GRAPH CONSTRUCTION

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7/10/89, rvsd 12July93, 18Sept95, 20Sept96, 3July97, 29June00, 28June01, 28June02, 3Nov04, 18Jul05, 30June08, 24July09
http://biology.clc.uc.edu/fankhauser/Labs/Microbiology/Growth_Curve/Graph_Construction.htm

1. DETERMINE THE RANGE LIMITS OF THE X-AXIS AND THE Y-AXIS

Examine the data set and note the minimum and maximum values:

X-axis: abscissa (independent or **known** variable): **pre-specified**: time, concentration, etc.

Y-axis: ordinate (dependent or **unknown** variable): **resulting measurement**: weight, A_{660}, etc

(If the zero value of X or Y is important for your graph, it should be included in the limits.)

2. DETERMINE THE LIMITS OF YOUR GRAPH PAPER

Count the number of squares available for the X and Y axes, leaving at least 2 square at the bottom and sides, and 9 squares at the top. Graph-lined composition notebooks with 5 X 5 quad ruling allow for a graph of no more than **34 squares wide** and **39 squares tall**.

3. ASSIGN VALUES TO AXES WHICH INCLUDE THE RANGE LIMITS

Assign values to the coordinates which meet the following requirements:

a. They *include the limits* determined in step 1.
b. They make an *adequately large* graph as large as the available space will accommodate.
c. They do *not exceed the space* available on the page.

Determine the value per square: Divide the range value by the number of squares available along the given axis. Round up so that the first significant figure of the result equals a multiple of ten or decimal fraction of **1, 2, 5 or 10 units per square**. (*I.e.*, 0.0207/square would be rounded up to 0.05/square). Memorize the numbers 1, 2, 5, or 10. Other values will make plotting the data difficult (and will cost you points when graded). The quantity zero should often be the space most to the left and/or bottom.

4. CONSTRUCT AXES, MARK WITH REGULAR VALUES

Draw lines: for the X-axis, 3 squares up from the bottom; for the Y-axis, 3 lines from the left of the graph-lined page. Label each axis**. Mark off the selected *regular* values** with a small line corresponding to units/square selected in step 2: often every 5 or 10 squares. (Do *not* mark every square) Label each mark with its corresponding value. ***Be certain to maintain linearity*:** all spaces *must have equal value.*

5. ENTER DATA POINTS

For the first point, locate the appropriate value along the X axis and then follow that line up until the appropriate value of Y is reached. Double check that you have not shifted from the desired location, and **make a small dot at the point**. **Draw a small circle around the point**, making it easier to see, but preserving the integrity of the point. Repeat until all data have been entered. Use squares to indicate a second data set, triangles the third, etc.

6. CONNECT THE CIRCLES

If the function you are graphing is linear, carefully connect the circles by lining a ruler up with the points and drawing a line between them. (**Do not violate the interior of the circles** so that the value of the point will remain clear.) Alternatively, if the function is non linear, you may either connect the circles or approximate the curve plots with a "best fit" curve.

7. TITLE THE GRAPH AND AXES

Create a title which is **meaningful and explicitly reflects the value** of the experimental data you have graphed. Place it in CAPITAL LETTERS as the title of the page. Below the title, indicate from where the original data came with a cross reference. Be certain that the axes are correctly labeled. Label any significant break points or phases in the curve, briefly indicate their meaning, if known.