

# **Trebuchets - Project:** Build a working Trebuchet and make a movie about it. **DUE March 27**

**Requirements:** The Trebuchet must be able to launch a water balloon up to 5, 10, and 15 meters at a target. Your trebuchet must be able to vary the distance it fires. It is to be a maximum of **1 m wide by 1 m long by 1 m tall (not counting arm)**, with a maximum **1.4 m** length of arm. You should use marked free weights. Weight of projectile = a water balloon filled with 0.3 liter of water = 0.3 kg of water. **A maximum of 5 people per group.**

**You need to provide the water balloons on launch day.**

***YOU MUST HAVE A REMOTE TRIGGER ON YOUR TREBUCHET!!!! - You will need a pin that keeps the trebuchet from launching and at least 6 feet of rope or string attached to pull the pin. If you have no remote trigger then you will not be allowed to launch and will not receive any points for the trebuchet.***

As you build the trebuchet you need to document the progress, i.e. take pictures, movies, notes. You will test your device and plot distance (on LoggerPro) thrown versus weight used. You will need to make a way to vary the weight used in your trebuchet. You will need to test it multiple times at each of the weight used. Your trebuchet must make it through all testing, so build it well. Grades will be based upon having a working trebuchet, a diagram of design **before** your begin, data gathered about the trebuchet and graphs to help predict what weights to use for what distance, the lab measuring how far your trebuchet will throw a water balloon, and how close you come to the target during the final test, but most of your grade will come from your lab report.

***You must take part in the building process and have proof (pictures) that you helped. No using trebuchets built for other classes or clubs.***

## **Due dates - Feb 06, 20, March 13, 27**

**Feb 06** - Must show evidence of research, have a design drawn out, and evidence of having materials purchased.

**Feb 20** - Must show evidence of work on trebuchet. (Pictures and movies)

**March 13** - Must show evidence (pictures and movies) of a working trebuchet and data from multiple trials. Trebuchet video showing at least a 5 meter launch.

**March 27** - Trebuchet due, must have video of a 5-meter, 10-meter, and 15-meter launch, graphs and data ready on this day. You will need to record video of your launches and take pictures during the testing day.

**April 7** - Movie and website due.

Your grade will be comprised from meeting the due dates, having a working trebuchet, having data and a graph about your trebuchet that you used to hit your target, making a website about the experience, and filling out an evaluation about the project.

You will get a \_\_\_\_\_ if you have a

100% = Working Trebuchet that launches a water balloon up to 15 meters, meets the size requirements, a website that documents building progress with data gathered about trebuchet and plotted. A working trebuchet that you have video proof launches 5, 10, and 15 meters. Proof means you and your teammates are in the video and you show the distances marked out. The website will need to include movies of multiple launches and pictures of building progress. Also your trebuchet must be able to show it can fire a water balloon different distances. You have met all deadlines, You also have followed all of the rules. **YOU CLEANED UP THE TESTING AREA AND TOOK YOUR TREBUCHET HOME BY THE END OF THE TESTING DAY.**

90% = Working Trebuchet that launches a water balloon up to 12 meters, meets the size requirements, a website that documents building progress with data gathered about trebuchet and plotted. A working trebuchet that you have video proof launches 5, 10, and 12 meters. Proof means you and your teammates are in the video and you show the distances marked out. The website will need to include movies of multiple launches and pictures of building progress. Also your trebuchet must be able to show it can fire a water balloon different distances. You have met all deadlines, You also have followed all of the rules. **YOU CLEANED UP THE TESTING AREA AND TOOK YOUR TREBUCHET HOME BY THE END OF THE TESTING DAY.**

80% = Working Trebuchet that launches a water balloon up to 10 meters, meets the size requirements, a website that documents building progress with data gathered about trebuchet and plotted. A working trebuchet that you have video proof launches 5, and 10 meters. Proof means you and your teammates are in the video and you show the distances marked out. The website will need to include movies of multiple launches and pictures of building progress. Also your trebuchet must be able to show it can fire a water balloon different distances. You have met all deadlines, You also have followed all of the rules. **YOU CLEANED UP THE TESTING AREA AND TOOK YOUR TREBUCHET HOME BY THE END OF THE TESTING DAY.**

75% = Working Trebuchet that launches a water balloon 5 meters, a website that documents building progress with data gathered about trebuchet and plotted. The website will need to include movies of multiple launches and pictures of building progress. Also your trebuchet must be able to show it can fire a water balloon different distances. You have met all deadlines, You also have followed all of the rules. **YOU CLEANED UP THE TESTING AREA AND TOOK YOUR TREBUCHET HOME BY THE END OF THE TESTING DAY.**

70% = Working Trebuchet that launches a water balloon forward, a website that documents building progress with data gathered about trebuchet and plotted. The website will need to include movies of multiple launches and pictures of building progress. Also your trebuchet must be able to show it can fire a water balloon different distances. You have met all deadlines, You also have followed all of the rules. **YOU CLEANED UP THE TESTING AREA AND TOOK YOUR TREBUCHET HOME BY THE END OF THE TESTING DAY.**

**0% = Throwing the water balloons at anyone or anything! Only water balloons launched by trebuchet are allowed.**

**0% = Your group fails to clean up the testing area or you fail to take home your trebuchet on testing day.**

**On test day:**

**You will get a maximum of 4 attempts to launch a water balloon (time permitting).**

**Extra credit:** (Maximum of 15% extra credit)

- 5% You make a movie that involves your trebuchet (Think Monty Python and the Holy Grail)
- up to 5% If you have creative attire on to match your trebuchet, i.e. costumes are encouraged (school appropriate)!
- 5% Hitting target with water balloon launched from trebuchet or
- 2% Splashing target with water from water balloon launched from trebuchet.

Trebuchet Website should include the following pages:

- A video introducing the project and team, along with written descriptions.
- Written and visual instructions on how to build with pictures of the build, (A movie explaining the step by step process.)
- Movies of test launches, Data & graphs
- Results / Conclusions / How to improve
- Credits - Citing where you got your information
- How was work divided among group members, who did what.

\*\* If your trebuchet fails or you are unhappy with the performance on test day you may rebuild it, filming videos/taking pictures of the rebuild process and videos of the rebuilt trebuchet working, launching 5, 10, and 15 meters multiple times. The video of the rebuild and a working trebuchet will need to be submitted the day we come back from Spring Break April 6. You may receive a maximum grade of 95% on the rebuild if all requirements are met.