

Quick View

Students vary the ammunition mass to understand the effect of mass on distance and trajectory.

Standards Addressed

NSTA 5-8

Students develop abilities necessary to do scientific inquiry.

- Students identify questions that can be measured through scientific inquiry.
- Students use appropriate tools and techniques to gather, analyze, and interpret data.
- Students think critically and logically to make the relationships between evidence and explanations.
- Students use mathematics in all aspects of scientific inquiry.

NCTM 6-8

Students recognize and apply mathematics in contexts outside of mathematics.

- Students understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.
- Students understand measurable attributes of objects and the units, systems, and processes of measurement.
- Students understand relationships among units and convert from one unit to another within the same system.
- Students build new mathematical knowledge through problem solving.

ITEEA 6-9

Students learn to design and use instruments to gather data.

- Students learn that systems thinking involves considering how every part relates to others.
- Students learn that malfunctions of any part of a system may affect the function and quality of the system.
- Students develop an understanding of the attributes of design.

Time Required

45-90 minutes (will vary with class size)

Content Areas

Primary: Science

Secondary: Technology, math, language arts

Vocabulary

- diameter
- distance
- mass
- trajectory
- trebuchet

Materials

- Completed trebuchet
- Mass plates
- Modeling clay
- 10-meter tape measure
- Digital balance or digital scale
- “Investigating Effects of Ammunition Mass Data Sheet”



Procedure

1 Begin by making three clay balls for ammunition. The first clay ball should have a mass of about one gram. The second ball should have a mass of about two grams, and the third a mass of about three grams.

2 Load the completed trebuchet with 10 mass plates. Hang the mass plates in the second slot.

3 Using a digital balance or digital scale, find the mass of each of the ammunition balls and record them on the “Investigating Effects of Ammunition Mass Data Sheet.”

4 Load the first ammunition ball into the trebuchet sling and release the firing pin. Note the trajectory path. When loading the trebuchet, make sure that the strings are not tangled and that they are pulled tight.

The students may need a brief explanation of trajectory and how it applies to a trebuchet.

5 Locate the spot where the ammunition ball first hit the floor and measure the distance using the tape measure.

Use a white roll of paper for the launch area – ammunition will make a small dot on the paper, providing easier and more accurate measurements. Have students label landing points of all ammunition; then, do all measurements and recording after all launches are complete.

6 Repeat the launching procedure with the remaining two ammunition balls.

7 Record your observations on the data sheet.

8 After the three ammunition balls have been launched, complete the data sheet.