

AP Physics – 2 Dimensional Problems - Review

Include complete problem set-up: Given, find, Solution, diagram. Show the formulas you use and include units at all times,

1. A cannon ball is shot with an initial velocity of 165.0 km/h at an angle of 25.0° with respect to the horizontal. What are the components of the cannon ball's velocity?
2. The first green at a golf course is 350.2 m away. If you drive the ball with your driver at an angle of 15.0° to the ground. What is the maximum height the ball will reach?
3. A storm occurring in the Pacific Ocean moved with speeds reaching a maximum of 126 km/h. Suppose a storm is moving north at this speed. If a gull flies east through the storm with a speed of 40.0 km/h relative to the air, what is the velocity of the gull relative to Earth?
4. Suppose a leatherback turtle swims across a river at 9.0 m/s relative to the water. If the current in the river is 3.0 m/s and it moves at a right angle to the turtle's motion, what is the turtle's displacement with respect to the river's bank after 1.0 min?
5. You drive to Wrigley Field in most straightforward way from your hotel. You drive 4.1 km west, then turn north and drive 17.3 km. Then turn 24.6° west of north for 1.2 km. What is your resultant displacement?
6. A lunch pail is accidentally kicked off a steel beam on a building under construction. Suppose the initial horizontal speed is 1.50 m/s. How far does the lunch pail fall after it travels 3.50 m horizontally?

7)

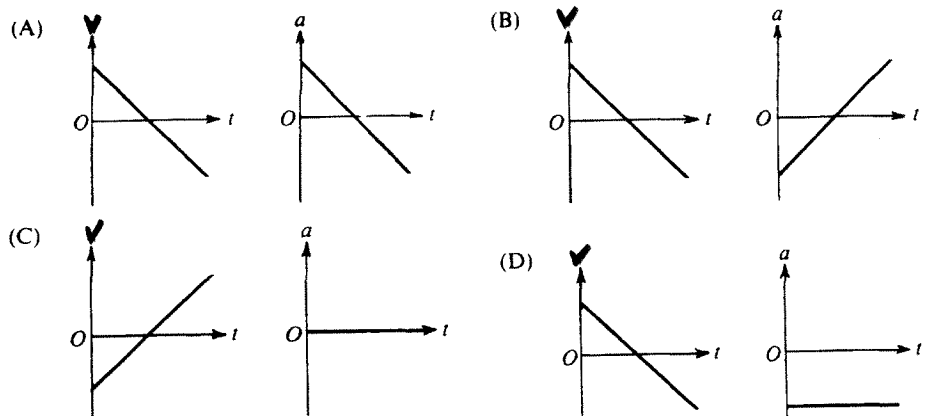
What AP Projectile Problems Look Like

AP motion and acceleration problems almost always involve graphs or projectiles. Here is an example that involves both:

Q:

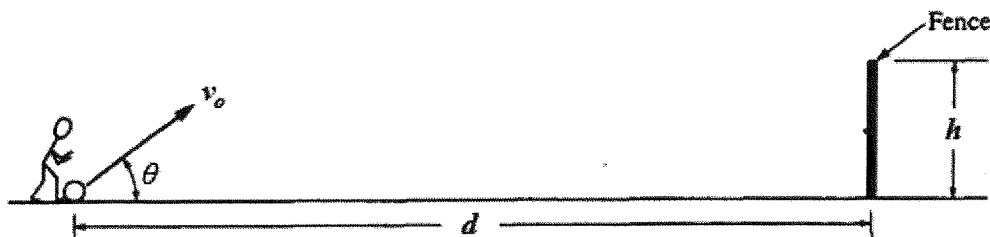


A projectile is fired with initial velocity v_0 at an angle θ_0 with the horizontal and follows the trajectory shown above. Which of the following pairs of graphs best represents the vertical components of the velocity and acceleration, v and a , respectively, of the projectile as functions of time t ?



8)

Q: A ball of mass m , initially at rest, is kicked directly toward a fence from a point that is a distance d away, as shown above. The velocity of the ball as it leaves the kicker's foot is v_0 at an angle of θ above the horizontal. The ball just clears the top of the fence, which has a height of h . The ball hits nothing while in flight and air resistance is negligible.



- Determine the time, t , that it takes for the ball to reach the plane of the fence, in terms of v_0 , θ , d , and appropriate physical constants.
- What is the vertical velocity of the ball when it passes over the top of the fence?