

AP Physics C
Review Chapter 4 Kinematics

1. A dog walks 5 m east, 3 m north then 1 m east in 20 seconds.
 - a. Find the magnitude of the dog's displacement.
 - b. Find the direction of the dog's displacement
 - c. Find the dog's average speed.
 - d. Find the dog's average velocity.

2. A car is traveling in a straight line along a highway at a speed of 20 m/s. The driver steps on the gas and 3 seconds later the car's speed is 32 m/s.
 - a. Find the average acceleration.
 - b. The driver sees a police car and slows to 22 m/s in 2.5 seconds. Find the average acceleration.
 - c. How far did the driver travel when slowing in the previous question?

3. A rock dropped off a cliff that is 80 m high strikes the ground.
 - a. What is the impact velocity of the rock?
 - b. How long does it take to hit the ground?

4. A baseball is thrown straight up with an initial speed of 25 m/s.
 - a. How high will it go?
 - b. How fast is it going 2 seconds after being thrown?
 - c. How long will it take to return to the thrower?

5. An object is thrown straight upward with a speed of 8 m/s and takes 3 seconds to strike the ground. From what height was the object thrown?

6. A ball is thrown horizontally from a high bridge. How far will it drop in 4 seconds?

7. A golf green is 75 m from a shooter who can hit a ball with a speed of 45 m/s. At what angle should the golfer hit the ball in order to be able to putt on the next shot?

8. The position of an object (measured in meters from the origin, where $x=0$) moving along a straight line is given as a function of time t (measured in seconds) by the equation $x(t) = 4t^2 - 6t - 40$. Find
- Its velocity at time t ,
 - Its acceleration at time t ,
 - The time at which the object is at the origin, and
 - The object's velocity and acceleration at the time calculated in c.
9. An object is moving along a straight axis with a constant acceleration of 3 m/s^2 . If the object's initial velocity is 2 m/s and its initial position is $x=3 \text{ m}$,
- Find the velocity function.
 - Find the position function.
 - Where will this object be at time $t = 4 \text{ s}$?
 - Draw a *position vs. time*, *velocity vs. time* and *acceleration vs. time* graph.
10. Two identical guns are fired from the same place. One is angled at 20° whereas the other is angled at 40° . Ignoring friction:
- Which bullet would you expect to be in the air the longest?
 - Which would go the furthest?
 - Which would go the highest?
 - Which would be traveling the fastest as it hits the ground?
 - Which would have experienced the greatest *maximum* acceleration during its flight?