

**Explanation Activity: Excel - Creating A Scatter Graph**

g8.INQ.5

**Curriculum Objective(s)****C INQ.7:** Identify and present relationships between variables in appropriate graphs.Performance  
Task**Approximate Completion Time:****30 Minutes****Assessment:****Scoring Rubric**

Point Total(s)

50 points

**Introduction:**

Graphs are used to summarize and to discover trends in the data you have recorded in your experiment. Often, sets of data do not easily display relationships unless graphed appropriately. In the "Simply Marble-less" activity you manipulated (independent) two variables, the angle of the launcher and the release point of the marble on the launcher. As a result, the marble responded (dependent) by rolling different distances. In this activity you will investigate the relationship between the two variables by creating a scatter graph of the data.

**Characteristics of a Graph:**

Graphs should include the following characteristics:

- A complete title that describes the relationship in the graph.
- The axes must display equidistant scales with appropriate starting points. Usually the independent variable is on the X-axis and the dependent variable is on the Y-axis.
- The axes of the graph must be appropriately labeled (no abbreviations) and contain appropriate units of measure.
- Graphs should be numbered in the sequence they occur in a document.
- Graphs should contain a caption that describes the trends in the data.
- Graphs should be neat and easy to read and interpret.

**Graphing Activity:****Part 1. Creating a Spreadsheet for the data.**

- Open **Microsoft Excel**. Select the **New Excel Workbook**. (See Fig. 1) A spreadsheet document will appear. (See Fig. 2 below.)
- Click on the diamond symbol in the top left of the workbook. (See Figure 3 below.) This selects all cells in the spreadsheet.
- Under the pull down menu *Format*, select *Cells*. Select *Alignment* from the pop-up window (See Figure 4) and click "Wrap Text". (See Figure 5.)

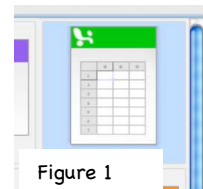


Figure 1

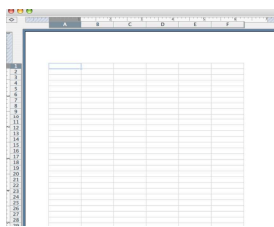


Figure 2

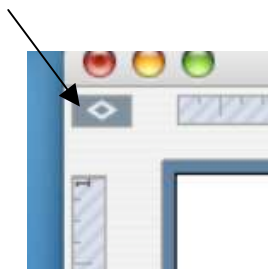


Figure 3

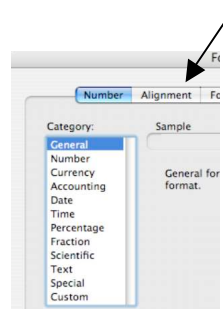


Figure 4

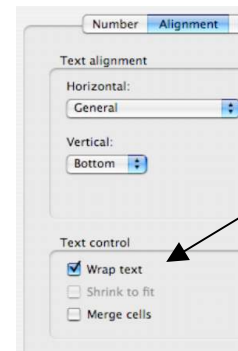


Figure 5

4. In cell A1, type: *Release Point of a Marble on the Marble Launcher in Centimeters (cm)*. In the cells below the heading type in 20, 30, 40, 50. Each number is in a cell below the other. (See Figure 6 below.)
5. In cell B1, type: *Average Distance of the Marble in Centimeters (cm) at a 10° Angle*. From your class data table, type in the average distances at each release point.
6. In cell C1, type: *Average Distance of the Marble in Centimeters (cm) at a 20° Angle*. From your class data table, type in the average distances at each release point.
7. In cell D1, type: *Average Distance of the Marble in Centimeters (cm) at a 30° Angle*. From your class data table, type in the average distances at each release point into the spreadsheet.
8. At this point your Spreadsheet should look like Figure 6.  
NOTE: Your numbers will vary in columns B, C, and D.

Release Point of the Marble on the Marble Launcher in Centimeters (cm)	Average Distance of the Marble in Centimeters (cm) at a 10° Angle	Average Distance of the Marble in Centimeters (cm) at a 20° Angle	Average Distance of the Marble in Centimeters (cm) at a 30° Angle
20	200	256	400
30	325	345	560
40	450	510	762
50	610	800	998

Figure 6

9. Next, highlight all the "cells" containing the **headings** and **data** in columns A and B. (See Figure 7.) Note: Do not highlight the column headings A and B at the top of the spreadsheet.

Release Point of the Marble on the Marble Launcher in Centimeters (cm)	Average Distance of the Marble in Centimeters (cm) at a 10° Angle	Average Distance of the Marble in Centimeters (cm) at a 20° Angle
20	200	
30	325	
40	450	
50	610	

Figure 7

## Part 2. Graph Creation

10. Select the *chart wizard* in the pull-down menu. (See Figure 8).



Figure 8

Chart Wizard

11. Select "Scatter" graph, the first Chart sub-type. (See Figure 9.) Click "Next".
12. Click "Next" in the *Chart Source Data* chart window.
13. In the *Chart Options* window type the following:

Chart title:

*Correlation of the Average Rolling Distance of a Marble and the Release Point of a Marble From a Marble Launcher at Various Angles.*

Value (X) axis:

*Release Point of the Marble on the Marble Launcher in Centimeters (cm).*

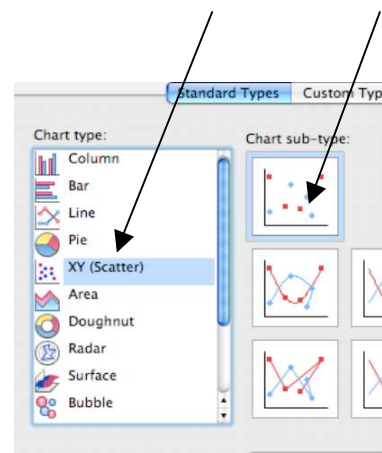


Figure 9

Value (Y) axis:  
Average Distance of the Marble in Centimeters (cm).

Click "Next".

14. It is important to give the chart (graph) its own window so in the *Chart Location* window, click "As new sheet" then click "Finish".

### Part 3. Graph Adjustments

15. Double-click on the numbers of the X-axis. The "Format Axis" window will open. Select "Scale" and change the 'Minimum' to "10" and 'Maximum' to "70". Change the 'Major unit' to "5". Click "OK". (See Figure 10.)
16. Double-click on the numbers of the Y-axis. The "Format Axis" window will open. Select "Scale" and change the 'Maximum' to "1200". Change the 'Major unit' to "50". Click "OK".

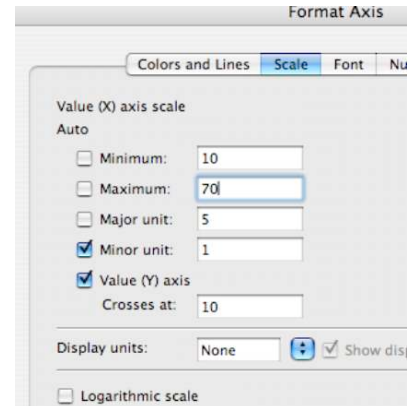


Figure 10

17. From the pull-down menu select *Chart*, and go to "Add Trendline...". Select "Exponential" and click *Options*. In the *Forecast* box, change *Backward* to "10". Click "OK". You should now have a graph that looks like Figure 11 below.

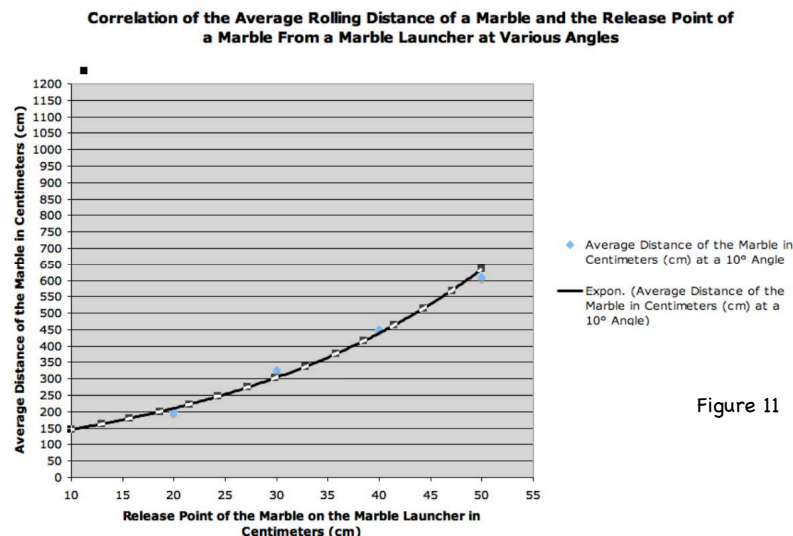
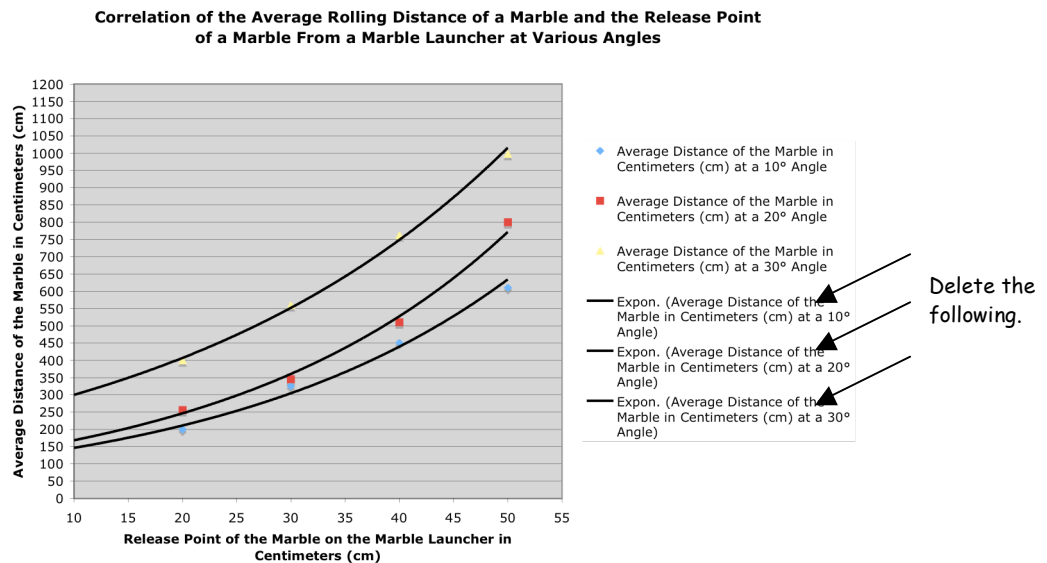


Figure 11

Next we must add the data from the other two angles. This version of Excel is intuitive enough to allow you to Cut/Paste data directly into the chart (graph).

18. Return to *Sheet 1*. Highlight and copy all the cells that have information in *Column C*.
19. Return to *Chart 1*. Click once in the center of the graph and paste the new data. It will automatically be entered into the graph. Note the change in the *Legend* on the right indicating new data is in the graph.
20. Next, repeat the steps to add the *Trendline* for the new data. When the *Add Trendline* window opens, click the 20° data before adding the trendline.
21. Repeat this process for the data in *Column D* of *Sheet 1*. When finished you should have a graph similar to the one below.

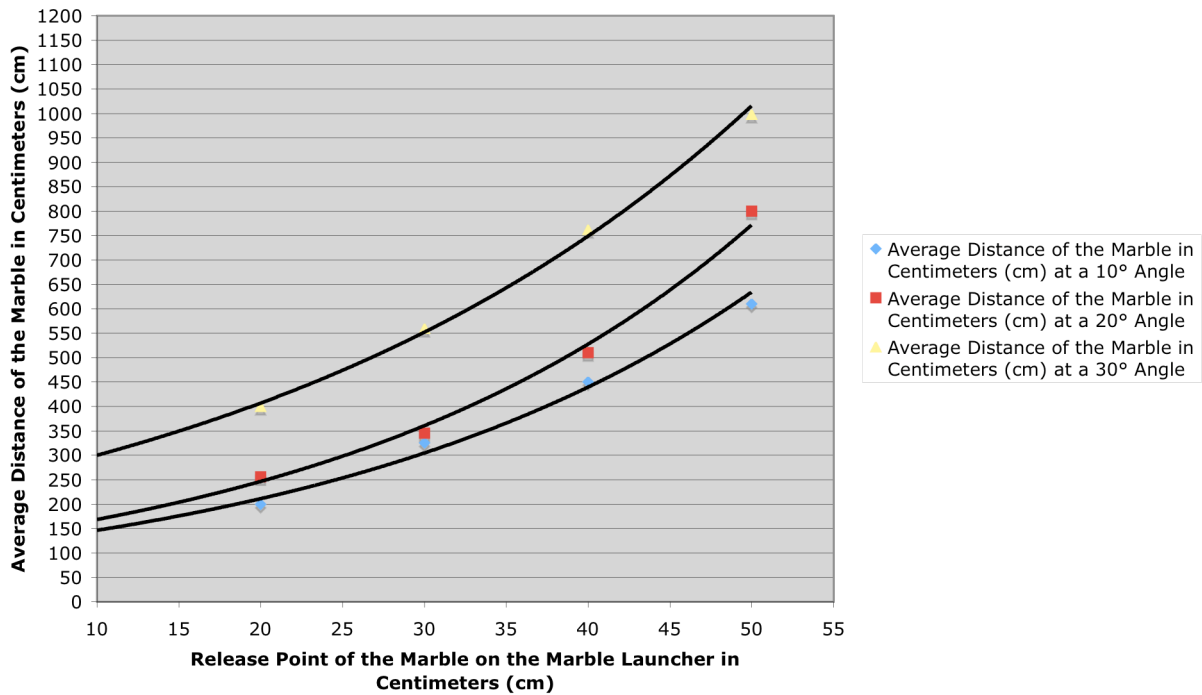


22. Next you will delete three sections in the *Legend*. Click once in the *Legend* area. Wait a second, and then click once on "*Expon. (Average Distance of the Marble in Centimeters (cm) at a 30° Angle)*". Delete the expression.

23. Repeat this process for 20° and 10°.

You should have a graph similar to the one on the next page.

**Correlation of the Average Rolling Distance of a Marble and the Release Point of a Marble From a Marble Launcher at Various Angles**

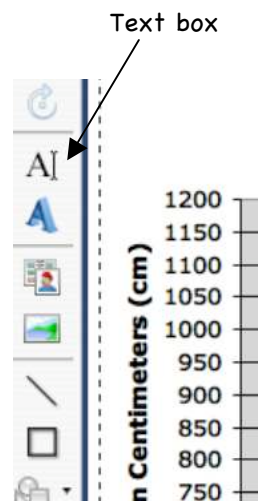


**Part 4. Final Touches.**

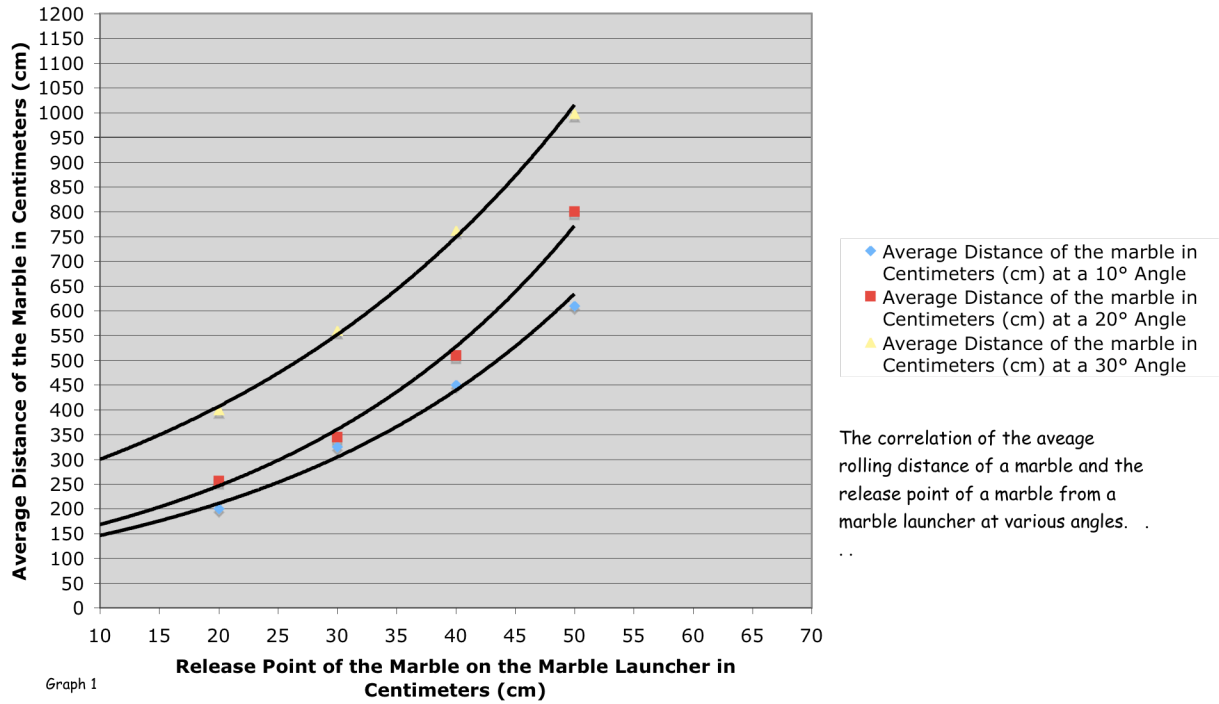
24. You may now change the style/color of each curve, or change the shape of the plot points by clicking on the curves. (This is optional.)
25. From the pull-down menu *View*, go to *toolbars*, to *drawing*. Select the "text box", from the drawing tool bar, and create a textbox on the lower left of the graph. In this textbox type: "Graph 1".
26. Lastly, you are to create another textbox in which you will write a **caption** that describes the data trends in the graph. Start the caption with the title of the graph, such as: *The correlation of the average rolling distance of a marble and the release point of a marble from a marble launcher at various angles. . . .*

*At this point you must describe the trends noted in the graph.*

**The final graph will be similar to the graph on the next page.**



**Correlation of the Average Rolling Distance of a Marble and the Release Point of a Marble From a Marble Launcher at Various Angles**



- ◆ Average Distance of the marble in Centimeters (cm) at a 10° Angle
- Average Distance of the marble in Centimeters (cm) at a 20° Angle
- ▲ Average Distance of the marble in Centimeters (cm) at a 30° Angle

The correlation of the average rolling distance of a marble and the release point of a marble from a marble launcher at various angles.