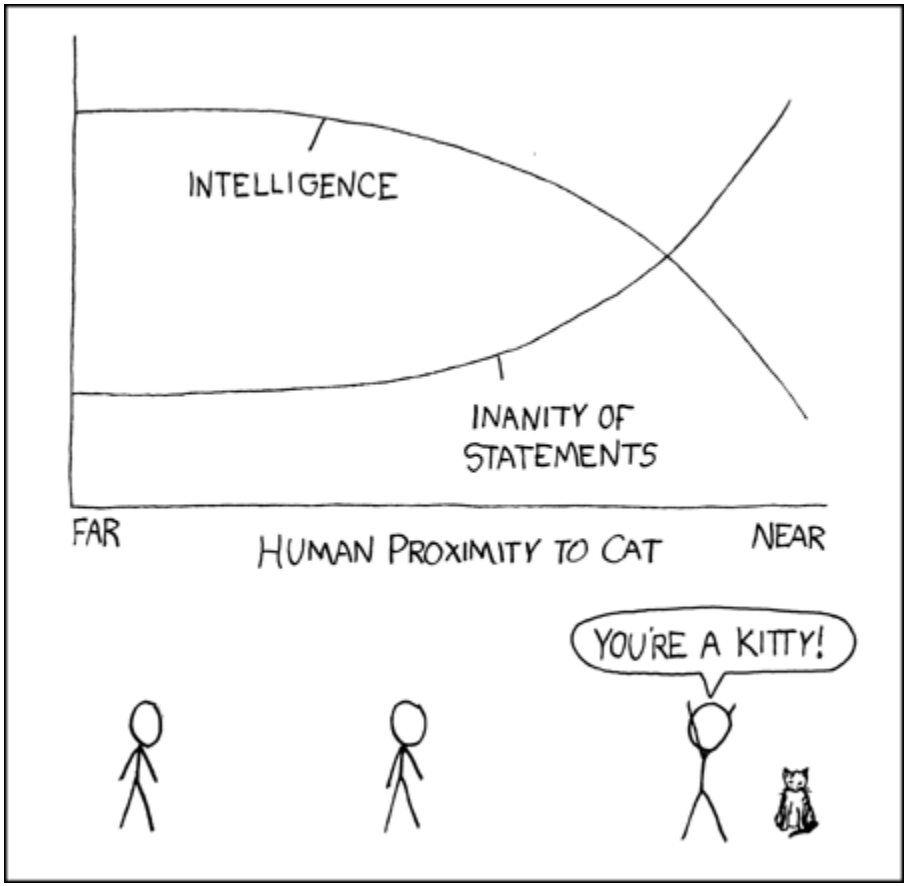


Graphing in Science

SNC2P

Qualitative vs. Quantitative

- **Qualitative** observations are descriptive:

  "The amplitude of the pendulum decreased."

- **Quantitative** observations contain numerical measurements:

  "The mass of the pendulum was 150 g."

Quantitative Data

Quantitative data should contain all the digits that were measured.

For example, if lengths are measured to the nearest mm, write 10.0 cm (NOT 10 cm).

Tables

Both qualitative and quantitative data can be recorded and presented in tables.

For example,

Table 1: Position-time Information For a Dynamics Cart Traveling Along a Level Surface

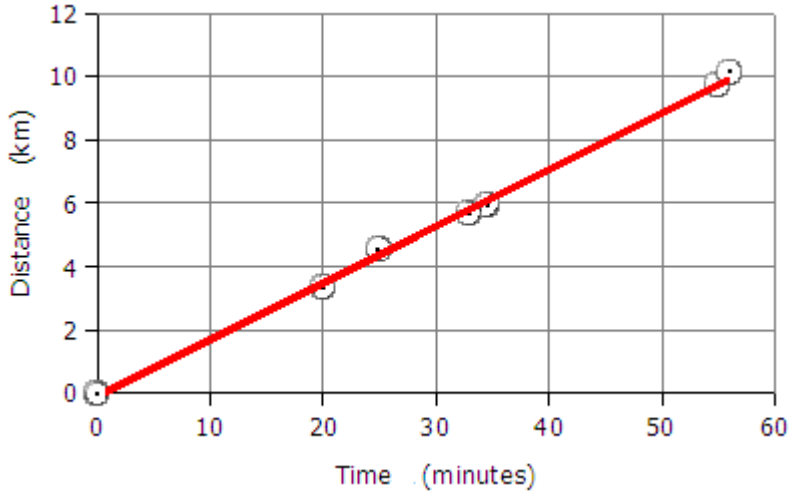
Position (cm)	0	1.6	2.9	4.3	6.2	7.2	9.1
Time (s)	0	0.1	0.2	0.3	0.4	0.5	0.6

Graphs

Quantitative data may be presented and analyzed using graphs.

For example,

Graph 1: Distance-time information for a cart travelling along a track



Graphs

Rules for graphing:

- You must use a ruler and graph paper.

Graphs

Rules for graphing:

- You must use a ruler and graph paper.
- Graphs must be numbered and titled.

Graphs

Rules for graphing:

- You must use a ruler and graph paper.
- Graphs must be numbered and titled.
- A graph must take up an entire page.

  (The axes should be about 2 cm from the edge of the page.)

Graphs

Rules for graphing:

- You must use a ruler and graph paper.
- Graphs must be numbered and titled.
- A graph must take up an entire page.

  (The axes should be about 2 cm from the edge of the page.)
- The axes must be labeled with the variables (including units).

Graphs

More rules for graphing:

- The scale on each axis should start at 0 and go up to *just* beyond the last data point in steps of 1, 2, 5, 10, 20, 50, or etc.

Graphs

More rules for graphing:

- The scale on each axis should start at 0 and go up to *just* beyond the last data point in steps of 1, 2, 5, 10, 20, 50, or etc.
- Points are plotted in pencil with a circle around each sharp dot.

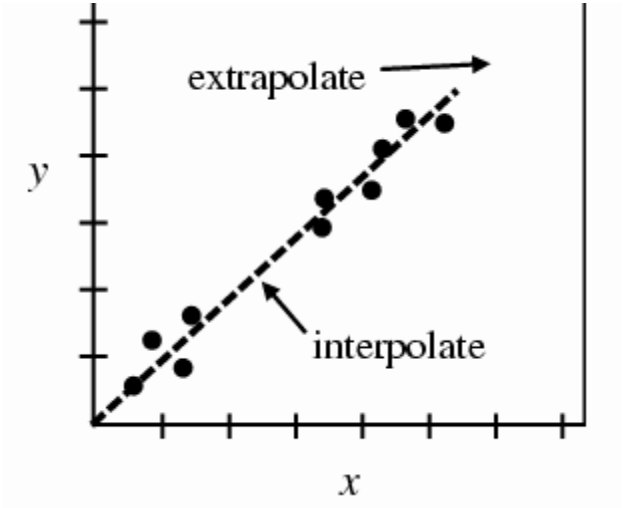
Graphs

More rules for graphing:

- The scale on each axis should start at 0 and go up to *just* beyond the last data point in steps of 1, 2, 5, 10, 20, 50, or etc.
- Points are plotted in pencil with a circle around each sharp dot.
- A straight line or smooth curve of best fit is drawn through the points. (Do NOT connect the dots.)

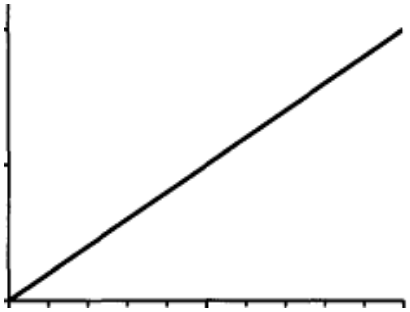
The Line/Curve of Best Fit

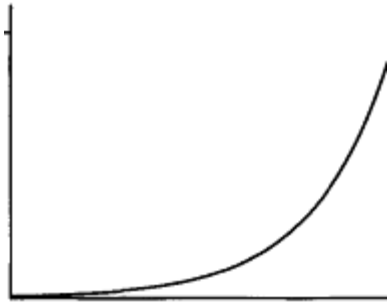
The line should extend past your points so that you can extrapolate (estimate values outside your data set).

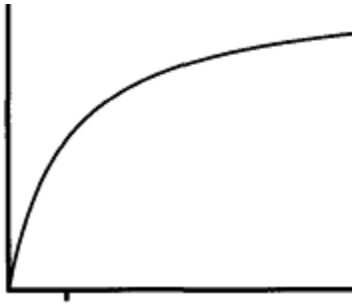


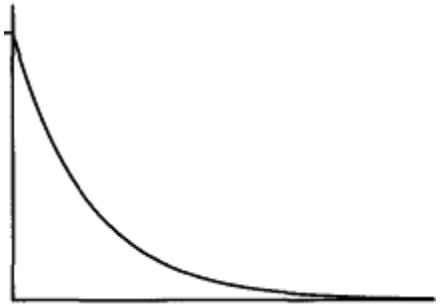
Trends in Graphs

The line or curve shows you the trend in the data.





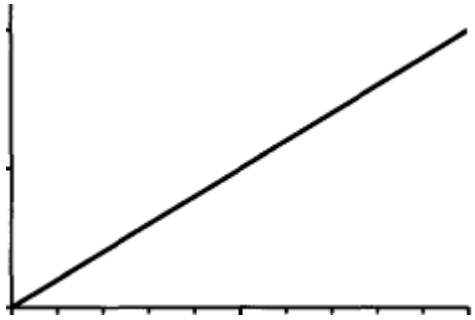




Linear Increase

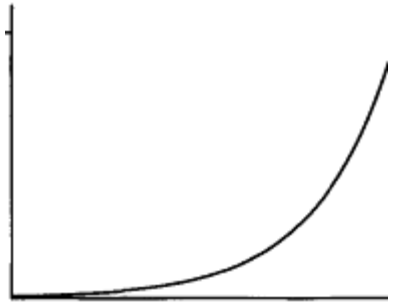
This graph shows a linear increase:

as the one variable increases, the other increases linearly.



Increase at an increasing rate

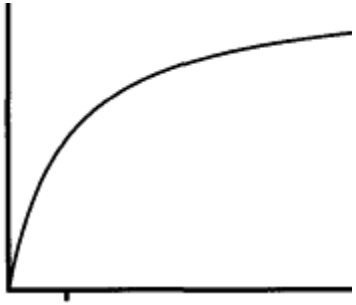
Here, as one variable increases, the other <u>increases at an increasing rate</u>.



(This is not necessarily an exponential increase. It could be a quadratic increase. The two are not the same!)

Increase at an decreasing rate

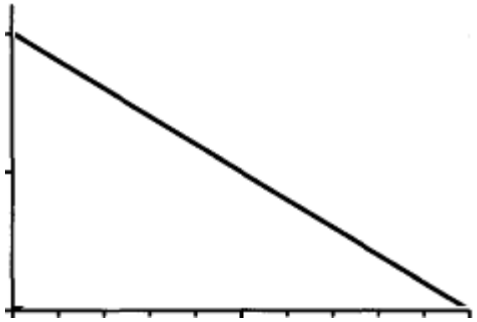
Here, as one variable increases, the other increases at an decreasing rate.



Linear Decrease

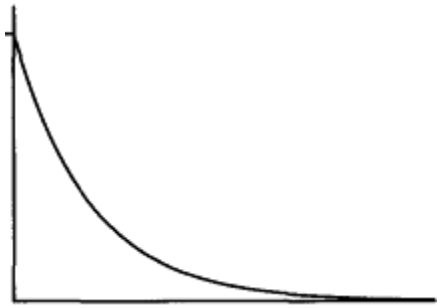
Linear decreases are rare.

If you get this, you've probably made a mistake.



Decrease at an decreasing rate

You are more likely to see this:



As one variable increases, the other <u>decreases at a decreasing rate</u>.

No Relationship

This graph shows NO RELATIONSHIP between the independent and dependent variables.