

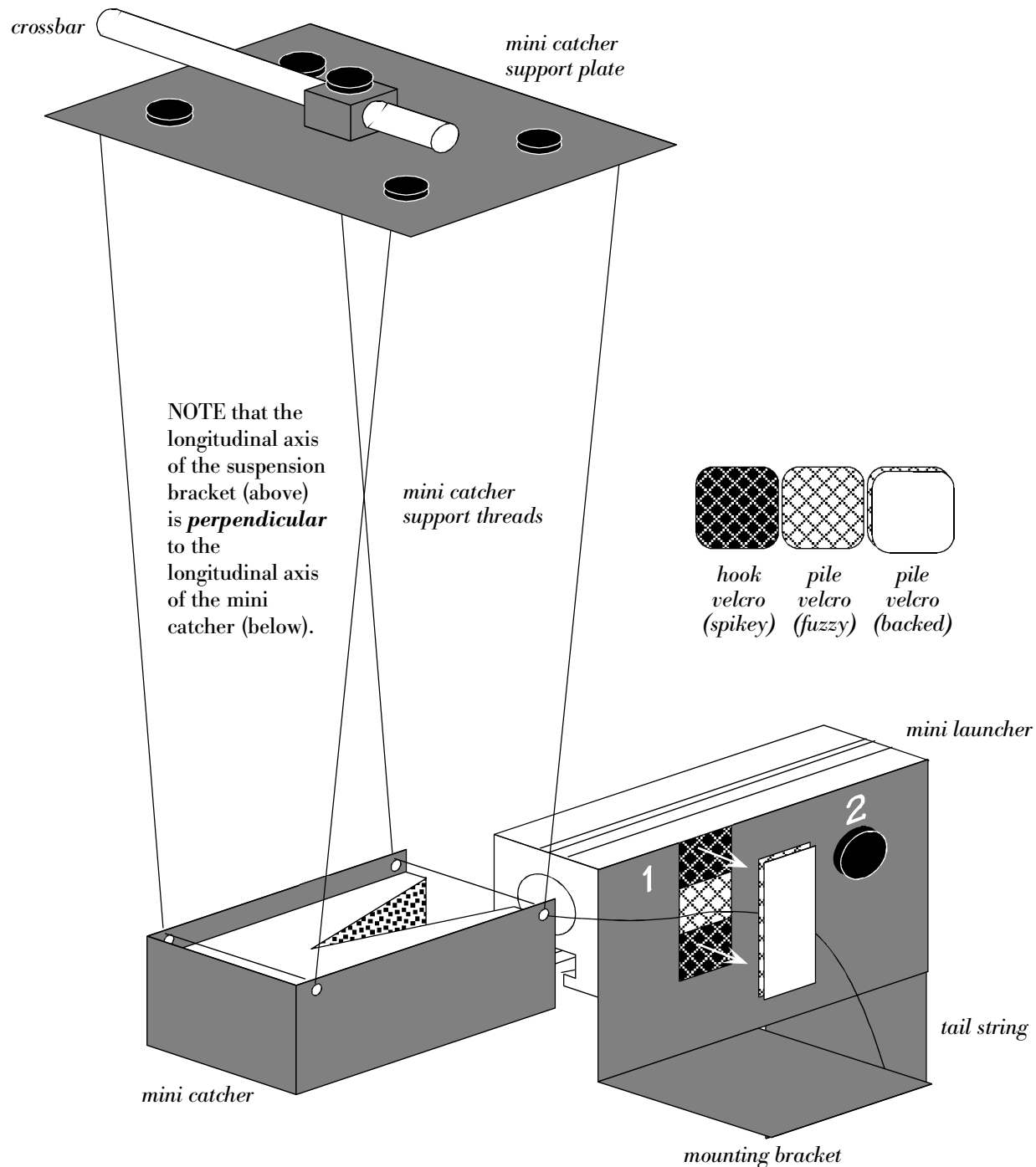
# PhyzLab: Swing Shot

ballistic pendulum and trajectory

PERIOD	1.		
	2.		
GROUP	3.		
	4.		

## • Apparatus •

- \_\_\_ mini launcher
- \_\_\_ 16mm steel ball
- \_\_\_ support rod (90cm or greater)
- \_\_\_ mini catcher
- \_\_\_ meterstick
- \_\_\_ mini launcher mounting bracket
- \_\_\_ C-clamp
- \_\_\_ right angle clamp
- \_\_\_ landing strip
- \_\_\_ access to tape
- \_\_\_ safety glasses
- \_\_\_ table clamp
- \_\_\_ crossbar (~30cm)
- \_\_\_ piece of carbon paper



Determine the mass of the 16-mm ball and the mini catcher (do not include the mass of the mini catcher support plate).

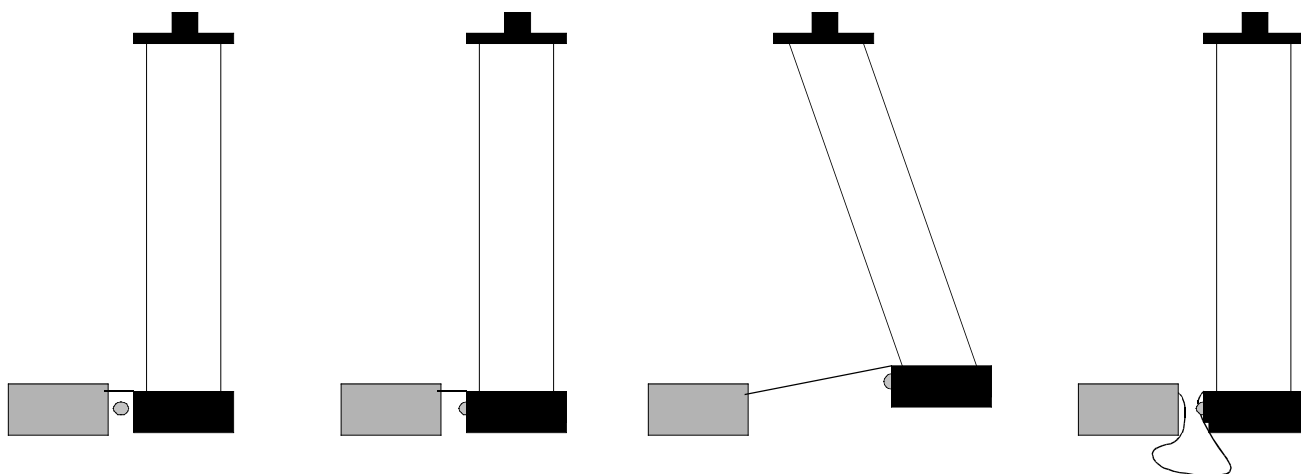
### • Ballistic Pendulum Setup •

Arrange the apparatus as shown above.

1. Attach the mini launcher mounting bracket to the table near the corner using the C-clamp. Attach the mini launcher to the bracket at hole 2.
2. Attach the table clamp to the table. Secure the support rod to it. Attach the right angle clamp and crossbar to the support rod.
3. Attach the mini catcher support plate to the crossbar so that the mini catcher hangs squarely in front of the mini launcher (close to it but not touching it).
4. Thread the "tailstring" on the mini launcher through the "velcro tunnel" on the outside panel of the mini launcher bracket.
5. Obtain a PhysBlessing.
6. Measure the distance from the bottom of the catcher to the table top.  $h_0 =$  \_\_\_\_\_

### • Procedure •

1. All group members stand behind the mini launcher. The launcher operator wears the safety glasses.
2. Launcher operator:
  - i. Place the ball in the barrel of the mini launcher and push it in to the **three-click** position (maximum depth, maximum launch speed).
  - ii. Launch the ball into the mini catcher. Notice that some length of the tailstring is pulled through the velcro tunnel. Pull just a little bit of the thread back through; leave the rest as slack.
  - iii. Load the launcher again and launch the ball into the catcher again.
3. Secure the newly pulled tailstring to the launcher bracket using tape or apply pressure with a finger.
4. Gently pull the mini catcher forward to the length to the secured tailstring. Measure the distance from the bottom of the catcher to the table top.  $h =$  \_\_\_\_\_

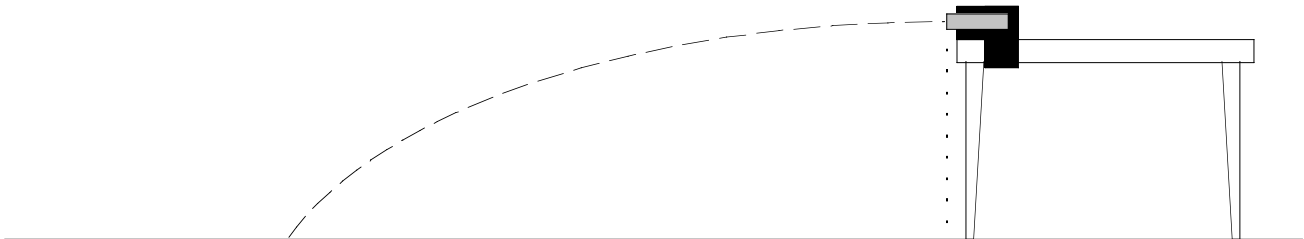


### • Ballistic Pendulum Analysis •

1. What was the launch speed of the ball?

a. Describe your method/strategy for determining the solution (based on the information you collected). Label measured distance(s) on the diagram above.

b. Show the calculations below.



### • Projectile Method Setup •

Arrange the apparatus as shown above.

1. Arrange the mini launcher to launch horizontally to the floor. (Make sure the ball will have an unobstructed path.)

2. Launch the ball from the three-click setting to see where the ball lands. Place a length of landing strip at the landing point. Use the carbon paper to make measurable dots on the landing strip.

3. Repeat several times.

4. Determine the range of the horizontally launched projectile. Also measure the height of the barrel of the launcher from the floor.

5. Label measured distance(s) on the diagram above.

DATA:

• **Projectile Method Analysis** •

1. What was the launch speed of the ball?

a. Describe your method/strategy for determining the solution (based on the information you collected).

b. Show the calculations below.

• **Findings** •

1. Determine the percent difference in launch speeds determined by the two methods.

2. Describe the experimental error encountered in each method.