

**Safety first!**

- When cocking the gun use the palm of the hand keeping your fingers out of the way.
- Make sure that no one is down range when the gun is cocked or fired! Sometimes the projectile will hit a part of the gun itself; therefore it is best to stand behind the gun when it is being fired.
- Please, be sure not to leave the gun in the cocked position with the ball on the rod. These guns have been known to fire of their own volition!

When removing the projectile from the pendulum, please, be sure to push the retaining spring up and out of the way before pushing the ball out of the pendulum basket. If you do not do this, the spring will break.

1. set up

- a. materials needed: ballistic pendulum, projectile, meter stick and triple beam balance

2. measurements

- a. carefully remove the pendulum from the base and measure its mass
- b. measure the mass of the projectile
- c. measure the center of mass pointer's height when the pendulum is hanging freely in the initial position
- d. fire the gun about six times, recording the notch number where the pendulum stops each time
- e. place the pendulum in the average notch number and measure the height of the center of mass pointer above the base

3. analysis

- a. use conservation of energy to determine the speed of the pendulum/projectile combination just after the collision
- b. use conservation of momentum to calculate the projectile's initial speed

4. Questions

- a. What is the speed of the pendulum/projectile combination just after the collision?
- b. What is the projectile's initial speed?
- c. Is the collision between the projectile and the pendulum elastic or inelastic? (Justify your answer!)
- d. How would doing this experiment on the moon effect the experiment?