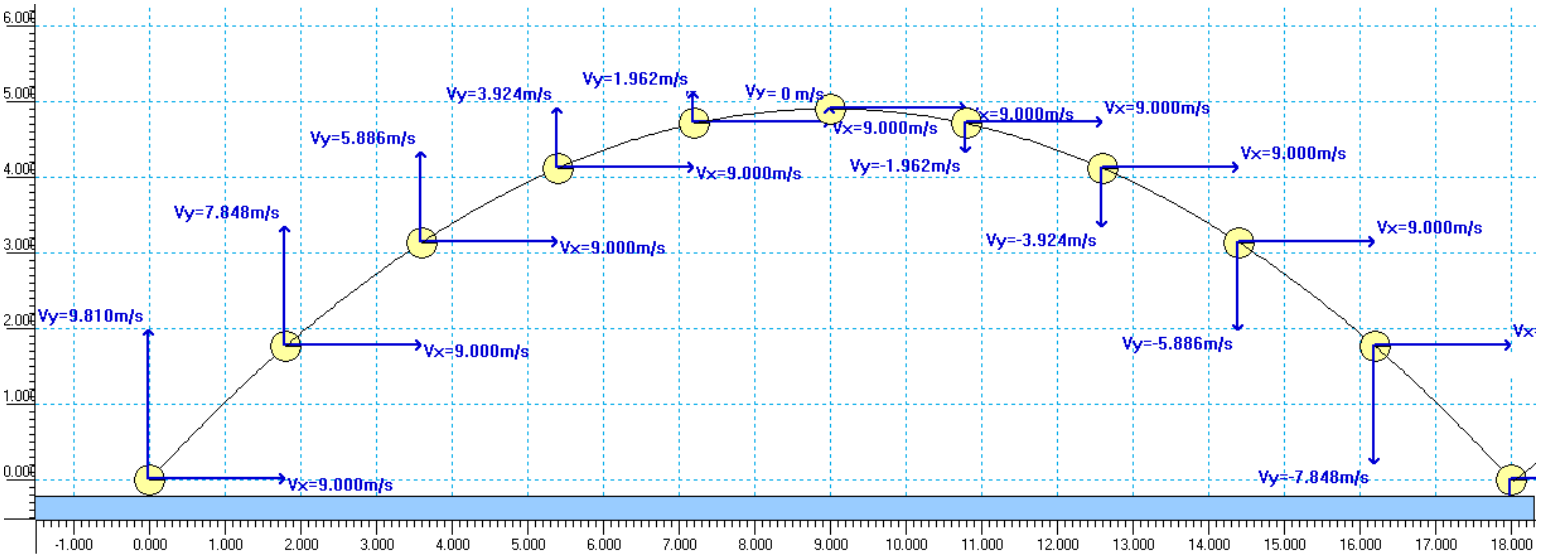
Name: _____

Projectile Motion Concepts

Directions: The diagram below shows a ball thrown at some angle into the air. Analyze the diagram to answer the following the questions.



1. What can you conclude about the horizontal speed of the ball? What observations led you to that conclusion?

2. What happens to the vertical speed as the ball moves upward?

3. What happens to the vertical speed as the ball moves downward?

4. Notice that the vertical speed in the second diagram is 7.848 m/s. What is the vertical speed of the ball when it comes back to the same position on the way down? Do you notice a trend?

5. What is the vertical speed of the ball at its maximum height? What is the horizontal speed at the maximum height?

6. Note that the initial vertical speed is 9.81 m/s. Calculate how long will it take the ball to get to its maximum height assuming an acceleration of -9.81 m/s^2? What is the hang time of the ball?

List givens for the trip up here

7. The ruler at the bottom of the diagram is in meters. How far did the ball travel?

8. Use the horizontal speed of the ball and the hang time to calculate the distance traveled by the ball.

Projectile Motion Conceptual Questions

Essential Questions:
What impacts have analyzing projectiles had on society?
What affects the path of a projectile?

1. Which of the following are examples of projectile motion? List all that apply.

   _____

   a. An airplane taking off
   b. A tennis ball lobbed over a net
   c. A Frisbee sailing across a lawn
   d. A hawk diving to catch a mouse
   e. A parachutist drifting to Earth
   f. A frog jumping from land into the water

2. Which of the following exhibit parabolic motion? List all that apply.

   _____

   a. A flat rock skipping across the surface of a lake
   b. A three-point shot in basketball
   c. The space shuttle while orbiting Earth
   d. A ball bouncing across a room
   e. A cliff diver
   f. A life preserver dropped from a stationary helicopter
   g. A life preserver dropped from a helicopter moving horizontally forward
   h. A person skipping

3. A bullet is fired horizontally from a pistol, and another bullet is dropped simultaneously from the same height. If air resistance is neglected, which bullet hits the ground first?

4. A rock is dropped from the top of a sailboat's mast while at rest and hits the deck below. Now the boat is moving at a constant speed and the rock is dropped from the same point. Will it hit the deck at the same point or a different point it hit when the boat was at rest?

5. Does a ball dropped out of the window of a moving car take longer to reach the ground than one dropped at the same height from a car at rest?

6. A golf ball is hit. How will the distance the ball goes change if the amount of air resistance increases?

7. What if the wind in problem #6 is now moving in the same direction as the ball? Will this affect the distance the ball travels?

8. Let's say the stuntman below has a horizontal speed of 5 m/s and a vertical speed of 20 m/s in the first image.

   a. What is his horizontal speed at his maximum height in the 4th image?

   b. What is his vertical speed at his maximum height in the 4th image?

   c. What is his horizontal speed when he gets back to his original height in the 7th image?

   d. What is his vertical speed when he gets back to his original height in the 7th image?