

INSTRUCTIONAL GUIDE

Contents

- A. Ball launcher
- B. Bracket
- C. Safety Key
- D. Laser Sight
- E. Black/Red Lead
- F. Monkey (disk)
- G. Nylon Washers (4)
- H. Wingnuts (3)
- I. 2 AA size batteries
- J. Projectile Balls (3)
- K. Thumbscrew
- L. L Bracket
- M. Rod Clamp
- N. Electromagnet

Required but not included:

- [Ring Stand \(66-4220\)](#)
- [C-Clamp \(PX-1209\)](#)



Background

The Monkey & Hunter demonstration allows students to verify the underlying principle of projectile motion and bring clarity to what appears as a discrepant event. While the Monkey (disk) falls only in the vertical plane, the projectile is moving in two dimensions through the air. The principle of the independence of a projectile's horizontal and vertical motion is illustrated when the vertical displacement of the projectile matches that of the monkey as it falls.

Set-Up

Clamp Bracket to Surface

1. Clamp the base of bracket using a standard “C” clamp to the desktop or lab stand. See Figure 1. Bottom of bracket can be reversed by unscrewing the 4mm Allen bolts that attach the 2-piece L bracket.



Figure 1

Attach the Ball Launcher to Bracket

2. Install AA batteries into the battery holder attached to ball launcher.
3. Attach ball launcher on side of bracket that is opposite of the C clamp. See Figure 2.
4. Insert the bolts of the ball launcher through the top hole & arched hole of the bracket. Secure bolts into place then use 2 washers & 2 wingnuts to attach to bracket. Wait to completely tighten wing nuts until ball launcher is aligned with monkey. See Figure 3.

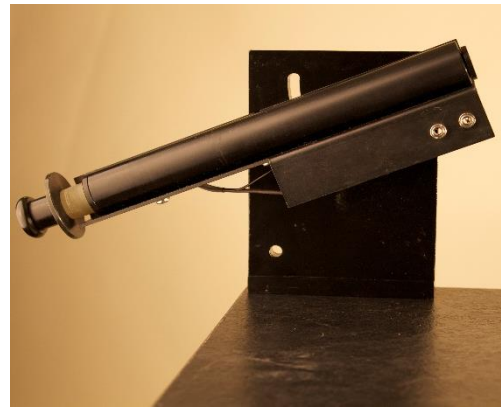


Figure 2



Figure 3

Insert Safety Key

5. Pull back handle to expose thin metal rod.
6. Insert safety key between the barrel & rubber stopper. See Figure 4.

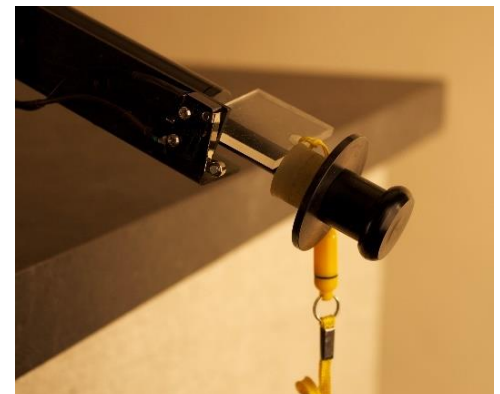


Figure 4

Assemble Electromagnet to Ring Stand

7. Assemble a ring stand.
8. Slide the rod clamp on the ring stand rod.
9. Insert thumbscrew through hole on side of rod clamp.
10. Slide the wider side of the L bracket on the thumbscrew. Use the wingnut to secure L bracket to rod clamp.
11. Unscrew hex nut on electromagnet.
12. Insert electromagnet screw through hole of L bracket. Replace hex nut and tighten. At this point setup should look like Figure 5.

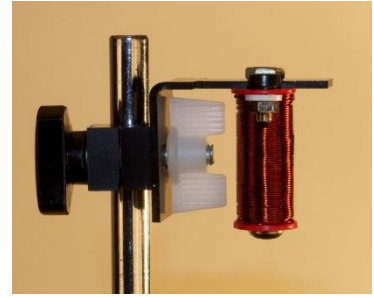


Figure 5

Hook Up Electromagnet

13. Attach the laser sight power cord into either one of the mini-jack receptacles at the end of the ball launcher.
14. Slide laser into the barrel of the ball launcher.
15. Plug the jack attached to the black/red lead cord into the open mini-jack receptacle on the ball launcher. At this point setup should look like Figure 6.
16. Plug the red & black leads into electromagnet. See Figure 7.
17. Hang the monkey from the electromagnet

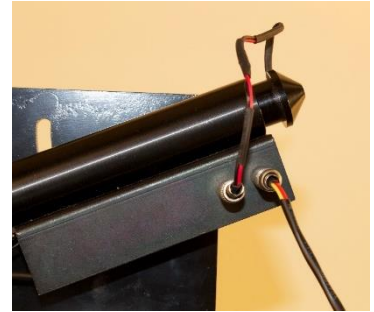


Figure 6

Align Ball Launcher & Launch

18. Align the ball launcher so that the laser is aimed at the center of the monkey. See figure 8
19. IMPORTANT: Once aligned, tighten both wingnuts on bracket to ensure ball launcher does not move during launch. Do not over-tighten the wingnuts, they are plastic and will strip.
20. Remove the laser from the barrel and insert 1 white ball.
21. To fire the ball, pull back ball launcher handle and remove the safety key while holding handle back. Release handle.
22. If ball launcher is properly aligned with the monkey and launcher release with enough force, then the ball will hit the monkey.

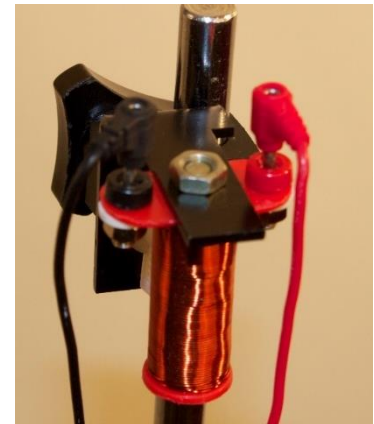


Figure 7

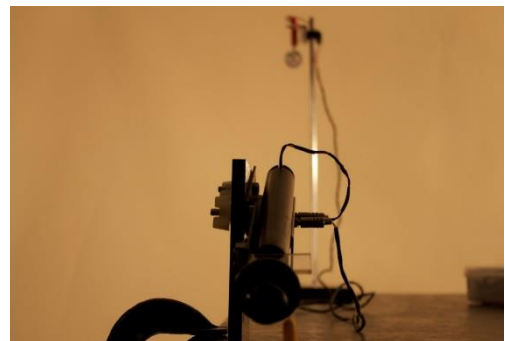


Figure 8

Resources

Download Cool Lab Teacher Notes and Student Worksheets:

<https://www.arborsci.com/blogs/cool-labs/the-monkey-and-hunter>

Related Products

Stunt Car Lab (P4-1340) Exciting indoor projectile investigation with this complete lab, inspired by the movie Speed. Calculate the car's landing spot, and then test it!

Mini Projectile Launcher (94-1970) This simple but precise launcher is versatile and great for indoor classroom use with projectile motion studies! The Mini Projectile Launcher projects 16 mm steel balls at ranges suitable for use on the benchtop or from the bench to the floor. Three launch speeds give ranges of 1m, 1.5m, and 2m.