Chapter 2   2D Motion

Review: Projectiles

1. A ball is thrown upwards with a velocity of 60 m/s. If up is concidared the positive direction, what is the acceleration and the velocity of the ball at the very top of its path and how fast will the ball be moving when it returns to its releace point?

2. A car drives off a cliff with a horizontal velocity of 10 m/s, explain what happens to both the vertical and horizontal components of a cars velocity as it falls?

3. Explain which of the following in more important when determining how long an object thrown horizontally will be in the air: height of fall or horizontal velocity.

4. It has been said that if a bullet is fired with enough velocity it will travel several hundred meters before it begins to fall, can you defend this statement? Explain

5. A bullet is fired horizontally with a velocity of 300 m/s from a gun and then hits the ground 2 seconds later. If the bullet had been fired twice as fast (600 m/s) and in the same direction, how long would it be in the air? Explain

6. Which would hits the ground first, a bullet fired horizontally from a gun or a bullet dropped from the same height at the same time?

7. An airplane drops a package, explain where does the package land in relation to the plane up above? Draw a picture that shows the path of the package as it falls.

8. A bus is moving at 5 m/s. If you walk at 2 m/s down the aisle towards the front of the bus, as the bus is moving forward, what is your speed relative to the ground ?

9. A red space ship is traveling at a speed of 140 m/s and a green space ship is traveling in the opposite direction at a speed of 320 m/s, both with respect to a fixed point in space. How fast does the red space ship appear to be traveling to an observer in the green space ship?

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10. If a man walks 25 meters east then 37 meters south, what is the magnitude of the man's displacement?

11. A boat travels perpendicular across a river flowing at 5 m/s. The velocity of the boat in the perpendicular is 3 m/s. What is the combined velocity of the boat?

12. A baseball dropped from the roof of a tall building takes 6.3 seconds to hit the ground. How tall is the building? [Neglect friction.]
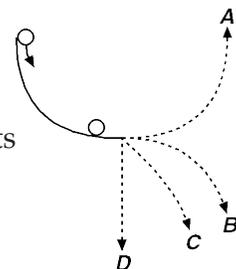
13. A ball rolls down a curved ramp as shown. Which dotted line best represents the path of the ball after leaving the ramp?

14. A ball is thrown horizontally from a window 85 meters up with an initial horizontal velocity of 9.0 m/s. How long is the ball in the air and far does the ball travel from the building?

15. A car drives off the edge of a cliff that has a height of 9.00 m. The car took 1.36 s to hit the ground 15 m from the cliff. What was the horizontal velocity of the car as it rolled off the cliff?

16. A car traveling at 15 m/s accelerates uniformly to a speed of 21.0 m/s in 12 seconds. What is the total distance traveled by the car in the 12 second time interval?

17. A object is thrown horizontally off a cliff with an initial velocity of 7.0 meters per second. The object strikes the ground 4.0 seconds later. [Neglect friction.]
   a. What was the vertical velocity of the object as it reaches the ground?
   b. What was the horizontal velocity of the object 1.5 second after it's released?
   c. How far from the base of the cliff did the object strike the ground?