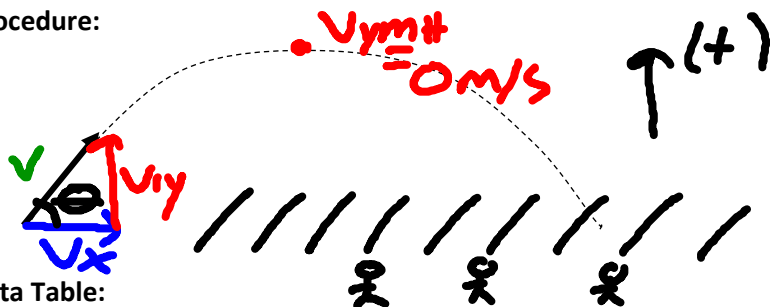


### Air Rocket Projectiles

**Purpose:** To calculate the launch speed and maximum height of air rockets launched at an angle.

**Procedure:**



**Data Table:**

Cap Setting	Angle (degrees)	Total Time (s)	Horizontal Distance (yards)	Horizontal Distance (m)	Horizontal Velocity (m/s)	Launch Speed (m/s)
Medium	45					
Medium	55					
Medium	65					
Medium	75					
High	45					
High	55					
High	65					
High	75					

**Calculations:** Show one example of each of the following. Make sure to include formulas, algebra, plugged-in numbers, units, and circled answers.

- 1) Convert horizontal distance in yards into horizontal distance in meters. (1 meter = 1.094 yards)
- 2) Calculate horizontal velocity using horizontal distance and total time.
- 3) Calculate launch speed using horizontal velocity and launch angle. (Use trig.)

$$\cos \theta = \frac{V_x}{V}$$

$$V = \frac{V_x}{\cos \theta}$$

**Questions:**

- 1) The launch speeds for the medium cap launches and high cap launches *should* all be the same. But they probably aren't... Explain how air resistance and wind could affect your results and cause variations in the calculated launch speeds.
- 2) What is the relationship between horizontal distance and launch angle? How can you tell?
- 3) Which launch had the greatest maximum height? Why?
- 4) Calculate the greatest maximum height. **SHOW ALL YOUR WORK.** (You will need to calculate the initial vertical velocity (using trig) and the time it takes to reach the maximum height.)

**Results:**

What was the launch speed of the medium cap? What was the launch speed of the high cap? What was the greatest maximum height?

**Discussion:**

Consider and discuss the accuracy of the measurements taken by the class.