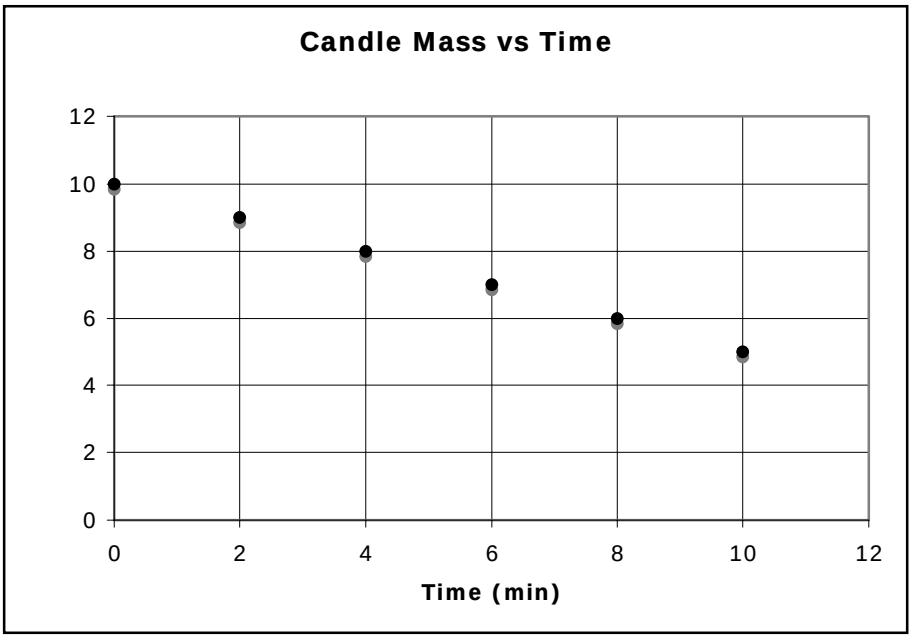
Graphing Concepts

It is assumed that chemistry students already have a good knowledge of graphing but here are some reminders.
The **horizontal axis** is the **x-axis**.
The **vertical axis** is the **y-axis**.

During an experiment 2 variables exist. These are the **independent variable** and the **dependent variable**. The **independent variable** is the one that changes at a steady rate. The **dependent variable** is the one that is being tested for and will change in response to the **independent variable**. On a graph, the independent variable goes on the x-axis (horizontal). The dependent variable goes on the y-axis (vertical). If time is a variable it is usually the independent variable.

Example: Imagine an experiment to measure the mass of a burning birthday candle as time goes by. We will be testing to see the change in mass compared to time. Time changes at a steady rate. Time acts independently and is called the **independent variable**. The mass of the candle changes in response to the time and is called the **dependent variable**.
Sample data:

Time (min)	Mass (g)
0	10
2	9
4	8
6	7
8	6
10	5



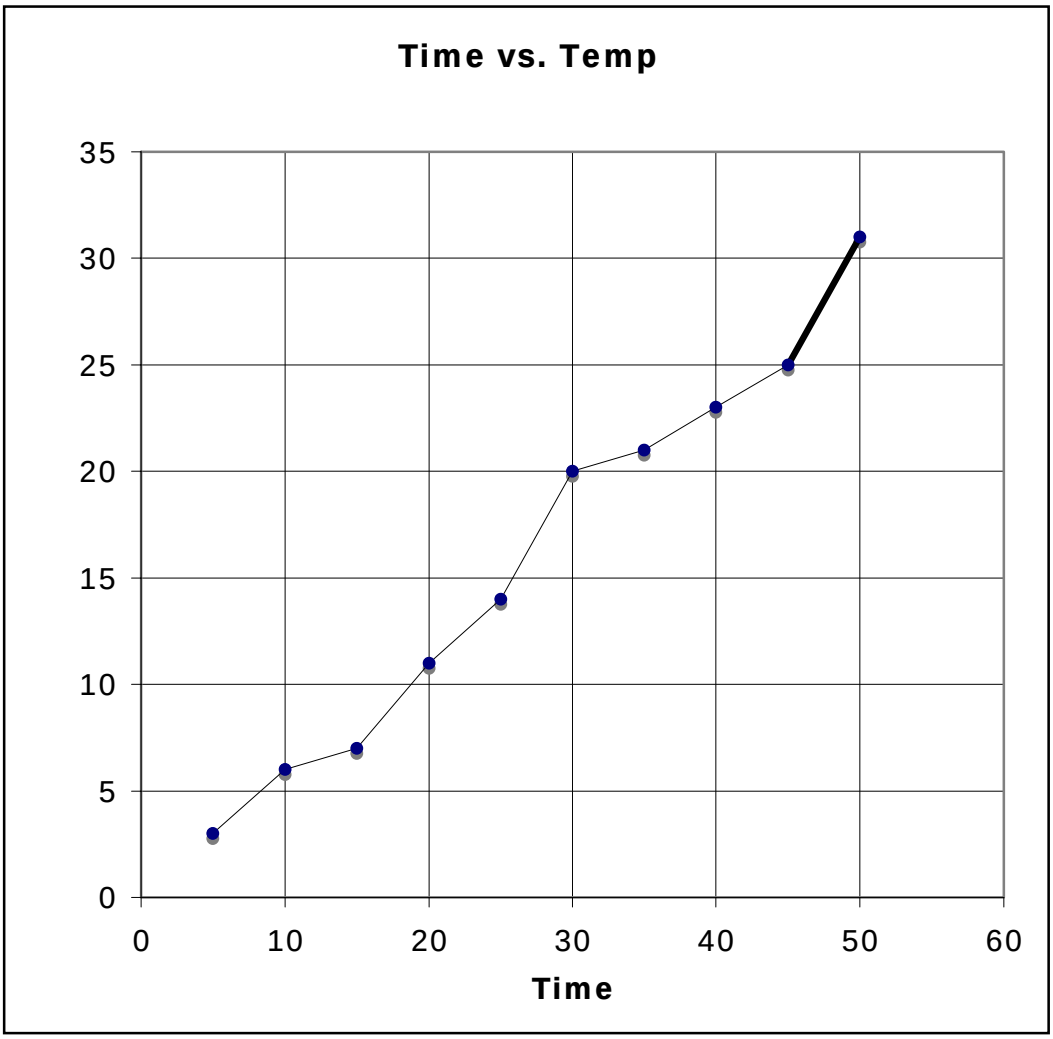
For this example, *time* is the **independent variable**; it is placed on the x-axis.

For this example, *mass* is the **dependent variable**; it placed on the y-axis.

Connect the Points

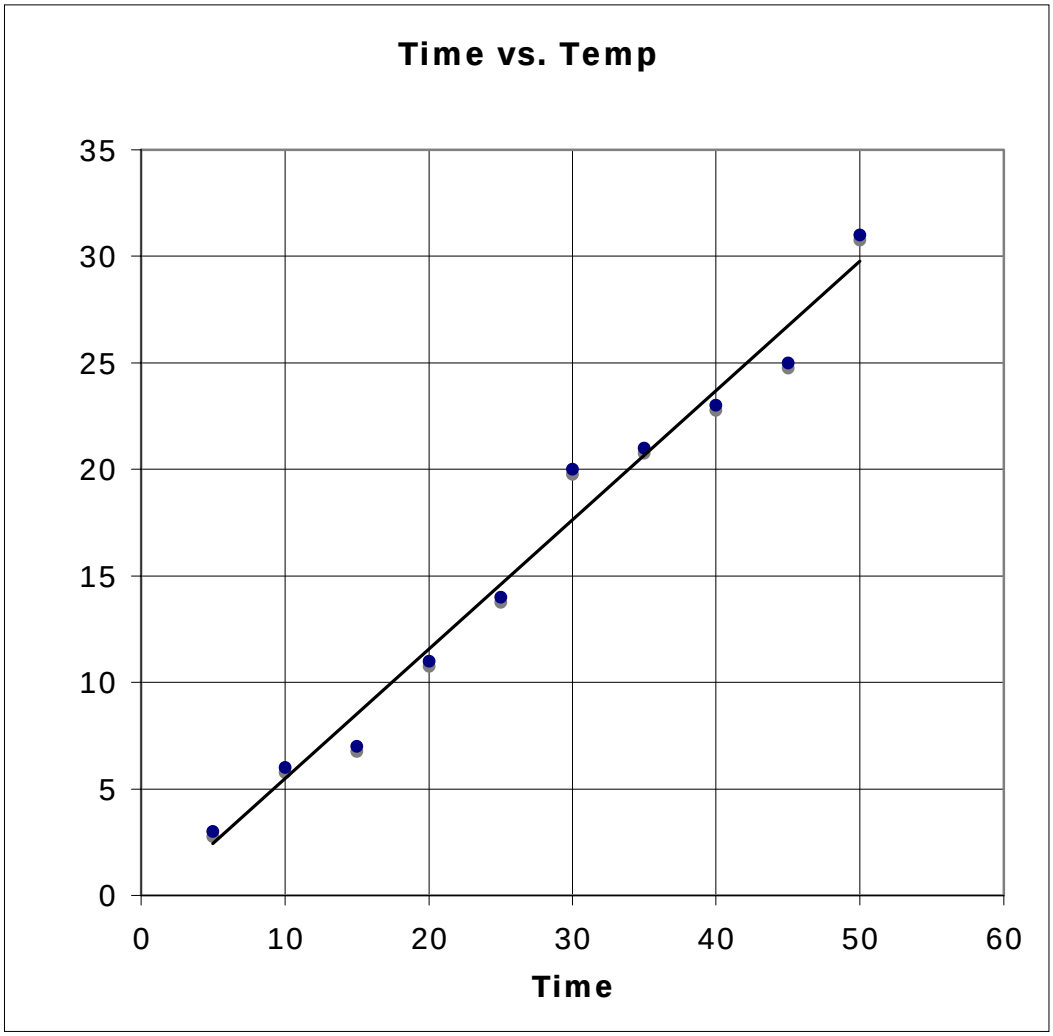
You are probably very familiar with connecting the points on a graph.

Example:



Best-Fit Straight-line

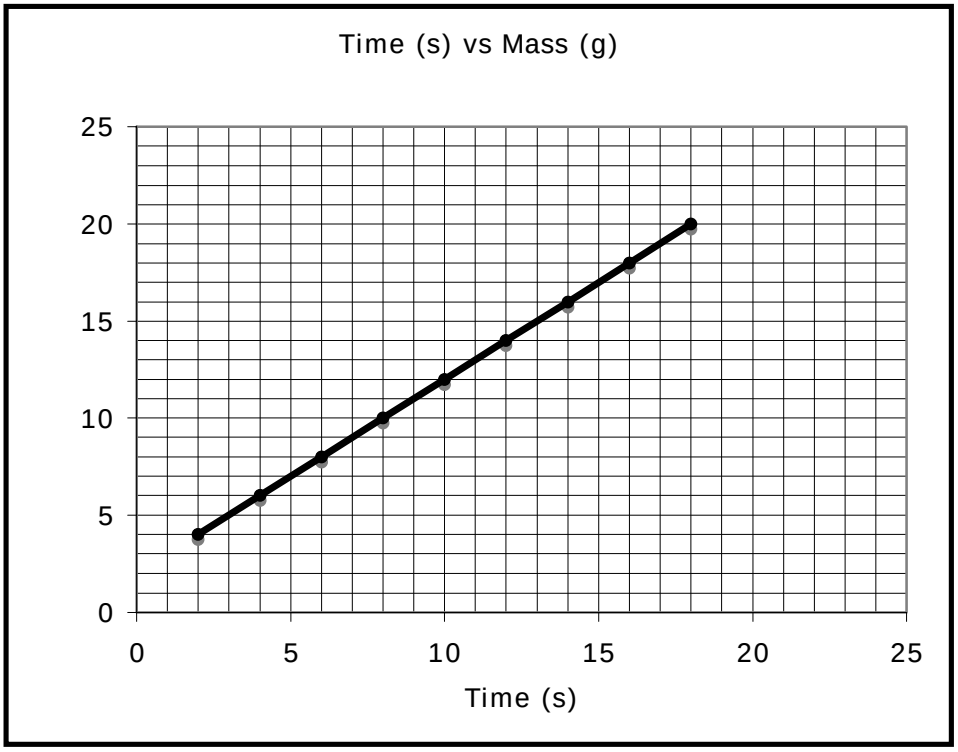
A **best-fit straight-line** is a straight line that passes through the group of data points as closely as possible. It can be considered an average. It may touch some points. It is possible that it wont touch any. Use a ruler and common sense.



Interpolation is the **in**serting of a value **in**-between actual known data points.

Time (s)	Mass (g)
0	
2	4
4	6
6	8
8	10
10	12
12	14
14	16
16	18
18	20
20	

If the above data were collected in an experiment we would believe these data points to be true. If we graphed the data as time vs. mass it would appear as below.



We can use the data table to see that 10 seconds corresponds to a mass of 12 grams. However, there is no collected mass data for 11 seconds. Using the graph, we can interpolate (choose the corresponding point in-between known points). The graph tells us that 11 seconds corresponds to a mass of 14 grams.

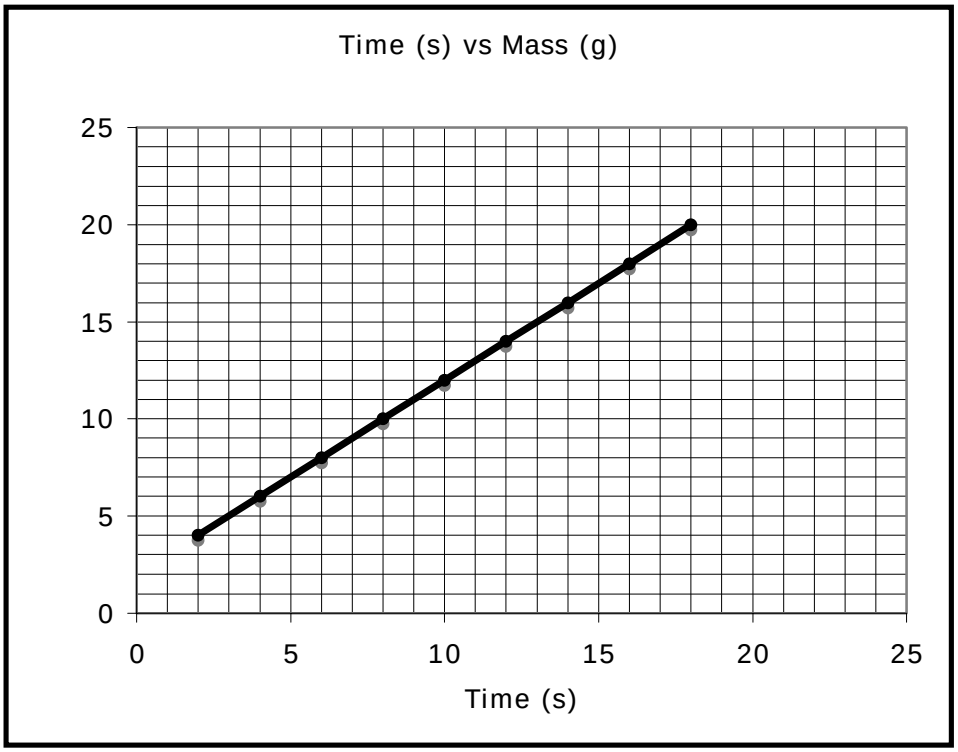
Interpolate to determine the corresponding mass for:

1) 3 seconds 2) 7 seconds 3) 15 seconds 4) 17 seconds

Extrapolation selects data outside a field of collected data points.

Time (s)	Mass (g)
0	
2	4
4	6
6	8
8	10
10	12
12	14
14	16
16	18
18	20
20	

If the above data were collected in an experiment we would believe these data points to be true. If we graphed the data as time vs. mass it would appear as below.



We can use the data table to see that 10 seconds corresponds to a mass of 12 grams. However, there is no collected mass data for 1 second. Using the graph, we can extrapolate (choose the corresponding outside of known points). You may need a ruler to extend the line. The graph tells us that 19 seconds corresponds to a mass of 21 grams.

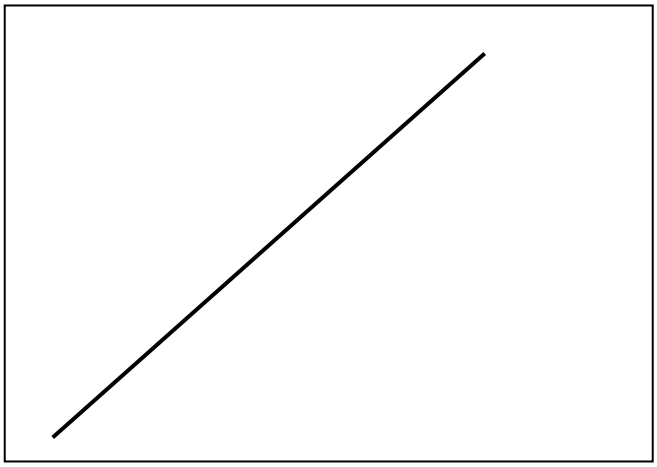
Extrapolate to determine the corresponding mass for:

1) 19 seconds 2) 20 seconds 3) 21 seconds 4) 1 second

Direct Relationship

In a direct relationship both variables increase in value.

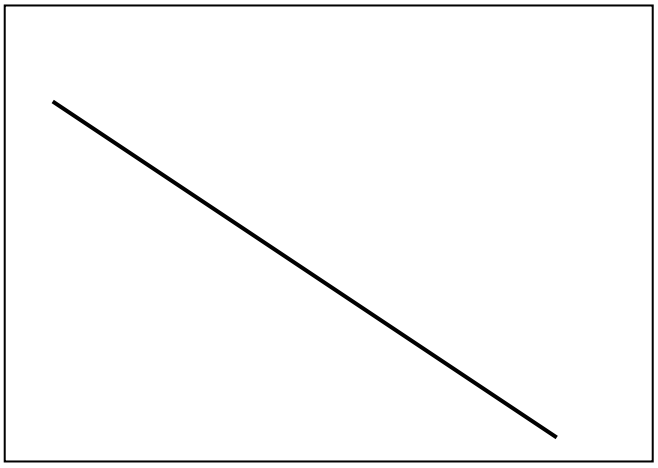
Mass



Time

Inverse Relationship In an inverse relationship one variable decreases as the other one increases.

Mass



Time