Activity: Use a 3D simulator to launch catapults and trebuchets!

- **OBJECTIVE:** Learn about the physics of ancient siege warfare, using animated 3D design software!
- **DIRECTIONS:** You will go to two different websites:
  - 1) http://www.forgefx.com/casestudies/prenticehall/ph/catapult/design-test-simulation.htm. This interactive 3D simulation allows students to work on the development of a piece of virtual machinery, capable of launching giant paintballs into the air. Using the Design and Test Methodology, students must create their hurling machine so that it is capable of hitting the multiple targets within the virtual world. In order to hit all of the targets in the virtual environment, students must design their device so it is capable of launching for distance, height, and strength. Students are able to customize the arm length, spring strength, ball weight, angle of release, and tension in order to hit each target. Play through each one of the simulations at least three times! Create a data collection table to record your results on the modifications you made to achieve the best results. Use a word processing program or Excel to create your data tables! 10 points!
  - 2) http://www.globalspec.com/trebuchet/ where you will make modifications to a 3D trebuchet simulation to achieve the best distance, accuracy and power! Play through each one of the simulations at least three times! Create a data collection table to record your results on the modifications you made to achieve the best results. Use a word processing program or Excel to create your data tables 10 points!

- **WRITTEN REPORT OF EXPERIMENTS, DATA COLLECTED AND CONCLUSIONS:**
  - In at least 400 words, explain how the Ancient Romans (who used the catapult) and the ancient Byzantines under the emperor Basil II (who used the trebuchet) could have achieved the best results with these siege weapons in warfare. What basic physics lessons did they need to understand to achieve the best distance, accuracy and power? Furthermore, explain how the Romans and Byzantines effectively developed and used these weapons in warfare to achieve victory and enlarge their empires. You will need to conduct online research, using sites such as Wikipedia. Be sure to properly cite all sources used in MLA format. Use www.citationmachine.net for help. 30 points!