

Teacher Resources

Missiles on a Mission!

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Introduction: Teamwork is essential for survival and safety of a submarine and its crew in the U.S. Navy. Ballistic missile submarines have fleet ballistic missiles to deter the threat of nuclear war, or to use in defense of our country. It is vital to use good teamwork skills during all submarine and missile operations.

Materials:

“Crossing the Rapid River”: carpet squares, rope

“Missiles on a Mission!”: Paper, plastic straws, rubber bands, paper clips, glue pen, balloons, craft sticks, tape, graph paper, ruler, scissors

Estimated time: 2-3 class blocks

Teacher procedures/student activities:

1. Show the U.S. Navy submarine”Battlestations” and “Teamwork” videos. Discuss the importance of teamwork in accomplishing goals. (whole class activity)
2. Discuss “Design Process and Teamwork” by using the prepared PowerPoint. (whole class activity)
3. Hook activity: “Crossing the Rapid River” activity (whole class activity)
4. “Missiles on a Mission” activity (group activity). This includes the hands-on activity, sketching the design in 3-D or on graph paper, peer evaluation (individual activity) and a reflective essay (individual activity).
5. Closure activity – Discuss the different designs created by the groups and discuss what aspects worked well and what aspects did not work well.
6. Assessment
 - A. Sketch and model of final design(1 per group)
 - B. Peer evaluations(individual)
 - C. Reflective Writing Assignment (individual)

Extension activities as needed: “Build and Maneuver a Submarine” activity from the site <http://www.history.navy.mil/branches/teach/dive/build2.htm>

Crossing the Rapid River!

(Teacher guide)

Objective:

- To emphasize the responsibility of each individual of a team to accomplish the goal
- To explore problem solving, communication skills, cooperation, planning, roles and expectations in teamwork situations

Scenario:

There is a rapid river that your team must cross to reach safety! There is one “stepping stone” (carpet square) per 2 people. If any part of you touches the “river” (floor), you will be swept away by the rapid river!

Instructions:

1. Mark the river with rope (or something comparable such as cones or masking tape to put boundaries for the left, right, beginning shoreline, and ending shoreline). This will probably be from 15-25 feet, depending on the number of students.
2. Each group of 2 will receive one carpet square. If there is an odd number of students give the last person a carpet square. (Check with your local carpet store for donating old carpet samples to you. Otherwise, you could use cardboard.)
3. Explain to the students that anyone that touches the river will be swept away by the river. If anyone touches the “river” at all, even if some part is still on a tile, the group will have to start over. (If your room is too small, make 2 or 3 sections of the river. Have everyone cross the first section, then start over with the next sections.)

Reflective questions for class discussion after completing the activity.

1. What happened during the process?
2. What did and did not work?
3. Was leadership demonstrated during the process?
4. What roles did individuals play in the process?
5. How important was teamwork for the process?

Missiles on a Mission!



SCENARIO: Submarines are used to launch missiles when needed to defend our country. Missiles can reach a target up to approximately 4600 miles.

CHALLENGE: Design, construct, and test a missile that is primarily powered by rocket propulsion.

TIME ALLOWED FOR PREPARATION: One class block (I recommend calling time for testing 10 minutes before the end of the block. Any group wanting to test must be in line by this time. This should allow enough time for the students to clean up their work area.)

MATERIALS: Paper, plastic straws, rubber bands, paper clips, glue pen, 2 balloons, craft sticks, tape, graph paper, ruler (I begin by giving the students a sheet of paper, 2 plastic straws, 2 rubber bands, 2 paper clips, 1 glue pen, 2 balloons, 2 craft sticks, 1 roll tape, 1 piece of graph paper, 1 ruler. I tell the groups that more of anything except balloons can be obtained by asking me. I only replace 1 balloon if it pops or if it is defective. I also distinguish between the groups by giving each group the same color of balloons. HINT: One balloon actually works the best, but I want them to discover this!)

EQUIPMENT: Scissors are the only tool provided.

DESIGN CRITERIA: After launching, missiles have wings that will eject. Your design should resemble a missile with wings. Use the internet to research different missiles. (Before testing, I make sure the design resembles a missile with wings. If it does not, the group will not test the missile.)

TESTING: A string will be attached to the ceiling. You must attach the missile to the string at waist level, stand behind the line and let go of it. It should travel up the string. (I demonstrate this before they begin their designs. I attach one end to the frame of a ceiling tile in one corner of my room. The other end is cut and I tie it to a chair across the room. I recommend using a

white line, such as plumber's line or a fishing line that a straw will fit through. Make sure it has a coating on the line so it will not ravel. I use a lighter to burn the end to keep it from raveling. The students will un-tie the string from the chair, attach the missile to the string (let them figure out how they want to do so) and release the missile (students cannot push it...just let go of it). I also use a marker the same color as the balloons I gave to the group to mark the location on the string so I can keep up with the distance for each group.)

EVALUATION:

1. Sketch the final design either with Google SketchUp (or other 3-D design program) or using graph paper. Be sure to draw the design to scale. (1 per group)
2. Distance traveled! You may test your missile as many times as possible during the allotted time. The missile that travels the longest distance will be the winner! (group activity)
3. Peer evaluations (individually)
4. Reflective Writing assignment (individually)

Group Evaluation Form

Completed by: _____ Date: _____

Group member 1: _____	Total points: _____
Group member 2: _____	Total points: _____
Group member 3: _____	Total points: _____
Group member 4 : _____	Total points: _____

Directions: Place the names of the group member being evaluated at the top of this page. Place the number of points in the blanks below that best describes how you feel about their participation. Total points and fill in scores next to names. **This should NOT be discussed with other team members!!!**

- 5 points - strongly agree
- 4 points - very much agree
- 3 points - agree
- 2 points - somewhat agree
- 1 points - somewhat disagree
- 0 points – disagree

(1)	(2)	(3)	(4)	
_____	_____	_____	_____	This person worked hard during class time to help our team meet the objectives.
_____	_____	_____	_____	This person completed their assigned role without being told to stay on task from the team members.
_____	_____	_____	_____	This person stayed with the team and did not waste time socializing with other teams.
_____	_____	_____	_____	This person was accepting of other members and their ideas.
_____	_____	_____	_____	

TOTAL POINTS (place this score by names above)

Reflective Writing Assignment

(This is to be done individually.)

1. Write a paper in a word processing program explaining the design process of your project. You must answer each of the following and use the described format:
 - Title centered at the top of the page with a font size of 16. Use standard 1" margins.
 - Insert a header that will include your name and date.
 - Paragraph 1 (at least 3 meaningful sentences):
 1. Describe the problem you were trying to solve.
 2. List the materials your group used to build the product.
 3. Explain the concepts and things your team considered to come up the final design and why your team chose this design.
 - Paragraph 2 (at least 3 meaningful sentences):
 1. What other design options did your group explore and why did you not choose this design?
 2. As you tested your design, if it didn't work explain why. If your design did work, explain why you think it worked. Describe any changes made to the original design to make it work or to improve it. Explain what affect the changes had on the success of the product.
 - Paragraph 3 (at least 3 meaningful sentences):
 1. Describe your contribution to the team. Be specific.
 2. Tell about the role of each member of your team and their contribution.
 3. Conclude by discussing the importance of teamwork in completing a project.