

## Graphing

A visualization of numerical data

## Graphs

- A graph is a visual way of representing numerical data.
- Most graphs have at least 2 axes, but some may have 3.
- The choice of axes depends on the kind of data
  - x-axis is for the independent variable (the one where we choose what and when to measure)
  - y-axis is for the dependent variable (the one that depends on what is measured)

## Scientific vs. Mathematical graphs

- In math, we are concerned mainly with the shape of the graph, not on any particular point(s) of the graph.
- In science, we are concerned with the representation of real data, so the shape is not as important.

## Scientific graphs

- The scale should be chosen for each axis so that most of the page is used for the graph.
- The scale does not need to be the same for each axis, but should be constant for each axis.
- Each axis should be labeled with the kind of measurement with the relevant units.
- The origin does not need to be represented.

## Scientific Graphs

- The precision in the graph should reflect the precision of the data, again the precision does not need to be the same on each axis.
- Title the graph descriptively
- Depending on the data, either draw a straight line or a smooth curve after plotting the data. The line doesn't have to pass through any of the points.

## Determining the mathematical relationship from a graph

- Find the slope (including units) of the line from two points that are on the line but are not data points.
- The two points should be relatively far apart.
- Find the y-intercept from the graph (including units).

### Determining the mathematical relationship from a graph

- Write the equation:

$$y = mx + b$$

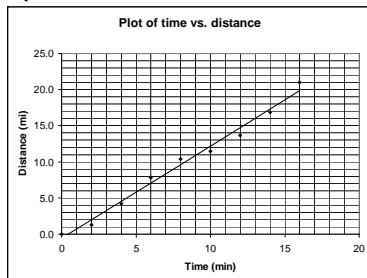
- Substitute for x and y the appropriate quantities, for m the value of the slope, and for b the value of the y-intercept.
- Include units for everything.

### Example: Time and distance data

- I measured the distance from home I traveled and how long it took to get that far.
- I got the following data:

<i>Time (min)</i>	<i>Distance (miles)</i>
0	0.0
2	1.3
4	4.2
6	7.8
8	10.4
10	11.5
12	13.7
14	16.9
16	21.0

### Graph the data



### Equation of the line

- The slope of the line in the graph is 1.28 mi/min.
- The intercept is 0 mi.
- The equation of the line is

$$\text{miles} = 1.28 \left( \frac{\text{mi}}{\text{min}} \right) \times \text{minutes}$$