

Formulas Excel 2003

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Educational Technology Center, Davis School District

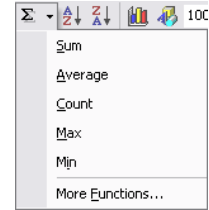
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Formulas

- Formulas are a powerful feature of Excel.
- Formulas available in Excel are grouped into the following categories:
 - **Financial** – Includes formulas for calculating depreciation, interest, return on an investment, loan payment, and mortgage.
 - **Date & Time** – Includes formulas for calculating the number of days between two dates, the current date, and day of the week for a given date.
 - **Math & Trig** – Includes formulas for calculating trigonometric functions, logs, random numbers, Roman numerals, rounding and truncating.
 - **Statistical** – Includes formulas for calculating averages, frequency, percentile, quartile, and standard deviation.
 - **Lookup & Reference** – Includes formulas for doing a horizontal or vertical lookup, a hyperlink, or getting data from a Pivot Table.
 - **Database** – Includes formulas for mathematical and statistical calculations on fields of a database.
 - **Text** – Includes formulas for combining text from various cells with the concatenate formula, converting text to upper case, lower case, or proper case, and trimming extra spaces from text.
 - **Logical** – Includes the logical operators of **And, True, False, If, Not, and Or**.
 - **Information** – Includes formulas which return a true or a false response in determining if a cell is blank, or if the content of the cell is a number or text.

Entering Simple Formulas

- Click in the cell where the formula is to be.
- On the **Standard Toolbar**, click on the down arrow by the **Sum** button.
- Choose the appropriate function.
 - **Sum** - Add the list of numbers.
 - **Average** - Find the mean of the list of numbers.
 - **Count** - Count the number of cells with numbers.
 - **Max** - Find the maximum (largest) number in the list.
 - **Min** - Find the minimum (smallest) number in the list.
- Click and drag to highlight the desired cells for the formula.
- Press the **Enter** key.



Order of Operations

- To be sure to get the desired results, use the proper order of operations.
- A mnemonic to remember the order is: **Please Excuse My Dear Aunt Sally**.
 1. **Please** (Parenthesis) - Things contained in parenthesis.
 2. **Excuse** (Exponents) - Exponential calculations.
 3. **My** (Multiplication) **Dear** (Division) - Multiplication or division. (A combination of these reads from left to right.)
 4. **Aunt** (Addition) **Sally** (Subtraction) - Addition or subtraction. (A combination of these reads from left to right.)

Writing a Formula

- Click in the cell where the formula should go.
- Type an equals sign (=).
- Select cells to be included by clicking and dragging.
- Enter the proper operations
 - Addition (+)
 - Subtraction (-)
 - Multiplication (*)
 - Division (/)
 - Exponentiation (^)
- Press the **Enter** key.

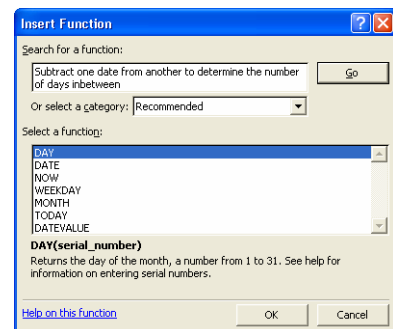
Entering More Complex Formulas

- Click in the cell the function is to be placed in.
- On the **Menu Bar**, click on **Insert** → **Function**
- OR click on the **Insert function** button on the **Input Line**.



Finding the Right Function

- Enter a description of what the desired function should do in the **Search for a function:** box.
- Click on the **Go** button.
- Click to select the function from the list in the **Select a function:** box.
- Notice the description below the box.
- Choose a different function if the selected one is not appropriate.
- Click on **OK**.

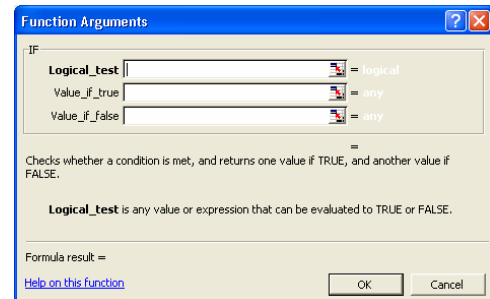


Working with the Function

- When selecting a range for the function:
 - Click on the button with the red dot in the first box.
 - Click and drag to select the cells to be included in the function.
 - Press the **Enter** key.
- If more cells need to be selected, use the next box.
- Notice the result of the function shown at the bottom of the window. If it is not correct, make changes.
- Click on **OK**.
- The **IF** formula below is an example.

IF Formula

- Click in the cell the formula is to be in.
- On the **Menu Bar**, click on **Insert → Function...**
- OR click on the **Insert function** button on the **Input Line**.
- Click on **IF** in the **Select a function** box.
- When **IF** is not in the **Select a function** box:
 - Click on the down arrow to **Select a category**.
 - Choose **All**.
 - Scroll through the **Select a function** box and choose **IF**.
- Click on **OK**.
- **Logical Test**
 - The test is the condition that must be met. The computer measures whether it is true or false.
 - The contents of a cell(s) can be examined.
 - If the cell is empty or contains a 0, a result of false is given. If the cell contains a number other than 0, true.
 - Another example, “Is the total in cell D5 larger than 32?” would be entered as **D5>32**.
 - To choose a particular cell, click on the red dot at the end of the box, click on the desired cell, then press the **Enter** key.
- **Value if true**
 - The contents of the cell appears when the results of the logical test is true.
 - Text must be enclosed in double quotes. For example, “**Number is too large**”.
 - To have the contents of another cell appear, click on the red dot at the end of the box, click on the desired cell, then press the **Enter** key.
- **Value if false**
 - The contents of the cell appears when the results of the logical test is false.
 - Text must be enclosed in double quotes. For example, “**Number is too small**”.
 - To have the contents of another cell appear, click on the red dot at the end of the box, click on the desired cell, then press the **Enter** key.
- Click on **OK**.



Nested IF Statements

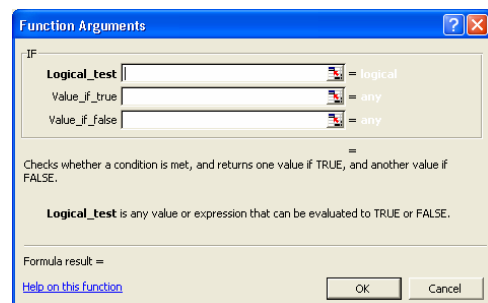
- A **Nested IF Statement** is when an IF statement is included as a value in another IF statement or other function. For example, if the cell should remain empty until the student has entered a response, use the Nested IF Statement.
- Create the regular IF statement.
- Decide whether the Nested If Statement should be in the value_if_true portion or the value_if_false portion.
- For the example above, the Nested IF Statement should be in the value_if_false portion.
- Click in the desired value area.
- Enter **IF**(.
- In the example above, click on the cell where the student is entering the information. The result of the logical test is **true** if the student has entered a number other than zero and **false** if they have not.
- Enter a comma and then the message surrounded by double quotation marks. (i.e. **“Try Again”**)
- Enter a comma and then a set of double quotations with nothing in the middle. (i.e. **“”**)
- Enter a closing parenthesis,).
- Press the **Enter** key to finish the formula.

Using IS Functions in the IF Formula

- The **IS** functions help in creating effective **IF** formulas.
- An **IS** function returns either **True** or **False**. This makes them very useable in the logical test of an **IF** formula.
- Some of the **IS** functions are:
 - **ISBLANK** – Returns **True** if the cell referred to is blank. Returns **False** is the cell if not blank.
 - **ISERROR** – Returns **True** if the cell referred to has errors. Returns **False** if the cell does not have errors.
 - **ISNONTEXT** – Returns **True** if the cell referred to does not have text in it. Blank cells do not have text. Returns **False** if the cell contains only numbers.
 - **ISNUMBER** – Returns **True** if the cell referred to is a number. Returns **False** if the cell is not a number.
 - **ISTEXT** - Returns **True** if the cell referred to text. Returns **False** is the cell is not text.

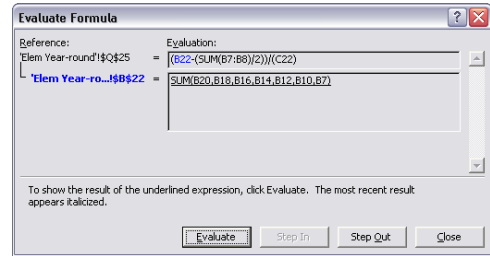
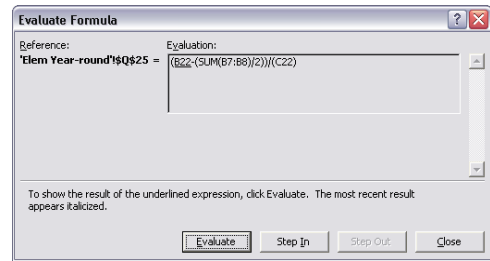
Using IS Functions in an IF Formula

- Click in the cell the formula is to be in.
- On the **Menu Bar**, click on **Insert** → **Function...**
- OR click on the **Insert function** button on the **Input Line**.
- Click on **IF** in the **Select a function** box.
- If **IF** is not in the **Select a function** box:
 - Click on the down arrow to **Select a category**.
 - Choose **All**.
 - Scroll through the **Select a function** box and choose **IF**.
- Click on **OK**.
- **Logical Test**
 - The test is the condition that must be met. The computer measures whether it is true or false.
 - Enter the **IS** function to be used.
 - Type (, click on the cell(s) to refer to, and then type).
 - For example, **ISBLANK(C16)** would test to see if cell C16 is blank.
- Enter the desired information in the **Value_if_true** box and the **Value_if_false** box.
- Click on **OK**.



Evaluating a Formula

- Evaluating a formula allows the user to examine the formula one step at a time, seeing the results of the formula at each step.
- Click in the cell containing the formula to be evaluated.
- On the **Menu Bar**, click on **Tools** → **Formula Auditing** → **Evaluate Formula**.
- In the **Evaluation** windows, the first portion of the formula is underlined.
- To evaluate or come up with the answer to the underlined portion of the formula, click on the **Evaluate** button. The results of the evaluation is shown in italics.
- To see the details of the next step of the formula, click on the **Step In** button.
- To come back out, click on the **Step Out** button.
- Continue clicking on the **Evaluate** button to work through the formula step by step.
- Each time the **Evaluate** button is clicked, the next calculation is performed and the resulting number replaces the formula in the **Evaluation** window.



Circular Reference

- **Circular Reference** refers to the mistake of including the cell where the formula is located in the cells used for the calculation. i.e. when the formula in cell E10 calculates the sum of cells E4 through E10.
- When a formula is created that has the **Circular Reference** error, the **Circular Reference** toolbar is displayed and the **Help** window opens on the right.
- The **Circular Reference** toolbar is only available when there is a formula with a circular reference.
- To view the **Circular Reference** toolbar, on the **Menu Bar**, click on **View** → **Toolbars** → **Circular Reference**.



Finding the Circular Reference Problem

- On the **Circular Reference** toolbar, click on the down arrow of the **Navigate Circular Reference** box and choose the cell name in the list.

Circular Reference Toolbar		
Name	Icon	Description
Navigate Circular Reference		Click on the down arrow of the Navigate Circular Reference box and click on the cell with the circular reference error.
Trace Dependents		Click on Trace Dependents to draw arrows from the selected cell to the cell with the formula that uses it.
Trace Precedents		Click on Trace Precedents to draw a box around the cells that are used in calculating the value for the selected cell. An arrow is drawn from a cell in the clock to the cell with the formula.
Remove All Arrows		Click to remove all arrows or boxes created with the Trace Dependents button or the Trace Precedents button.

Tracing Dependent Cells

- Tracing Dependent cells allows the user to find which cells use the selected cell in their formulas.
- Click in the cell in question.
- On the **Menu Bar**, click on **Tools → Formula Auditing → Trace Dependents**.
- Arrows are displayed from the selected cell to all cells which use it in their formulas.

Tracing Precedent Cells

- Tracing Precedent cells allows the user to find which cells are used in a formula.
- Click in the cell with the formula to be analyzed.
- On the **Menu Bar**, click on **Tools → Formula Auditing → Trace Precedents**.
- A box is drawn around the cells used in the formula and an arrow is displayed from the box to the cell with the formula.

Removing Arrows

- Tracing draws arrows and boxes on the spreadsheet.
- On the **Menu Bar**, click on **Tools → Formula Auditing → Remove All Arrows**.

Formula Auditing Mode

- Formula Auditing Mode displays the formula in each cell that has a formula and allows for the tracing and evaluating the spreadsheet. The cells will be enlarged to help display the formulas.
- On the **Menu Bar**, click on **Tools → Formula Auditing → Formula Auditing Mode**.

Error Checking

- Click on a cell with a formula to see the cells used for the calculation.
- On the **Formula Auditing** toolbar, click on **Trace Precedents** button to display the arrow showing the direction from the cells used in the formula to the cell with the formula.
- On the **Formula Auditing** toolbar, click on **Remove Precedent Arrows** button to remove the arrow showing the direction from the cells used in the formula to the cell with the formula.

Tracing Precedents













- Click on a cell with a formula to see the cells used for the calculation.
- On the **Formula Auditing** toolbar, click on **Trace Precedents** button to display the arrow showing the direction from the cells used in the formula to the cell with the formula.
- On the **Formula Auditing** toolbar, click on **Remove Precedent Arrows** button to remove the arrow showing the direction from the cells used in the formula to the cell with the formula.

Tracing Descendents

- Click in a cell with numbers used in a formula.
- On the **Formula Auditing** toolbar, click on **Trace Descendents** button to display the arrow pointing to the cell(s) where formulas refer to the cell.
- On the **Formula Auditing** toolbar, click on **Remove Descendents Arrows** button to remove the arrow(s) showing the cells where a formula(s) to the cell.

Turning Off Formula Auditing Mode

- On the **Menu Bar**, click on **Tools → Formula Auditing → Formula Auditing Mode**.

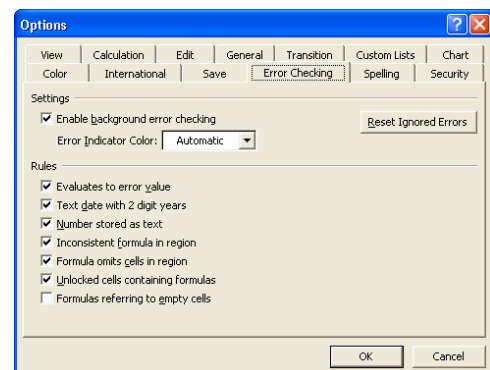
Formula Auditing Mode		
Name	Icon	Description
Error Checking		Click on Error Checking to check the worksheet for errors.
Trace Precedents		Click on Trace Precedents to draw a box around the cells that are used in calculating the value for the selected cell. An arrow is drawn from a cell in the clock to the cell with the formula.
Remove Precedent Arrows		Click on Remove Precedent Arrows to remove arrows drawn with the Trace Precedents button.
Trace Dependents		Click on Trace Dependents to draw arrows from the selected cell to the cell with the formula that uses it.
Remove Dependent Arrows		Click on Remove Dependent Arrows to remove arrows drawn with the Trace Dependents button.
Remove All Arrows		Click to remove all arrows or boxes created with the Trace Dependents button or the Trace Precedents button.
Trace Error		Click on the Trace Error button to find the error in the selected cell.
New Comment		Click on New Comment to place a new comment on the selected cell.
Circle Invalid Data		Click on Circle Invalid Data to display cells with invalid data with red circles around them.
Clear Validation Circles		Click on Clear Validation Circles to remove the red circles from the cells with invalid data.
Show Watch Window		Click on Show Watch Window to display the Watch Window .
Evaluate Formula		Click on Evaluate Formula to evaluate the formula of the selected cell.

Types of Errors

- The types of errors displayed in Excel include:
 - #### - The column is too narrow to display the contents.
 - #VALUE! – The wrong type of argument or operand (operation such as multiplication) was used.
 - #DIV/0! – A number is being divided by zero (0).
 - #NAME? – Excel does not recognize the text in the formula.
 - #N/A – A value is not available to the formula.
 - #REF! – A cell reference is not valid.
 - #NUM! – Invalid numeric values are in the formula.
- Further explanation can be found in **Help** in **Excel**.

Error Checking Options

- On the **Menu Bar**, click on **Tools** → **Options....**
- Click on the **Error Checking** tab.
- In the **Rules** section, click to select or unselect the desired rules for the error checking.
- Click on **OK**.



The Watch Window

- The **Watch Window** toolbar allows the contents of selected cells to be monitored.
- On the **Menu Bar**, click on **View → Toolbars → Watch Window**.
- **Adding a Watch**
 - Click in the spreadsheet on the cell to be watched.
 - Click on the **Add Watch...** button in the **Watch Window**.
- **Deleting a Watch**
 - Click on the watch to be deleted.
 - Click on the **Delete Watch** button in the **Watch Window**.
- Cells can be watched in any spreadsheet that is open.

