Name: _____ BU ID: _____ Lab Section: _____
Partner's name: _____ BU ID: _____ Date: _____
TF's signature: _____

PY105 Projectile Motion Experiment - Report Sheet

Fill in all the blanks and answer all the questions. Check with your TF to make sure that you have done everything before you leave. There is a 0.2-point bonus question on this report sheet, but you cannot get more than 8 points total.

Part 1. Horizontal shoot. Record your data below. (1.0 point)

$\theta = 0°$, h =_____(0.1 point)

Table. 1 (0.5 points total, 0.1 point each)

Trials	1	2	3	4	5
R_{meas}					

Average Range: $< R_{meas} >$ =_____(0.1 point)

By using Eq.7 with R replaced by $< R_{meas} >$, calculate v_0 =_____(0.3 point)

Part 2. Dependence of range on projection angle, for fixed initial velocity, v_0.

In here, change the angle θ while keeping the tension in the spring gun the same as in Part 1 so that the value of v_0 remains the same. Use Eq. 11 to calculate $<R_{calc}>$.
Copy the value of v_0 from above: v_0 = __

Table.2 (1.6 points total, -0.05 point for each error)

θ (^{o})	h (m)	R_{meas} (m)					$<R_{meas}>$ (m)	$<R_{calc}>$ (m)	$<R_{meas}>$-$<R_{calc}>$ (m)
		Trial 1	Trial 2	Trial 3	Trial 4	Trial 5			
5									
10									
20									
30									

Part 3. Dependence of the range on the initial velocity, v_0, at a fixed angle.

Table.3

(3.7 points total, -0.05 point for each error)

h (at $\theta = 0^o$): _____ (m) h (at $\theta = 20^o$): _____ (m)

θ (^{o})	R_{meas} (m)					$\langle R_{meas} \rangle$ (m)	v_0 (m/s)	$\langle R_{calc} \rangle$ (m) (from eq. 11)	$\langle R_{meas} \rangle - \langle R_{calc} \rangle$ (m)
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5				
0								---	---
20									
0								---	---
20									
0								---	---
20									

Q1. In the range equation, Eq. (11) of the Theory section, there is a ± sign. Which sign did you use? (0.2 point) Why? (0.2 point)

Q2: If the gun had been mounted at the floor level, the angle, θ_{max}, that will maximize the range is _____ (0.3 point)

Show your work. (0.6 point)

Q3: However, your spring gun is not mounted on the floor. So your answer to Q2 doesn't necessarily apply in this experiment. Based on your data in Table 2, for approximately what angle of projection was the range the greatest in the experiment? How does it compare with the value you calculated in Q2? (0.3 point) Explain qualitatively why this is so. (0.1 point) **Hint: Consider the velocity of the ball when it returns to the same level where it was launched, and how the motion of the ball beyond this point depends on θ.**

Q4 (Optional): Continue with **Q3**. How would the value of θ_{max} vary as you increase h, the launch level, while keeping everything else the same? (Bonus 0.2 point)

Pre-lab: _____ (10 × 20% = 2 points)

Lab: _____ (10 × 80% = 8 points)

- Punctuality (1 ponint) + performance (1point): _____ (2 points)
- Report sheet _____ (8 points)

Total: _____ (10 points)

TF: _____

Grader: _____