

LAP 3

$$\frac{\text{diameter}}{\text{time}}$$

PROJECTILE MOTION STAT LAB

TRIAL	TIME	VELOCITY (m/s)
1	.0040	6.425
2	.0042	6.119
3	.0042	6.119
4	.0040	6.425
5	.0040	6.425
6	.0040	6.425
7		
8		
9		
10		
11		
12		
		AVERAGE VELOCITY 6.323 m/s
		STDM .153

$$\Delta V = \frac{H_i - L_{ow}}{2} = \frac{6.425 - 6.119}{2}$$

BALL DIAMETER 0.0257m

SHOW WORK; SAMPLE CALCULATIONS

$$\text{velocity} = \frac{\text{diameter}}{\text{time}}$$

trial 1, 4, 5, 6

$$\frac{0.0257m}{.0040s} = 6.425 \text{ m/s}$$

trial 2, 3

$$\frac{0.0257m}{.0042s} = 6.119 \text{ m/s}$$

50  
50

## PROJECTILE MOTION STAT LAB

$$H = \underline{1.055 \text{ m}}$$

$\Delta H$  is about 5mm error due to the ruler started and using 3 rulers for measurement.

$$\text{ERROR IN } H = \Delta H = \underline{0.005 \text{ m}}$$

TRIAL	X (m)
1	3.018 m
2	3.020 m
3	3.011 m
4	3.026 m
5	3.016 m
6	3.029 m
7	
8	
9	
10	
11	
12	
AVERAGE X (EXPERIMENTAL) 3.020 m	
STDM $(X_{\max} - X_{\min}) / 2 = 0.009$	

$$X_{th} = V_0 t$$

$$\text{THEORETICAL } X = \underline{2.934 \text{ m}}$$

$$t = \sqrt{\frac{2h}{g}}$$

$$X_{th} = V_0 t$$

$$= (6.323 \text{ m/s})(.464 \text{ s})$$

$$t = \sqrt{\frac{2(1.055 \text{ m})}{9.8}}$$

$$\text{ERROR IN THEORETICAL } X = \underline{0.078}$$

$$t = .464 \text{ s}$$

$$X_{th} = 2.934 \text{ m}$$

SHOW WORK; USE ADDITIONAL SHEETS

$$\Delta X_{th} = \sqrt{\frac{2h}{g}} \cdot \Delta V_0 + V_0 \sqrt{\frac{1}{2gh}} \cdot \Delta H$$

$$= \sqrt{\frac{2(1.055)}{9.8}} * .153 + 6.323 * \sqrt{\frac{1}{2(9.8)(1.055)}} * 0.005$$

$$\Delta X_{th} = 0.078$$

$$\text{ERROR IN EXPERIMENTAL } X = \underline{0.009}$$

SHOW WORK; USE ADDITIONAL SHEETS

$$\Delta X_{exp} = \frac{X_{\max} - X_{\min}}{2} = \frac{3.029 - 3.011}{2} = 0.009$$

QUESTION 1) DO YOU FIND THE MEASURED RANGE AND THE CALCULATED RANGE AGREE WITHIN EXPERIMENTAL ERROR? SHOW WORK; USE ADDITIONAL SHEETS

$$|X_{avg} - X_{th}| < \Delta X_{th} + \Delta X_{exp}$$

$$|3.020 - 2.934| < 0.078 + 0.009$$

$$.086 < .087$$

✓