Water Project

Lesson Setup

Real-World Context	Possible Math Tools
Students divide into groups, and each group will determine how much water the school would need in an emergency disaster. Students may brainstorm one of many different modeling problems: • How much would all of the water cost? • How much space would all of the water take up? • What is the best way to distribute the water? • How much water does the school need to resupply after a disaster?	6-8 students: variables, rates, algebraic equations, linear functions, volume, area

Possible Learning Objectives:

6 – 8 grade students will gather information about how much water people drink in order to create algebraic equations about the volume of water needed. Students will also describe the cost of the water based on various parameters.

Cross-curricular Connections:

This problem can be related to a health and wellness lesson about how much water different ages of people need to drink each day. This problem can also be related to social studies lessons about the history of natural disasters and emergencies. Additionally, the problem can be connected to Earth Science lessons about how natural disasters are formed. Lastly, the problem can be related to Biology lessons about why the body needs water to function.

Materials List:

Paper, pencils, pens, various sized containers, water, Internet access, measuring cups, graduated cylinders, beakers, rulers

Additional Notes:

Regardless of the variation you chose, be aware that design tasks are prone to non-mathematical solutions. To combat this, limit student choices in the design phase and be clear about what questions the model is answering. How much water does the school need for an emergency? How much does the water cost? What is the best way to store the water? For more resources on how to add parameters and constraints or how to extend this task to other grades, consider consulting the GAIMME report pages 136-139 http://www.siam.org/reports/gaimme.php.

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Anticipate:

Where might students go with the provided context?

These questions are adapted from the GAIMME report – Guidelines for Assessment and Instruction in Mathematical Modeling Education. You can freely download the report here: http://www.siam.org/reports/gaimme.php.

What questions might students ask to **define a focused problem** from the broader real-world context?	How many people do we need to provide water for? Where are we going to buy the water from? What sized containers of water are we going to buy? Does everyone drink the same amount of water each day? Where are we going to store the water? What containers will we use to store the water? What containers will people use to drink the water? How long does the disaster last?
What **information** might students need, and who will provide/find that information?	Students will need to know: • information about how much water different ages, weights, and genders need to drink daily. • how many students, teachers, and staff members are at the school. • how much various bottles of water cost. Teachers can provide this information to students, or students can obtain the information through independent research.
What **vocabulary** should students learn before they begin the task?	Disaster, emergency, volume, cost
What **assumptions or generalizations** might students make using the information they have?	Everyone drinks the same amount of water each day. The water can be purchased in any incremental units we want. The duration of the disaster lasts for a specific number of days. The disaster began at the beginning of a day and the disaster ends at the end of a day, so no half days or quarter days are included. People always consume the total amount of water they should drink in a day so there are no leftovers. There is no tax on a purchase. It doesn't cost money to drive to the store.
What **mathematical tools** might your students gravitate towards?	Volume, area, multiplication, division, linear functions, variables
Which parts of the modeling process should happen in **small groups** and which with the **whole class**?	The problem should be presented to the large group and then students should break into their groups in order to ask questions and gather information they need. Students should also work in groups to determine assumptions and then build their model. Whole group instruction can be used for students to share their ideas along the way.
How will students **record** their ideas? In what format will they **present**?	Students should use a brace map or rubric to record ideas and should present on posters or by writing a letter to the teacher explaining findings on how much water needs to be purchased.