**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_**

PHYSICAL SCIENCE: GRAPHING LAB

Penny Toss

**Introduction:**

A graph is one of the tools used by scientists to interpret data. When we plot a graph, we do not collect the points but instead we draw the line of best fit. Our data points from the raw data almost never fall in the straight line they belong. This is because of *experimental error*. When we fit a line to our points, we draw the line the points should have been on. This is kind of like an average. This takes practice and concentration. In this lab, we will use probability to practice finding a line on a graph.

**Materials:**

4 pennies, Cup, Ruler, Graph Paper

**Procedure:**

1. You will be “flipping” pennies 25 times for each group.
2. Start with one penny in the cup. Shake it and then pour it on the table by flipping over your cup. Count the total number of heads you get in 25 tosses. **Keep track of how many heads on the chart and record the total in the chart below.**
3. Repeat this with two pennies in the cup, then three, then four. Don’t forget to record your tosses!

**Data:**

|  |  |  |
| --- | --- | --- |
| **Number of Pennies** **in the Cup** | **Tally Marks of Pennies that land on heads** | **Total Number of Heads for 25 tosses** |
| **1** |  |  |
| **2** |  |  |
| **3** |  |  |
| **4** |  |  |

**Graphing:**

1. On graph paper, plot your 4 sets of data points. The number of pennies per group will be the horizontal x axis. Number it out to 6 pennies, even though you only used 4. The number of heads tossed per group will be the vertical or y axis. Try to use as much of the graph as possible.
2. Now using a ruler, *draw the line of best fit* for your data points. Your line will start at point (0,0) at the corner of your graph. Be sure to extend the line past where x=6.

**Calculations**

1. According to your graph, how many heads would there have been for 6 pennies tossed 25 times? (Simply find where your line crosses the x=6 line, the go over to the y axis to find the value)

According to my graph, 6 pennies thrown 25 times = \_\_\_\_\_\_heads

1. Now calculate the mathematical value for 6 pennies thrown 25 times. The probability of a head being tossed with a penny is 50%. Remember, percents must be converted to the decimal form for multiplication.

The formula would be:

 (The number of pennies in the cup) x (Number of Tosses) x (Probability)

 OR

 (6) x (25) x (.5) =

 Theoretical number of heads for 6 pennies thrown 25 times = \_\_\_\_\_\_heads

1. Calculate the percent error in your graph. SHOW WORK!

Formula: |Theoretical Value – Actual Value| x 100

 Theoretical Value

1. Theoretically, how many pennies would land on head if you put 24 cups in the cup and tossed them 25 times? Show your work below.