

Names: _____ Period _____ Date: _____

Determining Muzzle Velocity of a Dart Gun

Materials: Dart pistol
Meterstick
Protractor

Procedure:

- Shoot a single dart horizontally from 1 meter off the ground. Use the meter stick to get the correct height and use the level to make sure the shot is perfectly horizontal.
- Measure the distance the dart traveled from the tip of the dart in the gun to where it first hits the ground.
- Repeat the shot for a total of five times. Average the distance.
- Calculate how long the dart takes to fall from 1 meter using the equation: $t = \sqrt{\frac{2h}{g}}$.
- Use the average distance the dart traveled and the time it takes to fall to calculate the muzzle velocity of the gun.

Dart #	Distance in Meters
1	
2	
3	
4	
5	
Average	

Time for the dart to fall 1 meter: _____ seconds

Muzzle velocity of the dart: $V =$ _____ m/s

Continue to Part 2 on the back

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Part 2 – Predicting the Distance and Experimental Results

Procedure:

- Use the muzzle velocity (V) to calculate the distance the dart will travel at an angle of 10° , 15° , and 20° . Fill in the table below with your calculations.

Angle	V_x	V_y	Time Up	Total Time	Distance
10°					
15°					
20°					

- Use the large protractor to angle the gun at the 10° and shoot the dart *from the ground*.
- Measure the distance the dart traveled to an accuracy of 1 cm using the large tape. (Your data should be written as 12.34 m.)
- Repeat the test shot for a total of 5 times at 10° and average the distance.
- Repeat the test for 15° and 20° , but stop the test if the darts are hitting the ceiling.

Angle	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average Distance
10°						
15°						
20°						

Conclusion

How accurate were your predictions? Detail your results, include any errors in your prediction and explain possible causes for the errors.
