

Lesson 1 Create Forecast Worksheets

Analysing trends in Excel is not new – you've been able to guess at future values based on historical data for quite some time. E.g. you can create a linear forecast by using the FORECASTLINEAR() function, which has the syntax FORECASTLINEAR(*x*, *known_ys*, *known_xs*). The *known_xs* argument contains a range independent variables, such as years, and the *known_ys* describe dependent variables, such as package volumes for a specified year. The FORECASTLINEAR function takes those historical values and projects the package volume for future year *x*. If current trends continue.

A quick way to extend a data series is to select the cells that contain your historical data and then drag the fill handle down to extend the series. Excel analyses the pattern of the available values and adds new value based on the analysis.

IMPORTANT

The value used to create your forecast worksheet must be evenly spaced such as every day, every seven days, or the first day of the month or year.

The Standard exponential smoothing function, FORECASTS(), returns the forecasted value for a specific future target date by using an exponential smoothing algorithm. This function has the syntax FORECAST.ETS(*target_date*, *values*, *timeline*, (*seasonality*), (*data_completion*), (*aggregation*)). The arguments used by the function are:

- *target_date(required)*. The date for which you want to predict a value, expressed as either a date/time value or a number. The *target_date* value must come after the last data point in the timeline.
- *values (required)* refers to the historical values, Excel uses to create a forecast.
- *Timeline (required)* Refers to the data or times. Excel uses to establish the order of the values data. The dates in the timeline range must have a consistent step between them, which can't be zero.
- *Seasonality (optional)* A number value indicating the presence, absence or length of a season in the data set. A value of 1 has Excel detect seasonality automatically, 0 indicates no seasonality, and positive whole numbers up to 8,760 (the number of hours in a year) indicate to the algorithm to use pattern of the length as the seasonality period.
- *Data_completion (optional)* FORECAST.ETS0 allows, and can adjust for, up to 30 percent of missing data in a time series. A value of 0 directs the algorithm to account for missing points as zeros, whereas the default value of 1 accounts for missing points by computing them as the average of the neighbouring points.
- *Aggregation(optional)*. This argument tells FORECAST.ETS0 how to aggregate multiple points that have the same time stamp. The default value of 0 directs the algorithm to use

AVERAGE, whereas other options available in the AutoComplete list are SUM, COUNT, COUNTA, MI, MAX and median.

FORECAST.ETS.SEASONALITY() follows exactly the same syntax as *FORECAST.ETS()* but it returns the length of the seasonal period the algorithm detects. As with *FORECAST.ETS()*, the maximum seasonal period is 8,760 units.

You will often use *FORECAST.ETS.SEASONALITY()* and *FORECAST.ETS()* together, or *FORECAST.ETS()* by itself. The output of *FORECAST.ETS.SEASONALITY()* isn't very useful without a forecast.

The final function, *FORECAST.ETS.CONFINT()*, returns a confidence interval for the forecast value at the specified target date. The confidence interval is the value that the actual value will differ from the forecast, plus or minus a certain value that Excel calculates, a specified percentage of the time. The function has the following syntax: *FORECAST.ETS.CONFINT(target_date, values, timeline, [confidence_level], [seasonality], [data_completion], [aggregation])*.



Tip

Smaller *confidence_level* values allow for smaller confidence intervals because the actual result doesn't have to be within the confidence interval as often. Larger *confidence_level* values require a larger interval to account for the greater probability of unlikely results.

The new argument, *confidence_level*, is an optional argument that lets you specify how certain you want the estimate to be. E.g., a *confidence_level* value of 80 percent would require the actual value to be within the confidence interval (plus or minus a certain value that Excel calculates) 80 percent of the time.



Tip

The default *confidence_level* value is 95 percent.

Excel includes a new capability to create a Forecast Worksheet, which uses the *FORECAST.ETS* function to create a line or column chart showing a forecast when given historical data. The forecast Worksheet provides a striking visual summary of the exponential smoothing forecast. In addition to creating the forecast, you can control the start date, set seasonality and determine how to handle missing or duplicate values.



Forecast Worksheets show projections for future values

To create a linear by using a formula

1. Create a list of data that contains pairs of independent variables (known_xs) and dependent variables (known_ys).
2. In a separate cell, enter a future value of x.
3. In another cell, create a formula that follows the syntax **FORECAST.LINEAR(x, known_ys, Known_xs)**.
4. Press the **Enter** key.

To create a simple forecast by using the fill handle.

1. Select the cells that contain the historical data.
2. Drag the fill handle down the number of cells that represents the number of periods by which you want to extend the trend.

To create a Forecast Worksheet

1. Click any cell in a Excel table that contains a column with date or time data and another column with numerical results.
2. On the **Data** tab of the ribbon, in the **Forecast** group, click the **Forecast Sheet** button.
3. In the upper-right corner of the Create Forecast Worksheet dialog box, do one of the following:
 - . Click the **Create a line** chart button to create a line chart.
 - . Click the **Create a column** chart button to create a column chart.
4. Click the **Forecast End** calendar to specify an end for the forecast.
5. Click **Create**.

To create a Forecast Worksheet with advanced options

1. Click any cell in an *Excel* table that contains a column with date or time data and another column with numerical results.
2. Click **Forecast Sheet**.
3. Identify the chart type and forecast end, and then click **Options**.



Set advanced options and manage data used to create a Forecast Worksheet

4. Using the tools in the **Option** area of the **Create Forecast Worksheet** dialog box do any of the following:
 - . Identify the cell range that contains the timeline values.
 - . Identify the cell range that contains the numerical values.
 - . Set a new forecast start date.
 - . Change the confidence interval.
 - . Select a method for filling in missing values.
 - . Select a method for aggregating multiple values for the same time period.
5. Click **Create**.

To calculate a forecast value by using exponential smoothing

1. Create a list of data that contains pairs of independent variables (timeline) and dependent variables (values).
2. In a separate cell, enter a future date (*target _ date*).
3. In another cell, create a formula that follows the syntax
`FORECAST(target _ date, values, timeline, [seasonality], [data _ completion], [aggregation])`
4. Press **Enter**.

To calculate the confidence interval for a forecast by using exponential smoothing

1. Create a list of data that contains pairs of independent variables (timeline) and dependent variables (*values*).
2. In a separate cell, enter a future date (*target _ date*).
3. In another cell, create a formula that follows this syntax:
`FORECAST.ETS(target_date, values, timeline, [seasonality], [data_completion], [aggregation])`
4. Press **Enter**.

To calculate the length of a seasonally repetitive pattern in time series data.

1. Create a list of data that contains pairs of independent variables (timeline) and dependent variables (*values*).
2. In a separate cell, enter a future date (*target _ date*).
3. In another cell, create a formula that follows syntax:
`FORECAST.ETS.SEASONALITY(target_date, values, timeline, [seasonality], [data_completion], [aggregation])`

Questions

1. Explain what the following terms mean:

target _ date

values

timeline

seasonality

data _ completion

aggregation

2 How do create a Forecast Worksheet?