Unit Plan: Projectile Motion: Submarine 5” Deck Gun

Developed by Lawrence Chapman, Pre-Engineering Teacher, Old Saybrook High School, Saybrook CT, 2013 Submarine Force Museum & Historic Ship *Nautilus* STEM Fellowship

Unit Plan: Projectile Motion: Submarine 5” Deck Gun

- Lesson 1: History of the 5” Deck Gun, Manual
- Lesson 2: Projectile Motion Simulation Software & Questions
- Lesson 3: Fabricate an Actual Rocket and PVC Launcher
- Lesson 4: Launch Day
- Extension Activities: Class trip or virtual visit to Submarine Force Museum and Historic Ship *Nautilus* in Groton, CT (www.ussnautilus.org).
- Projectile Motion Tutorial PPT.pdf

Technology and Engineering Design
Standards and Benchmarks Addressed

Standards for Technological Literacy

Standard 2: Students will develop an understanding of the core concepts of technology.
BM AA: Requirements involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.

Standard 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.
BM F: Knowledge gained from other fields of study has a direct effect on the development of technological products and systems.

Standard 6: Students will develop an understanding of the role of society in the development and use of technology.

Standard 8: Students will develop an understanding of the attributes of design.
BM H: The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.

Standard 9: Students will develop an understanding of engineering design.
BM F: Design involves a set of steps, which can be performed in different sequences and repeated as needed.
BM G: Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
BM J: Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

Standard 11: Students will develop the abilities to apply the design process.
BM E: The process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s) from many.
BM I: Specify criteria and constraints for the design.
BM R: Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.

Standard 17: Students will develop an understanding of and be able to select and use information and communication technologies.

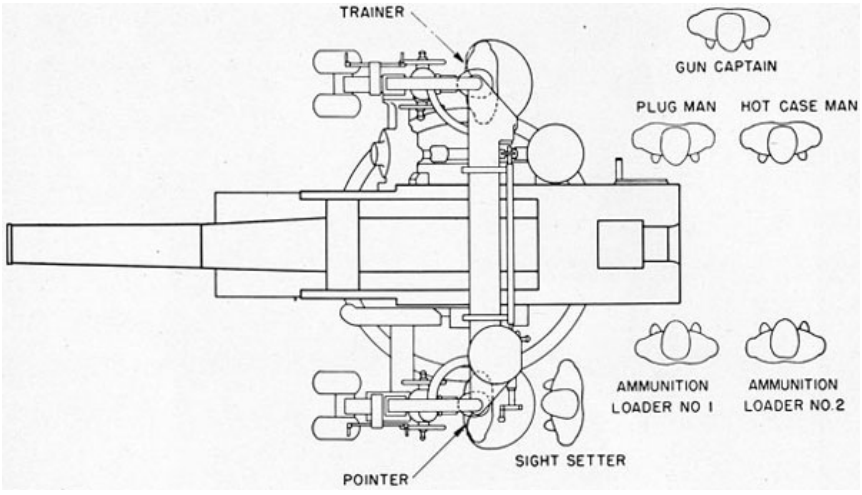
Lesson 1 History of the 5” Deck Gun, Manual

SCENARIO: Submarines used deck guns to attack and defend when needed for the defense of our country during World War II. They were complex machines that required 8-crew members to operate in accordance with Ordnance Pamphlet 1029.

CHALLENGE: The student will review the 5-Inch Submarine Deck Gun Manual, Ordnance Pamphlet 1029, and answer the following questions on lesson 1 worksheet.

CLASS DISCUSSION: This gun would be considered simple today. What would a manual on a modern ballistic or cruise missile look like? Why is the deck gun’s maximum vertical angle, shown below, 40 degrees?

TIME ALLOWED FOR PREPARATION: One class block



Lesson 1 History of the 5" Deck Gun, Manual
Worksheet 1

- Was the manual very detailed, how?

- What is the purpose of the first four pages, following the manual's cover page?

- What did you expect the manual to look like?

- Describe how the gun is maneuvered, be detailed?

- Describe how the gun is aimed, what mechanisms are used?

- Where is the deck gun located at the museum?

(search in the grass at the virtual tour webpage)

http://www.ussnautilus.org/virtualTour/nautilus/_flash/USS%20Nautilus_nautilus.html)