

Experiment 2
The Raven and the Jug²

In this experiment we will add marbles to a beaker of water and record the depth of the water in the beaker. The *independent* variable is the number of marbles that have been added to the water and the *dependent* variable is the depth of the water.

Equipment:

- marbles, uniform in size
- straight-sided, flat-bottomed 8-10 oz drinking glass or beaker
- centimeter rulers
- water

Procedure

Fill the glass one-third to one-half full of water, until a convenient level is reached; 5.5 cm to 6 cm is usually satisfactory. Add marbles, at least 5 at a time, and record the water level. The marbles must remain submerged.

² From *Algebra I Experiments*

Sheet 1: Collecting the Data

The independent variable, x , is _____ Units _____

The dependent variable, y , is _____ Units _____

Data Collection

<u>Independent</u>	<u>Dependent</u>

Points to be Graphed

x	y

Sheet 2: Find the Equation

After plotting your data, draw the median-median line and the least-squares regression line through the data.

1. What is the slope of each line? What is the meaning of the slope?
2. Find the y -intercepts of the lines? What is the meaning of the y -intercept?
3. Write the equation of the line:
$$y = \underline{\hspace{2cm}} x + \underline{\hspace{2cm}}$$
4. Rewrite the equation, using the names of the variables instead of x and y .

Sheet 3: Interpret the Data

Write your equation here: $y = \underline{\hspace{2cm}}x + \underline{\hspace{2cm}}$

Use this equation to answer the following questions. Show your work.

1. How high would the water level be if 31 marbles were submerged? $\underline{\hspace{2cm}}$
2. How many marbles are needed to make the water level exactly 6.75 cm? $\underline{\hspace{2cm}}$
3. How many marbles are needed to make the water level exactly 8.75 cm? $\underline{\hspace{2cm}}$
4. How many marbles are needed to make the water rise 4.5 cm? $\underline{\hspace{2cm}}$
5. How many marbles are needed to make the water rise 5.5cm? $\underline{\hspace{2cm}}$
6. How much does the water rise for every 10 marbles you add? $\underline{\hspace{2cm}}$
7. How would the line change if you had used larger marbles?
8. How would your line change if the glass had been narrower?