# Choosing the right Trendline type for your data

Trendlines are used to predict possible future trends based on the know values of the past. You can choose any one of these six different trend or regression types**: Linear Trendlines**, **Logarithmic Trendlines**, **Polynomial Trendlines**, **Power Trendlines**, **Exponential Trendlines**, or **Moving Average Trendlines**. The type of data you have will help determine the type of trendline to use.

A trendline is most accurate when its *R-squared value (R-squared value: A number from 0 to 1 that reveals how closely the estimated values for the trendline correspond to your actual data. A trendline is most reliable when its R-squared value is at or near 1. Also known as the coefficient of determination.)* is at or near 1. When you fit a trendline to your data, Excel automatically calculates its R-squared value. The R-squared value can be displayed on your chart.

Linear trendlines

A linear trendline is a best-fit straight line that is used with simple linear data sets. Your data is linear if the pattern in its data points resembles a line. A linear trendline usually shows that something is increasing or decreasing at a steady rate.

In the following example, a linear trendline illustrates that refrigerator sales have consistently risen over a 13-year period. Notice that the R-squared value is 0.979, which is a good fit of the line to the data.

Refrigerator Sales chart: $R^2 = 0.979$
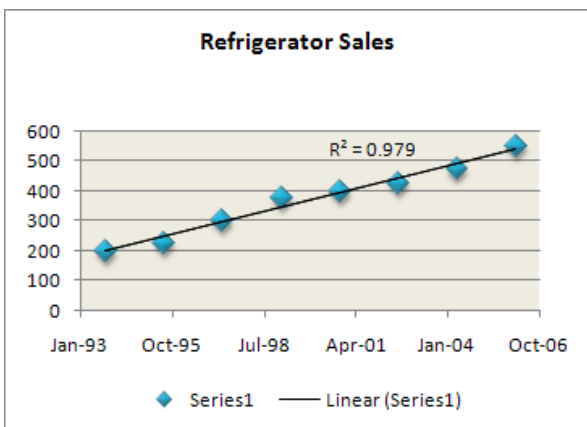
Logarithmic trendlines

A logarithmic trendline is a best-fit curved line that is used when the rate of change in the data increases or decreases quickly and then levels out. A logarithmic trendline can use both negative and positive values.

The following example uses a logarithmic trendline to illustrate predicted population growth of animals in a fixed-space area, where population leveled out as space for the animals decreased. Note that the R-squared value is 0.933, which is a relatively good fit of the line to the data.
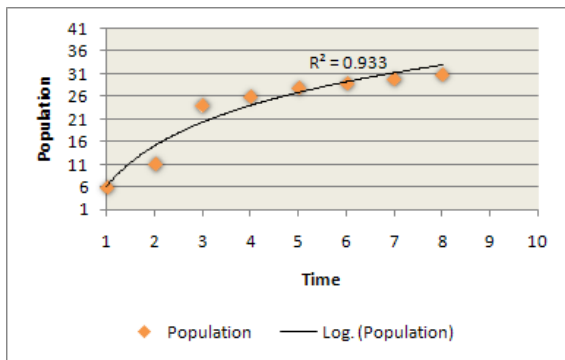
Polynomial trendlines

A polynomial trendline is a curved line that is used when data fluctuates. It is useful, for example, for analyzing gains and losses over a large data set. The order of the polynomial can be determined by the number of fluctuations in the data or by how many bends (hills and valleys) appear in the curve. An Order 2 polynomial trendline generally has only one hill or valley. Order 3 generally has one or two hills or valleys. Order 4 generally has up to three hills or valleys.

The following example shows an Order 2 polynomial trendline (one hill) to illustrate the relationship between driving speed and fuel consumption. Notice that the R-squared value is 0.979, which is a good fit of the line to the data.
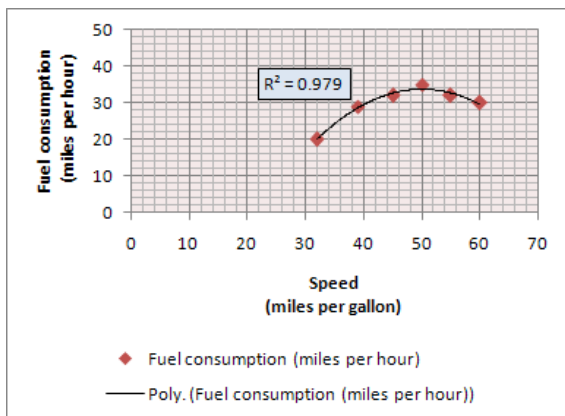
Power trendlines

A power trendline is a curved line that is used with data sets that compare measurements that increase at a specific rate — for example, the acceleration of a race car at 1-second intervals. You cannot create a power trendline if your data contains zero or negative values.

In the following example, acceleration data is shown by plotting distance in meters by seconds. The power trendline clearly demonstrates the increasing acceleration. Note that the R-squared value is 0.986, which is an almost perfect fit of the line to the data.
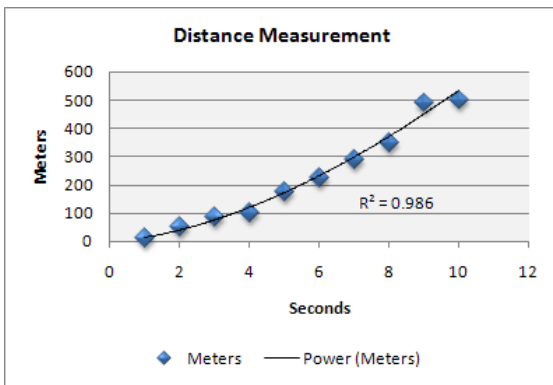
Exponential trendlines

An exponential trendline is a curved line that is used when data values rise or fall at constantly increasing rates. You cannot create an exponential trendline if your data contains zero or negative values.

In the following example, an exponential trendline is used to illustrate the decreasing amount of carbon 14 in an object as it ages. Note that the R-squared value is 0.990, which means that the line fits the data almost perfectly.
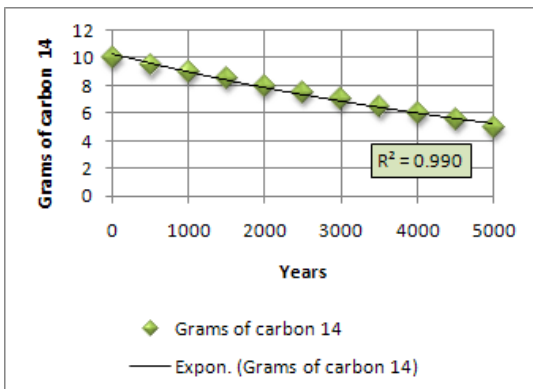
Moving average trendlines

A moving average trendline smooths out fluctuations in data to show a pattern or trend more clearly. A moving average uses a specific number of data points (set by the Period option), averages them, and uses the average value as a point in the line. For example, if Period is set to 2, the average of the first two data points is used as the first point in the moving average trendline. The average of the second and third data points is used as the second point in the trendline, etc..

In the following example, a moving average trendline shows a pattern in number of homes sold over a 26-week period.