

Projectile Motion Questions

1. Draw a diagram to represent the motion of a projectile. Draw vectors at five points (evenly spaced from start to finish) on the diagram representing acceleration and velocity at each point.
2. Compare the downward component of the motion of a projectile with the motion of an object in free fall.
3. Explain why the vertical component of a projectile's velocity accelerates but the horizontal doesn't.
4. An object thrown horizontally off a cliff takes 5.3 seconds to hit the ground.
 - a) Calculate the height of the cliff
 - b) Calculate the vertical speed of the projectile on impact.
5.
 - a) Calculate the vertical and horizontal components of a projectile launched at 31.0° above the horizontal with a speed of 11.2 ms^{-1}
 - b) Calculate the time the projectile takes to hit the ground if it is launched from ground level.
 - c) Calculate the range of the projectile.
 - d) Calculate the horizontal and vertical components of the velocity on impact.
 - e) Determine the velocity vector on impact
 - f) Calculate the maximum height of the projectile
6. The projectile in question 5 is launched again from the ground at an angle of 59.0° .
 - a) Show that the range of the projectile is the same.
 - b) Explain why the range is the same even though the time of flight is longer.
7. Draw the path of a projectile without air friction, and a possible path if there were air friction.
8. Calculate the time of flight and horizontal range of a package dropped from a plane 200m above the ocean, if the plane was moving at 20 ms^{-1} when the package was dropped.
9. A cannon fires a cannonball from ground level at 42 ms^{-1} at an angle of 60.5° above the horizontal.
 - a) Calculate the time of flight and horizontal range of the cannonball
 - b) Calculate the velocity of the cannonball on impact
10. Explain the effect of increasing the launch height of a projectile.