

PHYS 1200 Physics of Everyday Experience

Review questions and exercises for Lecture 5 (M-4)

1. What is the acceleration of a projectile while it is rising and falling?
2. What is the force (magnitude and direction) acting on a projectile while it is rising and falling? (no air resistance)
3. Two objects fall under the influence of gravity (no air resistance) from the same height. One falls straight down and the other is given an initial horizontal kick. What object hits the ground first?
4. What are the horizontal and vertical components of the velocity of a projectile when it is at the highest point of its trajectory?
5. (a) What factors determine the range of a projectile? (b) For a fixed initial velocity, how should the projectile be fired to achieve maximum range?
6. What is the difference between a projectile and a non-projectile?
7. To hit the center of a target, where should a rifle be aimed?

Answers:

1. The acceleration of a projectile is 9.8 m/s^2 downward while it is both rising and falling.
2. In the absence of air resistance, the only force acting on a projectile is gravity (its weight) which is mg and is always downward.
3. Both objects will hit the ground at the same time.
4. At its highest point, the vertical velocity of a projectile is zero. Its horizontal velocity is constant throughout its entire trajectory.
5. (a) In the absence of air resistance, the range of a projectile depends on its initial speed and the angle of elevation. (b) Maximum range is achieved by setting the angle of elevation to 45 degrees with the horizontal.
6. A projectile is an object that is given an initial velocity and then moves under the influence of gravity alone.
7. After a projectile leaves the barrel of a rifle it begins falling under gravity. To hit the center of the target, you must aim the rifle at a point above center.