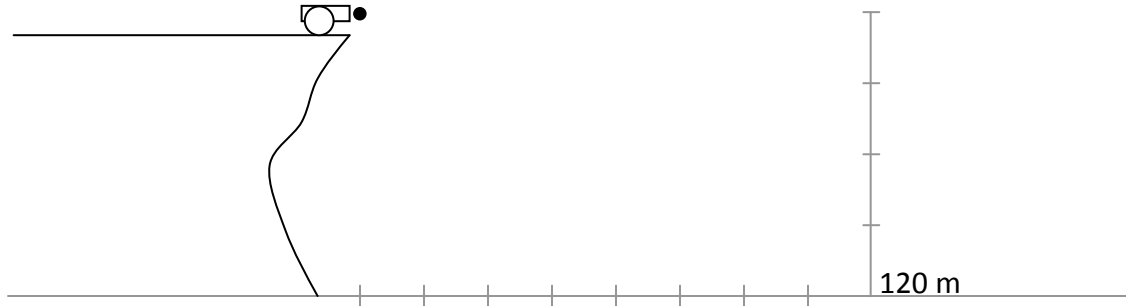


Motion in 2 Dimensions Homework 1

Name: _____

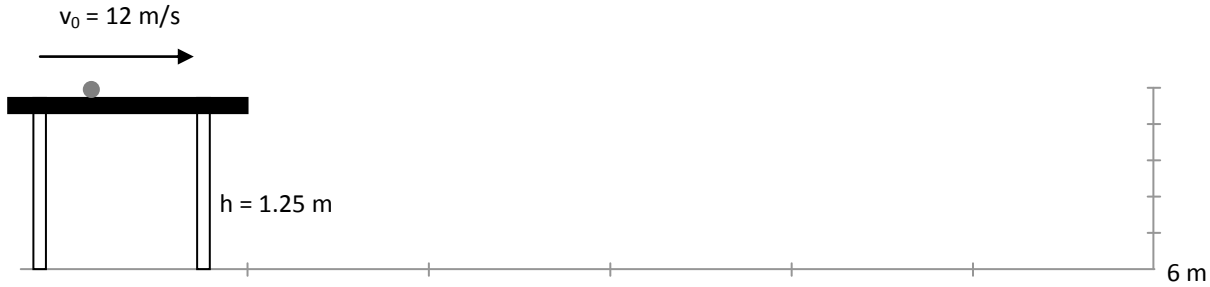
Hour: _____ Date: _____

1. A cannon ball is launched horizontally from a cliff 80 m above the ground. The velocity of the ball as it leaves the cannon is 30 m/s.



- How long does it take for the ball to reach the ground? Show your work.
- What is the horizontal range of the ball? Show your work.
- On the diagram above sketch a motion map (each dot equals 1 s) for the ball after it leaves cannon. Be sure to show, horizontal velocity, vertical velocity, resultant velocity and acceleration arrows on each position dot.
- What is the horizontal speed when it hits the ground?
- What is the vertical speed when it does hit the ground? Show your work.
- What is the resultant speed of the ball when it hits? Show your work.
- At what angle (relative to the ground does it hit)? Show your work.

2. Given the following situation of a ball in motion at a constant speed:



- Find the time it takes for the ball to reach the ground. Show your work
- Determine the horizontal range (Δx) of the marble as it falls to the floor. Show your work.
- On the diagram above sketch a motion map (each dot equals 0.1 s) for the ball after it leaves the table. Be sure to show, horizontal velocity, vertical velocity, resultant velocity and acceleration arrows on each position dot.
- What is the horizontal speed when it hits the ground?
- What is the vertical speed when it does hit the ground? Show your work.
- What is the resultant speed of the ball when it hits? Show your work.
- At what angle (relative to the ground does it hit)? Show your work.

3. Refer to question #2. What would happen if we increased the height of the table in by a factor of 4 so that it is now 5.0 m high and kept the velocity of the ball while on the table 12 m/s.
- Calculate the new time in the air for the ball.
 - Calculate the new horizontal range of the ball.
 - State the relationship that exists between the vertical displacement and the time in the air (linear, parabolic, square root or inverse).

Refer to question #2. What would happen if decreased the speed of the ball on the table to 6 m/s and we kept the height at of the table 1.25 m?

- Calculate the new horizontal range of the ball.
- State the relationship that exists between the horizontal speed and the horizontal range (linear, parabolic, square root or inverse).

4. The movie "The Gods Must Be Crazy" begins with a pilot dropping a Coke bottle out of an airplane. It is recovered by a surprised native below who thinks it is a message from the gods. The plane from which the bottle was dropped was flying at a height of 180 m, and the bottle lands 480 m horizontally from the initial dropping point.
- How long did it take for the bottle to reach the ground (ignore all air friction)? Show your work.
 - How fast was the plane flying when the bottle was released? Show your work.
 - What is the vertical speed of the bottle when it hits the ground? Show your work.
 - What is the resultant speed of the bottle when it hits? Show your work.
 - At what angle will the bottle strike the ground (relative to the ground does it hit)?
 - Draw a quick sketch indicating the path of the bottle relative to the ground.

