THE BALANCING ACT

Scenario: Students will test the balancing point of a ruler as pennies are stacked on it. Then students will make a scatter plot, find the line of best fit, and answer questions over the data.

Supplies:
Ruler Pennies

PASS: Process Standard 4.1 - Link mathematical ideas to the real world.
Content Standard 3.2 - Collect data involving two variables and display on a scatter plot; interpret results using a linear model/equation and identify whether the model/equation is a line best fit for the data.

Procedure:
1. Put students in groups of three or four in an area with a table or ledge.
2. Student need to lay the ruler on the edge of a table with the 0 cm end hanging off. Push it over the edge until balanced.
3. Record the measurement at the balancing point (edge of table)
4. Add one penny to the zero end of the ruler and move the ruler to find the new balancing point. Record the data in the table.
5. Repeat the process adding a penny at a time. Work up to eight pennies.
6. Use the data in the table to answer the questions.

<table>
<thead>
<tr>
<th>Number of pennies</th>
<th>Balancing point</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
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<td>2</td>
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<td>7</td>
<td></td>
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<tr>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>
Analyse the data:

1. Plot the data on a scatter plot. Don't forget to label the axis.

2. Describe the trend of the data. Does it go up, down?

3. What is the independent variable? What does it represent?

4. What is the dependent variable? What does it represent?

5. What type of correlation (positive, negative, none, weak, strong) do you think exist in this data?


7. Find the equation for the line of best fit.

\[ m = \]

\[ b = \text{equations:} \]

8. What does the y-intercept tell us?

9. Explain what the slope of this experiment means.

10. What is the domain of the experiment?

11. What is the range of the experiment?

Extension

- Put the data in a graphing calculator to find the line of best fit.
- What would happen to the scatter plot and line of best fit if the 33 cm end of the ruler is placed off the table?
- What is the maximum number of pennies that can be placed on the ruler and it still balance?
- Do you think a line is the best representation for this data or would some other equation represent it better?