 50 ms^{-1}. At what angle should it be launched to achieve a range of 200 meters?

14. A ball is thrown from a height of 5.0 meters at an initial velocity of 25 ms^{-1} at an angle of 60°. Calculate its speed when it hits the ground.

15. A projectile is launched at 50 ms^{-1} from the ground and must hit a target 100 meters away at the same level. At what two angles can the projectile be launched to achieve this?