WAMC Lab Template

Math Concept(s): Solving Systems of Equations
Source / Text: Corded Algebra
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Attach the following documents:

- Lab Instructions
- Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

Students will use the knowledge they have of solving systems and put 'mines' in the shipping lanes of enemy ships. They will put this on a coordinate grid on the floor and determine if the equation they solved 'hit' the ship.

Lab Plan

Lab Title: Battleship Mine

Prerequisite skills:

How to solve system of equations

Lab objective:

Students will use their knowledge of solving system of equations, to plant there 'mines' in the enemies shipping lanes.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

- CCSS.MATH.CONTENT.HSA.CEDA.2 – graph equations on coordinate axes with labels and scales

Standards for Mathematical Practice:

- Make sense of problems and persevere in solving them
- Model with mathematics

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- CCSS.ELA-LITERACY.L-10.1 – Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

K-12 Science Standards

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Technology

- 5 – computational thinker – students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

Engineering

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Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ X Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation
- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Critical Thinking and Problem Solving
- ☐ x Reason Effectively
- ☐ x Use Systems Thinking
- ☐ Make Judgments and Decisions
- ☐ Solve Problems

Communication and Collaboration
- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy
- ☐ Access and Evaluate Information
- ☐ Use and manage Information

Media Literacy
- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)
- ☐ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability
- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction
- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural
- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability
- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility
- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- String or cord, 20 feet long
- Colored paper, different color for each lab group
- Scissors
- Masking tape
- Tape measure
- Optional: graphing calculators

Set-Up Required:

- Clean a spot on the floor
- Put these six different equations on pieces of papers for each of the groups, so that they can be picked.

  $y - x = -1$
  $4x + y = 17$
  $-12x - 7y = -154$
  $8y = 5x$
  $2x + y = 20$
  $4x + 7y = 105$

Make sure to have solutions for each of the different equations, along with the solutions for the 'enemy shipping lanes'

$x + 3y = 42$
$10y - 2x = 20$
$3x - 8y = -40$

Lab Procedure:

1) In the area of the classroom floor, that has been cleared, you will tape off a uniform grid, using a tape measure and marking with masking tape. This lab will only use quadrant I.
2) Identify two perpendicular reference lines to serve as the x and y.
3) As a class, identify what length will be used to serve as 'one unit'. If the floor has tile, you may use them. If not, a good length is 10 inches or 20 centimeters.
4) Measure and label the unites along each of the axis, labeling each of the units with a small piece of masking tape. The units should go from 0 to 20 on both the x and y axis.
5) Each group pick an equation to pick the course of the groups battleship.
6) Determine the points where your equation (the path of your battleship) intersects each of the enemy shipping lanes. Round to the nearest .1
7) Cut three 1-inch squares, in your assigned color.
8) For each point of intersection, locate it on the coordinate plane, and place one square, holding it down with tape. This is where you have dropped your 'mine'.

9) When everyone is finished, you will find two ordered pairs for each of the enemy ships. Using a string we will show the line to see if your 'mine' has been successful.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students will be working in groups, with each having jobs.

Cooperative Learning:

- Students will be in groups of 2 – 4 to complete this lab. Each member of the group will have a job to complete. These jobs will have already been assigned.

Expectations:

Students will complete all parts of the lab within the one class period – being on task at all times.

Timeline:

- This should be one – 50 minute class period

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Determining profit in a business

Career Applications

- Financial and businesses

Optional or Extension Activities

- Can make up more equations – and do more 'mines'
- Have students come up with equations, with answers, and give them to each other to do