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- Investigating Effects of Ammunition Mass  
  (science/tech, math, LA) ........................................ 45-90 minutes*
- Calculating Potential Energy (math/tech, science, LA)  
  ................................................................. 45-90 minutes*
- Modifying the Trebuchet I (tech/math, science, LA)  
  ................................................................. 90-180 minutes*
*Times are estimates and will vary with class size.

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- Finding Initial Velocity (math/tech, science, LA)  
  ................................................................. 90-135 minutes*
- Relating Mass and Range (science/tech, math, LA)  
  ................................................................. 90-135 minutes*
- Modifying the Trebuchet II (tech/science, math, LA)  
  ................................................................. 90-180 minutes*
*Times are estimates and will vary with class size.

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QuickView

Students launch a clay ball into a bucket at a given distance from the trebuchet.

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 recognize and analyze alternative explanations and predictions.
- Students communicate scientific procedures and explanations.
- Students develop abilities for technological design.
- Students evaluate completed technological designs or products.

NCTM 6-8
Students develop and evaluate inferences and predictions that are based on data.
Students recognize and apply mathematics in contexts outside of mathematics.

ITEA 6-9
Students develop an understanding of engineering design.
- Students learn that modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.

Students develop abilities to apply the design process.
- Students learn to apply a design process to solve problems in and beyond the laboratory-classroom.
- Students learn to make a product or system and document the solution.

Students develop abilities to assess the impact of products and systems.
- Students learn to design and use instruments to gather data.

Time Required

180-260 minutes (will vary with class size)

Content Areas

Primary: Technology
Secondary: Math, science, language arts
Vocabulary

• arc
• reengineer
• trajectory
• trebuchet

Materials

• Completed trebuchet
• Bucket
• Modeling clay
• Mass plates
• 10-meter tape measure
• Masking tape
Procedure

1 This activity simulates using the trebuchet in a battle. As trebuchet engineers, you will use scientific principles and collect data to configure the trebuchet to launch a clay ball into a bucket.

*The trebuchet and the bucket should both be on the floor; use the tape measure to place the bucket and the trebuchet approximately four meters apart. Mark this distance with masking tape so the students know where to set up the trebuchets. Use a five-gallon bucket for its large opening. Also, the height of the bucket will force the students to need a higher trajectory.*

2 Your teacher will give you a mass of clay and several mass plates.

3 It is your job, given all you have learned about the trebuchet, to launch the clay ball into the bucket. Set up your trebuchet at the line your teacher has created, and configure the trebuchet to throw the clay balls in a high arc with distance.

4 You will begin by using the mass of clay and rolling it to the size you want. You will estimate the number of mass plates you think it will take to reach the target and load them on the weight support. You can also adjust the length of the string, the release point of the trigger, and the position of the weight support on the lever arm.
QuickView

Launch a clay ball into a bucket at a given distance from the trebuchet.

Materials

- Completed trebuchet
- Bucket
- Modeling clay
- Mass plates
- 10-meter tape measure
- Masking tape
Procedure

1. This activity simulates using the trebuchet in a battle. As trebuchet engineers, you will use scientific principles and collect data to configure the trebuchet to launch a clay ball into a bucket.

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4. You will begin by using the mass of clay and rolling it to the size you want. You will estimate the number of mass plates you think it will take to reach the target and load them on the weight support. You can also adjust the length of the string, the release point of the trigger, and the position of the weight support on the lever arm.