



# A Stone's Throw Away

## National Standards > Mathematics

- Data Analysis and Probability
- Measurement
- Numbers, Number Sense and Operations

## Kentucky Standards > Mathematics

### Number/Computation

#### MA-E-1.2.1

- Add, subtract, multiply, and divide whole numbers using a variety of methods (e.g., mental, paper and pencil, calculator)

### Geometry/Measurement

#### MA-E-2.2.1

- Use nonstandard and standard units to measure weight, length, perimeter, area, (figures that can be divided into rectangular shapes) and angles

### Probability/Statistics

#### MA-E-3.2.1

- Pose questions that can be answered by collecting data

#### MA-E-3.2.2

- Collect, organize, and describe data (e.g., drawings, tables, charts)

#### MA-E-3.2.3

- Construct and interpret displays of data (e.g., line graph, bar graph, pictograph, line plot)

## Ohio: Mathematics Standards and Benchmarks

### Data Analysis and Probability

#### Benchmarks

#### Grades K-3

A. Gather and organize data from surveys and classroom experiments, including data collected over time.

#### Measurement

A. Select appropriate units for perimeter, area, weight, volume (capacity), time and temperature, using:

- objects of uniform size;
- U.S. customary units; e.g., mile, square inch, cubic inch, second, degree Fahrenheit, and other units as appropriate;
- metric units; e.g., millimeter, kilometer, square centimeter, kilogram, cubic centimeter, degree Celsius, and other units as appropriate.

#### Number, Number Sense and Operations

G. Model, represent and explain addition as combining sets and counting on.

### **Objective**

Students will explore capacity using objects from the environment, U. S. customary units and metric units. They will record data, and compare the number to the predictions.

### **Materials**

- Clear container that can hold water (pitcher, bowl, cup, etc.)
- Three different sized objects that sink (must have enough of each object to fill the container) ie. golf balls, marbles, pennies, gravel, nails, paper clips, etc.
- Water
- Pencil
- Paper

### **Vocabulary**

- Sort
- Data
- Tally marks
- Volume
- Liters
- Milliliters
- Cups
- Pints
- Quarts

### **Activity**

#### **Teacher will:**

- Show students the container.
- Briefly discuss volume (capacity), Include information about liters and milliliters as well as cups, pints, quarts and gallons. (It would be helpful to have examples, like a 2L pop bottle or a measuring cup.)
- Present the three objects that you will be placing in the container.
- Ask students to predict how many of object 1 will be needed to fill up the container. (Discuss exactly what "filled up" means in this setting.)
- Ask students to predict the number of objects 2 & 3 that will be needed to fill the container.
- Record predictions and discuss why certain answers. (Why is this prediction so high? Why is this prediction so low? Are all the predictions close to the same number? Etc.)
- See how many of object 1 fits in the container by placing them inside the container one at a time.
- Make sure to count as each object is placed in the container.
- Tell students to keep track of the amount by placing tally marks on their papers for each object.
- Record the answer and compare it to the prediction for object 1.
- Repeat steps 7-9 for objects 2 & 3.
- Discuss how the same pitcher is being filled up, but it is taking a different amount of each object to fill it up.
- Ask students if this reminds them about anything from the play, Aesop's Fables. (How the crow threw stones in the pitcher so that it could drink the water.)
- Fill the container half full of water.
- Tell students that it is time to make more predictions.

- Have students predict how many object 1 pieces will be needed to make the water in the container overflow.
- Have students make the same prediction for objects 2 & 3.
- Record and discuss predictions.
- Ask “If the container is already half full, is it possible that we may need half of the number of objects that were needed to fill the entire container?”
- Begin placing pieces of object 1 in to the container one at a time and ask students to watch what happens to the water level.
- Make sure to count as each object is placed in the container.
- Tell students to keep track of the amount by placing tally marks on their papers for each object.
- Ask students to explain what is happening to the water level after a few pieces have been placed in the container.
- Continue adding pieces of object 1 until the water spills over the top of the container.
- Record data, and compare the number to the predictions.
- Repeat the same process for pieces 2 & 3.
- Discuss the results of all three objects and compare and contrast the objects and what happened when they were placed into the water.

### **Assessment**

- Have a container of known quantity and measuring devices (measuring spoons, measuring cups, pint bottles, litter bottles, etc.)
- Have students choose two of the measuring devices to use for this activity.
- Predict how many times each measuring device (filled with water) will be poured into the given container to fill it.
- Record predictions.
- Use the first measuring device to begin placing water in the given container.
- Each time the water is poured from the measuring device into the given container, record it with a tally mark to keep track of the number of times it had been used to pour water into the given container.
- Record the number of pours required to fill the given container with water from the first measuring device.
- Repeat the process for the second measuring device.
- Students should turn in the volume of the given object, the volume of each measuring device, the tally marks showing the number of pours for each measuring device.
- Students will also be able to explain the differences between the two measuring devices used to fill the given container.