

Do Now:

Sit down and take out your Raven and the
Jug lab handout
or a sheet of paper!

Page 1

A raven was very thirsty and wanted a drink of water. She could not see a pool of water anywhere. She flew round and round. Then she saw a big jug outside a house.

The raven flew down to the jug. She looked inside. There was a little water at the bottom of the jug.

She could not reach the water with her beak. She climbed onto the jug. She almost fell into it, but she could not put her beak into the water.

She tried to break it with her beak. But the jug was too strong.

She tried to knock it over, so that the water would run out onto the ground. But the jug was too heavy. It did not fall over. Now the raven was very tired. She thought she was going to die of thirst.

Then she had an idea. She saw some stones lying on the ground. She picked up a stone in her beak and dropped it into the jug. Then another, and another. The water rose higher every time a stone fell into the jug.

Soon the jug was nearly full of stones. The water came to the top. Then the clever raven had her drink.

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The Raven & The Jug

Name _____
Partners _____

Draw a diagram of the
experiment and include labels



Describe the procedure for the experiment.
What did you do, step-by-step?

The independent variable, x, is _____ Units _____

The dependent variable, y, is _____ Units _____

Equipment Used: _____

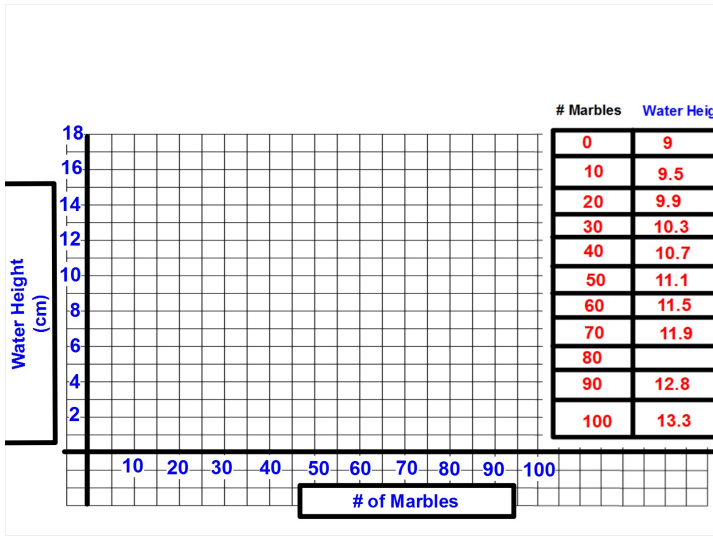
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Data Collection

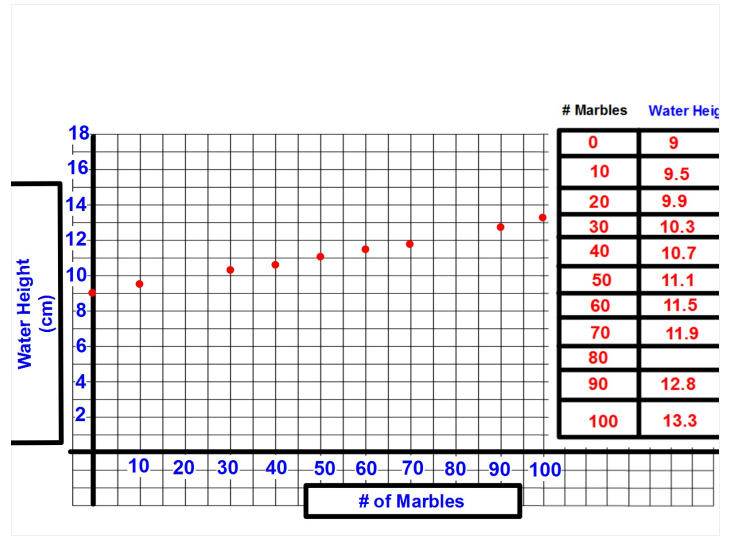
Marbles Water Height (cm)

0	9
10	9.5
20	9.9
30	10.3
40	10.7
50	11.1
60	11.5
70	11.9
80	
90	12.8
100	13.3

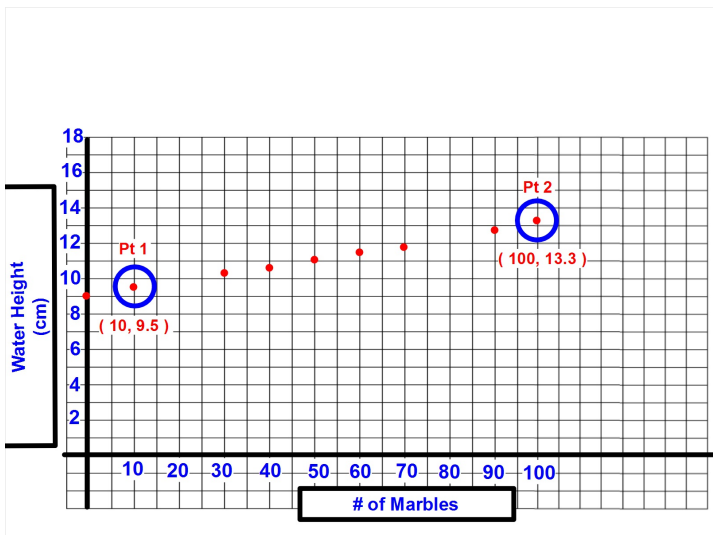
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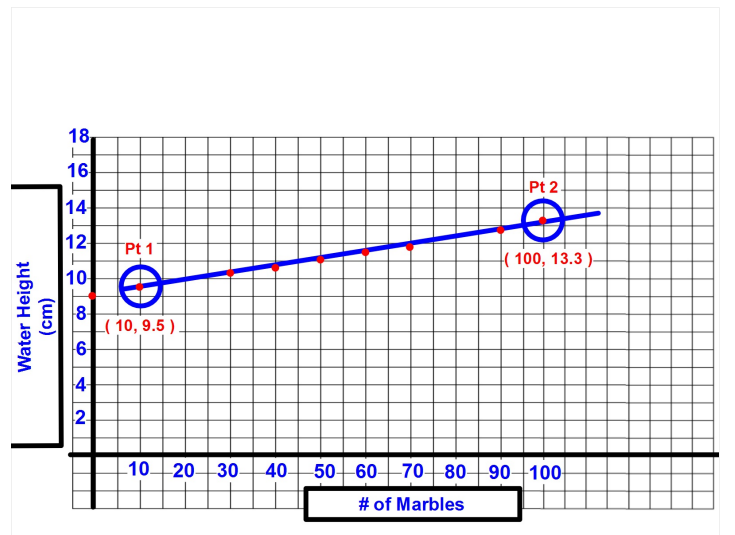
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Finding the Linear Equation

After plotting your data on graph paper, draw a straight line through two of your points. Choose the line that best fits your data. Circle the points that you used on your graph and copy their coordinates below:

Your points: (10 , 9.5) and (100 , 13.3)

Use these points to find the equation of your line. Show your work:

1.) Find the slope of the line using $m = \frac{Y_2 - Y_1}{X_2 - X_1}$

$$m = \frac{13.3 - 9.5}{100 - 10} = \frac{3.8}{90} = 0.042222...$$

2.) Identify the y-intercept of the line (Hint: What is the height of the water with no marbles?)

(0 , 9)

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2.) Identify the y-intercept of the line (Hint: What is the height of the water with no marbles?)

(0 , 9)

3.) Write the equation of the line

$$y = \frac{0.042}{\text{Slope}} x + \frac{9}{\text{y-intercept}}$$

4.) Rewrite the equation using the names of the variables instead of x and y

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}} * \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

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4.) Rewrite the equation using the names of the variables instead of x and y

$$\underline{\text{water height}} = \underline{0.042} * \underline{\text{\# of marbles}} + \underline{\text{Starting height}}$$

Interpret the Data

Rewrite the equation of your line: $y = \frac{0.042}{\text{Slope}} x + \frac{9}{\text{y-intercept}}$

Use this equation to answer the questions below. SHOW YOUR WORK!

5.) How high would the water level be if 31 marbles were submerged?

$$y = 0.042 (31) + 9 = 10.3 \quad \underline{10.3 \text{ cm}}$$

6.) How many marbles are needed to make the water level exactly 10.75 cm?

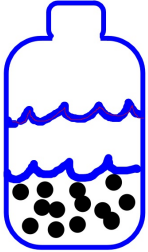
$$\begin{array}{r} 10.75 = 0.042x + 9 \\ - 9 \qquad - 9 \\ \hline 1.75 = 0.042x \\ 0.042 \quad 0.042 \\ \hline 41.67 = x \end{array} \quad \underline{42 = x}$$

7.) How many marbles are needed to make the water rise 4.5 cm?

Initial Height: 9 cm

If it rises 4.5 cm, new height is $9 + 4.5 = 13.5$ cm

108 marbles



13.5 cm

9 cm

Solve $13.5 = 0.042x + 9$

$4.5 = 0.042x$

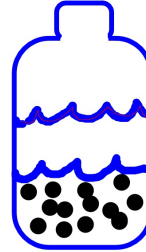
$107.1 = x$

7.) How many marbles are needed to make the water rise 5.5 cm?

Initial Height: 9 cm

If it rises 5.5 cm, new height is $9 + 5.5 = 14.5$ cm

131 marbles



14.5 cm

9 cm

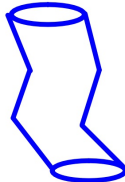
Solve $14.5 = 0.042x + 9$

$5.5 = 0.042x$

$131 = x$

9.) How much does the water rise for every 10 marbles you add?

10.) Predict what you think might happen to the height of the water if we used a jar shaped like this:



9.) How much does the water rise for every 10 marbles you add?

$y = 0.042 (10) + 9$

$y = 0.42 + 9 = 9.42$ cm

9.42 cm

10.) Predict what you think might happen to the height of the water if we used a jar shaped like this:

Answers will vary. Make a prediction!

