Excel includes an IF function that makes decisions based on information that is stored in a spreadsheet. The IF function can make a comparison and if the comparison returns true, a value can be displayed in the cell; if the comparison returns false, another value can be displayed.

The IF function has three arguments and takes the following form:

\[ \text{=IF(<comparison>, <value if true>, <value if false>)} \]

For example, the formula =IF(A5>B5, 5, 10) displays a 5 if the value in A5 is greater than the value in B5. If the value in A5 is less than or equal to the value in B5, 10 is displayed.

The comparison argument of the IF function can contain one of the following relational operators, which are used to compare two values:

- = Equal to
- < Less than
- > Greater than
- <= Less than or equal to
- >= Greater than or equal to
- <> Not equal to

The arguments of an IF function can contain values, cell references, or calculations as shown in the following formulas:

\[ \begin{align*}
\text{=IF(A1<=10, 50, 100)} \\
\text{=IF(A2<J25, 0, C3*15\%)} \\
\text{=IF(D10>SUM(A2:A7), B11, B14)} \\
\text{=IF(E20<>G20, 0, SUM(A1:A10))}
\end{align*} \]

Let’s use the following spreadsheet to illustrate how an IF function can be used to make a calculation. In this example, we need to determine how much tax needs to be deducted from each person’s salary. If employees earn less than $30,000, 6% needs to be deducted from their salary. If employees earn $30,000 or more, 8% needs to be deducted from their salary.
The formula in cell C8 checks if the value stored in cell B8 is less than 30000. If this is true, the deduction is calculated by taking the value in B8 and multiplying it by the value in cell B4 (i.e. 6%). If the value is not less than 30000, the deduction is calculated by taking the value in B8 and multiplying it by the value in cell B5 (i.e. 8%). The values in column D are calculated by simply taking the values in column C and deducting it from the values in column B.

**USING TEXT IN THE IF FUNCTION**

The IF function can also be used to display text when certain criteria are met. In the following spreadsheet, for example, a company wants to track their inventory and display the words “REORDER” if the amount of inventory is less than 20, and display nothing if the amount of inventory is greater than or equal to 20.

To check to see if a cell’s contents are empty, two quotation marks (""") can be used. For example, =IF(B20="", "YES", "NO") displays YES if the cell contents are empty and NO if there is data in the cell. Two quotation marks can also be used to display nothing in a cell (as we did in the above example).

Text can also be used in the comparison part of the IF function. When compared, the alphabetical order of the text is determined. For example, the following formula displays TRUE because apple comes before orange alphabetically:

=IF("Apple"<"Orange", "TRUE", "FALSE")
THE COUNTIF FUNCTION

The **COUNTIF** function is used to count the number of times specific data is found in a selected group of cells. The **IF** portion of the function determines what data meets the specified criteria. The **COUNT** part does the counting.

The syntax for the COUNTIF function is:

\[
=\text{COUNTIF}(\text{range}, \text{criteria})
\]

- **range** is the group of cells where the data will be searched.
- **criteria** is the value that will be compared against the data in the range of cells. If a match is found then the cell in the range is counted. Actual data or the cell reference to the data can be entered for this argument.

If we continue with the above example, the formula \(=\text{COUNTIF(C4:C8, "REORDER")}\) will determine how many cells in the range C4 to C8 contain the text “REORDER”. So if we were to enter this formula in cell C9, the value 3 would be displayed indicating that three different hockey sticks need to be reordered.

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THE RANK FUNCTION

The **RANK** function ranks the size of a number compared to other numbers in a list of data. The syntax for the RANK function is:

\[
=\text{RANK}(\text{number}, \text{ref}, \text{order})
\]

- **number** is the cell reference of the number to be ranked.
- **ref** is the range of cells to use in ranking the ‘number’.
- **order** determines whether the number is ranked in ascending or descending order. ‘0’ ranks in descending order (largest to smallest). ‘1’ ranks in ascending order (smallest to largest).
In the following example, I have a list of 10 marks ranging between 30 and 100:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MARK</td>
</tr>
<tr>
<td>1</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>98</td>
</tr>
<tr>
<td>3</td>
<td>86</td>
</tr>
<tr>
<td>4</td>
<td>87</td>
</tr>
<tr>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>96</td>
</tr>
<tr>
<td>7</td>
<td>96</td>
</tr>
<tr>
<td>8</td>
<td>74</td>
</tr>
<tr>
<td>9</td>
<td>39</td>
</tr>
<tr>
<td>10</td>
<td>66</td>
</tr>
</tbody>
</table>

In order to rank the marks from highest to lowest, I would enter the following formula in cell B2:

= RANK(A2, $A$2:$A$11, 0)

To apply the formula to the remaining cells (i.e. B2 to B11), you would just simply use the auto fill feature to get the following result: