

# Trebuchet Project

The construction of this project will be completed in teams of three.  
Each student must submit a drawing of the trebuchet, and a report on the project.

Problem: Griffy has been kidnapped, and is being held to ransom in the storage shed in the compound. His captors are demanding a ransom of \$8.88.

Task: Rescue the beast (there's no more money left in the SAC piggy bank to pay the ransom).

Solution: We will mount a campaign to save Griffy using our superior technological skills. Our amazing counter-intelligence operatives have determined that the walls of the shed can be knocked down with golf balls (from a distance of 25'). So, we will construct siege machines (i.e. Trebuchets) to accomplish this task. This will require 10 machines from our unit.  
Be warned, our counter-intelligence has also informed us that the villains are armed with pea shooters, so we must maintain a safe distance.

Materials: (provided)

- Spruce lumber cut to 1" x 1" dimensions
- sisal twine or string
- dowelling (various sizes)
- Concrete-counterweight (bring in your own plastic container to suit your needs such as a yogurt, margarine, ice-cream. etc.)
- or any other materials you can prove that were available in 1200 AD

Restrictions:

- must use joinery techniques taught in class
- glue and nails are strictly verboten

Size: No more than 1 meter tall (including the throwing arm)

Criteria: See attached rubric

- Must have a triggering mechanism
- Must have a suitable sling for throwing the object
- Must have a suitable counter-weight ( 2 choices)
- Must be able to fire a projectile a distance of at least 25'

Tools Available:

Band saws

Drill press

Hand tools

Sanding machine

Sand paper

You Supply:

- Plastic container for concrete counter-weight

## Steps in Designing Your Trebuchet (and Writing the Report)

**Problem:** Define the problem clearly. Ask for clarification if you are not sure.

**Possibilities:** What great ideas do you have? This is called brainstorming! You are working with your partners to come up with great ideas for your trebuchet. List any and all ideas that you may have.

**Reality Hits:** Every project has restrictions on it that may prevent you from following through on your idea and this project is no exception. What are they? Can they be overcome?

**Must have:** What features are parts are non-negotiable, given the requirements of the task?

**Would be nice to have:** Some additional ideas to help the project stand out:

**Investigation:** This is the research part of the project. What strategy are you going to use to develop your design ( i.e. experts, internet research, books, measurements...).

**Ideas:** It's time to brainstorm again. Review the criteria that you listed on the previous page and narrow down your ideas to those that are feasible. (Jot down any new ideas you may have as well).

**Choose:** Once you have had a chance to investigate a number of possible solutions and you feel you have done enough research, it's time to choose a solution and develop it. As you develop your project, you may need to modify your design. Expect this: it is part of the design process called Redesign or Revision:

**Create:** Now's the time to create your trebuchet.

Remember don't throw anything away!

- Keep brainstorming ideas
- Thumbnail sketches
- Material that you may use later

## Trebuchet Drawing Rubric (Communication)

You are required to submit an individual drawing of your Trebuchet (isometric or orthographic, 3-views) using the following criteria:

Name: \_\_\_\_\_

Criteria	Level 1 Limited Success (50% - 59%)	Level 2 Some Success (60% - 69%)	Level 3 Mostly Successful (70% - 79%)	Level 4 Highly Successful (80% - 100%)	Value
Line	Lines not drawn with straight edge, sloppy blotted, uneven	Lines too light, construction lines not used	Straight, clean lines. Use of construction lines evident.	Exceptionally precise work	/5
Lettering	Sloppy, incomplete lettering. Not centered, wrong height, lowercase	One or two of the problems listed in level 1	Block letters, all CAPITALS, correct height, centered, neat	Exceptionally well formed letters with a consistent style	/5
Proportion (scaling)	Looks like an elephant with mouse ears or vice-versa	Most parts of object drawn to appropriate scale	All items drawn to appropriate scale	Exceptionally precise and accurately scaled drawings	/5
Presentation	Smudged, torn, or wrinkled. Careless and confused drawings	Mostly clean, somewhat attractive drawings	Clean, attractive, accurate and understandable drawings	Very clean, attractive, accurate and extremely understandable drawings	/5
Dimensioning	No dimensions shown	Some dimensions shown but are mostly inaccurate	All dimensions shown with few errors	Exceptionally accurate dimensioning	/5
<b>Total</b>					<b>/25</b>

# Trebuchet Project: Construction Rubric (Application)

Team Names: \_\_\_\_\_

Criteria	Level 1 Limited Success (50% - 59%)	Level 2 Some Success (60% - 69%)	Level 3 Mostly Successful (70% - 79%)	Level 4 Highly Successful (80% - 100%)	Value
Craftsmanship	Project was constructed with little regard to aesthetics or joinery	Project demonstrates attention to technique or appearance, but not both	Project was constructed with aesthetics and joinery techniques in mind	Project was constructed by master-craftspersons	/20
Aesthetics	Project was constructed with little regard to symmetry or looks	With a little more work, this project would look OK	Project is symmetrical and appealing	Project looked like it was constructed out of a kit	/10
Joinery	All joints were very loose and unstable	Some joints are loose or unstable	Good use of joinery techniques. Project is stable	Very inventive use of joinery techniques. Project is extremely stable	/20
Time Management	Team members could not collaborate on ideas or construction tasks	Cooperation broke down occasionally. Some parts of the project were incomplete or makeshift	Team members collaborated well on ideas and construction tasks. Project was successful	Team members worked as a single entity and project was an extreme success	/20
Functionality	Project did not function	Project functioned but barely met expectations	Project functioned fully and met all expectations	Project functioned extremely well and went above expectations	/30
<b>Total</b>					<b>/100</b>

## Trebuchet Report (Thinking)

You are required to submit an individual 2 to 3 page report using the following criteria:

- 12 point lettering in a suitable font
- Provide a cover page with the title of the report, name of the school and the course, the name of the teachers, and the date submitted.
- Answer the following questions:
  1. As I look at our trebuchet, I can say that the strengths in our design are:  
(provide examples)
  2. As I look at our trebuchet, I can say that the weaknesses in our design are:  
(provide examples)
  3. If we could build another trebuchet, we would make the following changes:  
(provide examples)
  4. My favourite part of the project was.... Because....

## Trebuchet Project: Report Rubric

Name: \_\_\_\_\_

Criteria	Level 1 Limited Success (50% - 59%)	Level 2 Some Success (60% - 69%)	Level 3 Mostly Successful (70% - 79%)	Level 4 Highly Successful (80% - 100%)	Value
Content	Very little thought or preparation	Report contained some of the content that was required	Report was complete and insightful	Report resembled a thesis	/15
Aesthetics	Report was hand-written with either a red pen, crayon, or a dull pencil	Report was written with proper point or appropriate font, but not both	Report was done in 12 point, with appropriate font, and double-spaced	Report looks professional	/5
Grammar, Sentence Structure, and Spelling	Very little evidence that any care was put forth in compiling this report	Report was written using proper grammar, spelling, or sentence structure, but not all three	Well written with few errors	A lovely and an informative read	/5
	TOTAL				/25

## Trebuchet Project: Display Board (Communication)

You must prepare a display board to explain how your trebuchet works and how it is constructed. You should briefly describe the steps you went through in the design and construction process. Explain the role each member of the team played in the process.

Your display board is primarily a means of communicating graphically with your audience. You may use drawings, sketches, charts, diagrams, and photographs on your board. You may use only original graphics. If you see something in a book or on the internet, you must recreate the drawing yourself.

There will be a camera available to take pictures during the duration of the project. Each group may have two pages of photographs or drawings printed in colour, but your work must be ready by the deadline. One member of your team should be assigned primary responsibility for completing the presentation board.

Team Members: \_\_\_\_\_

Criteria	Level 1 Limited Success (50% - 59%)	Level 2 Some Success (60% - 69%)	Level 3 Mostly Successful (70% - 79%)	Level 4 Highly Successful (80% - 100%)	Value
Content	Provides only a very basic description of the machine and the process.	Describes some parts of the machine, explains part of the process of design and construction.	Includes key points about trebuchets, and describes process group went through to build it	Full coverage of the principles of trebuchet operation and the process of designing and building it.	/15
Graphics	Amateurish, or out of focus photos; crude drawings and sketches.	Poorly lit or out of focus photos; or hurried and incomplete drawings.	Original photos and drawings carefully prepared and presented.	Exceptional photography and precise drawings and charts.	/15
Graphic Design	Pictures and text placed haphazardly. Ineffective use of text and images.	Some success at placing the graphic elements in an attractive format.	The graphics and text are balanced, easy to read, well placed.	Very powerful, interesting and educational use of graphics.	/10
Aesthetics and Communication	Graphic elements scattered, text fails to explain the topic.	Graphics without explanation, or excessive text, or ineffective layout.	Good balance of graphics and text used to convey most important information	Excellent graphics enhance communication of information.	/10
	TOTAL				/50