MS Office 2010 (MS Word 2010 & MS Excel 2010)

Lesson 05 :Working with Functions and Formulas

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Lesson Objectives

- Formulas & Function
- Entering Formulas into Worksheets
- Elements of Formulas
- Functions
- Insert Function
- Autosum
- Autofill
- Cell Reference
- Names in Formulas
- Functions by Category
- IF Function
- Lookup Functions

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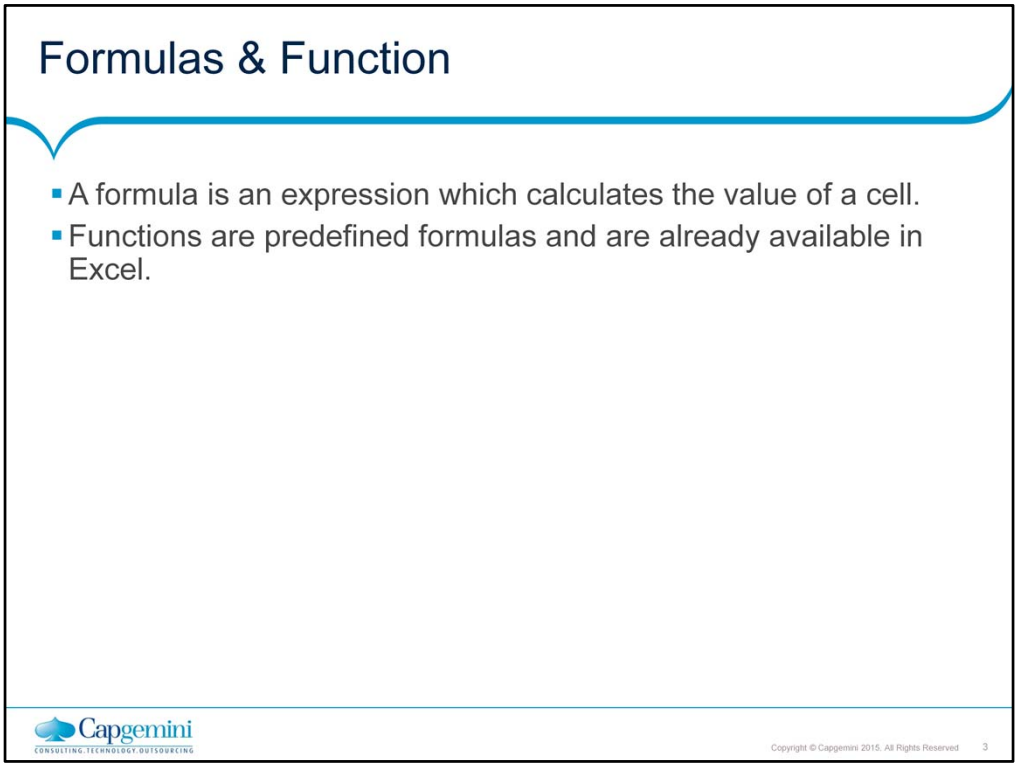

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Entering Formulas into Worksheets

- Entering formulas manually :
  - In a selected cell, you simply type an equal sign (=) followed by the formula.
  - As you type, the characters appear in the cell and in the Formula bar.

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Elements of Formulas

- A formula can consist of any of these elements:
  - Mathematical operators, such as +(for addition) and *(for multiplication)
    - Example:
  - =A1+A2 Adds the values in cells A1 and A2.
  - Values or text
    - Example:
  - =200*0.5 Multiplies 200 times 0.15. This formula uses only values, and it always returns the same result as 100.
  - Cell references (including named cells and ranges)
    - Example:
  - =A1=C12 Compares cell A1 with cell C12. If the cells are identical, the formula returns TRUE; otherwise, it returns FALSE.

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Functions

- Built-in Excel Functions can be a faster way of doing mathematical operations than formulas.
- Example- if you wanted to add the values of cells D1 through D10, you could type the formula "=D1+D2+D3+D4+D5+D6+D7+D8+D9+D10".
- A shorter way would be to use the SUM function and simply type "=SUM(D1:D10)".

Function	Example	Description
SUM	=SUM(A1:A100)	finds the sum of cells A1 through A100
AVERAGE	=AVERAGE(B1:B10)	finds the average of cells B1 through B10
MAX	=MAX(C1:C100)	returns the highest number from cells C1 through C100
MIN	=MIN(D1:D100)	returns the lowest number from cells D1 through D100
SQRT	=SQRT(D10)	finds the square root of the value in cell D10
COUNT	=COUNT(A1:A6)	Count the number of cells in the range that contain numbers

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Insert Function

- Excel has hundreds of prewritten formulas which make it easy to do complex procedures with numbers, dates, times, text, and more.
- To insert a function, execute the following steps:
  - Click the Insert Function button on the formula bar.
  - The Insert Function dialog box opens
  - In the Search for a function box, type a description of what you want to do.

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Autosum

- The AutoSum button, which resembles the Greek letter Sigma (shown above), automatically creates a SUM( ) function.
- When you click the AutoSum button Excel creates a sum function for the column of numbers directly above or the row of numbers to the left.
- Excel pastes the SUM( ) function and the range to sum into the formula bar.

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Auto filling Functions

- Autofill can also be used to copy functions.
- In the example below, column A and column B each contain lists of numbers and column C contains the sums of columns A and B for each row.
- The function in cell C2 would be "=SUM(A2:B2)".
- This function can then be copied to the remaining cells of column C by activating cell C2 and dragging the handle down to fill in the remaining cells.
- The autofill feature will automatically update the row numbers as shown below if the cells are reference relatively.

C2 =SUM(A2:B2)

	A	B	C	D
1	number 1	number 2	sum	
2	87	49	136	
3	54	30		
4	34	10		
5	42	9		
6	24	23		
7	59	30		
8				

C7 =SUM(A7:B7)

	A	B	C	D
1	number 1	number 2	sum	
2	87	49	136	
3	54	30	84	
4	34	10	44	
5	42	9	51	
6	24	23	47	
7	39	57	96	
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Cell Reference

- There are two basic types of cell references in Excel: relative and absolute.
- The difference between absolute and relative cell references becomes apparent when you copy formulas from one cell to another.
- When you copy a formula containing relative references, the references are adjusted to reflect the new location.
- Absolute references always refer to the same cell, regardless of where the formula is copied.
- Relative references are the default.
- To create an absolute reference, type $ before each part of the cell address.

Cell Entry	Type of Referencing and Result
C1	Relative Both the row and column will change when copied to another location.
$C1	Mixed The column will not change when copied to another location, but the row will.
C$1	Mixed The row will not change when copied to another location, but the column will.
C1	Absolute The column and row will not change when copied to another location.

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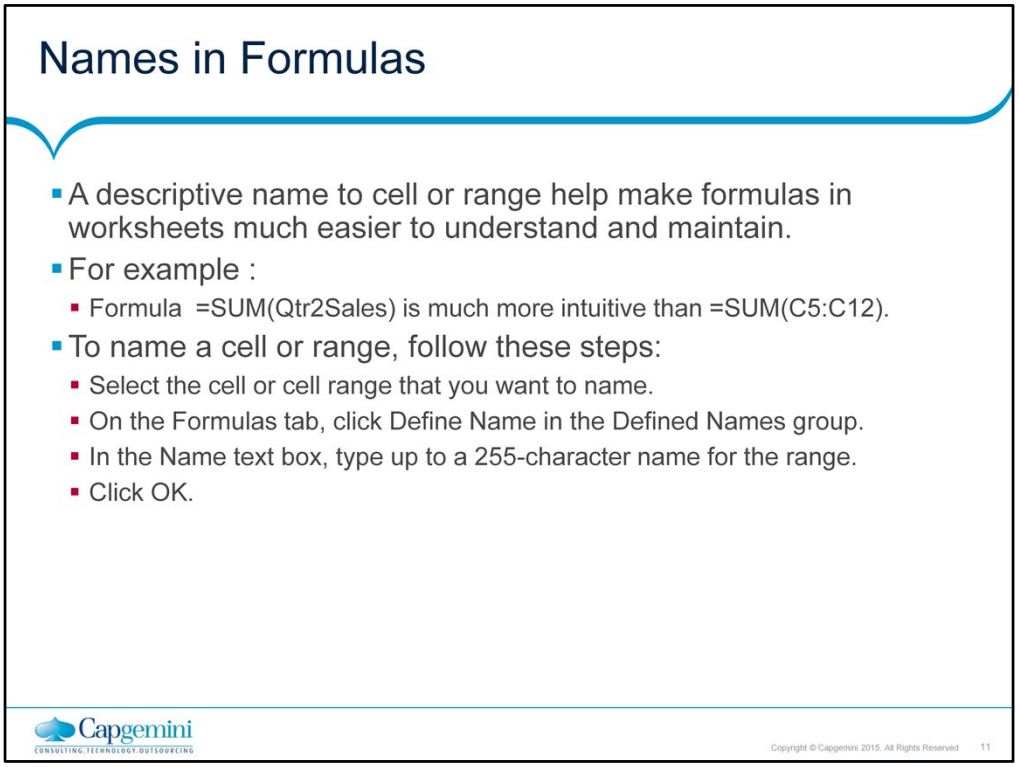

Note :

- **Using a named range**

To use a named cell or range, click the down arrow in the Name box at the left end of the Formula bar. Select the range name you want to access, and Excel highlights the named cells.

We can insert range names into formulas just like they were normal cell references.

- **Name Manager**

To edit and delete defined names, execute the following steps.

1. On the Formulas tab, click Name Manager.
2. For example, select TaxRate and click Edit.

Functions by category

- Text Functions
  - UPPER: Converts all characters in a supplied text string to lower case
  - UPPER: Converts all characters in a supplied text string to upper case
  - TRIM: Removes duplicate spaces, and spaces at the start and end of a text string
  - CONCATENATE: Joins together two or more text strings
  - LEFT: Returns a specified number of characters from the start of a supplied text string
  - MID: Returns a specified number of characters from the middle of a supplied text string
  - RIGHT: Returns a specified number of characters from the end of a supplied text string
  - LEN: Returns the length of a supplied text string.
  - FIND: Returns the position of a supplied character or text string from within a supplied text string (case-sensitive)

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Functions by categories

- Date & Time
  - DATE: Returns a date, from a user-supplied year, month and day
  - TIME: Returns a time, from a user-supplied hour, minute and second
  - DATEVALUE: Converts a text string showing a date, to an integer that represents the date in Excel's date-time code
  - TIMEVALUE: Converts a text string showing a time, to a decimal that represents the time in Excel
  - NOW: Returns the current date & time
  - TODAY: Returns today's date
- Statistical
  - MAX: Returns the largest value from a list of supplied numbers
  - MIN: Returns the smallest value from a list of supplied numbers
  - AVERAGE: Returns the Average of a list of supplied numbers
  - COUNT: Returns the number of numerical values in a supplied set of cells or values
  - COUNTIF: Returns the number of cells (of a supplied range), that satisfy a given criteria
  - SUM: Returns the sum of a supplied list of numbers

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Functions by categories

- Logical
  - AND: Tests a number of user-defined conditions and returns TRUE if ALL of the conditions evaluate to TRUE, or FALSE otherwise
  - OR: Tests a number of user-defined conditions and returns TRUE if ANY of the conditions evaluate to TRUE, or FALSE otherwise
  - NOT Returns a logical value that is the opposite of a user supplied logical value or expression i.e. returns FALSE is the supplied argument is TRUE and returns TRUE if the supplied argument is FALSE)
- Math & Trig
  - ABS: Returns the absolute value (ie. the modulus) of a supplied number
  - SIGN: Returns the sign (+1, -1 or 0) of a supplied number
  - SQRT: Returns the positive square root of a given number
  - MOD: Returns the remainder from a division between two supplied numbers

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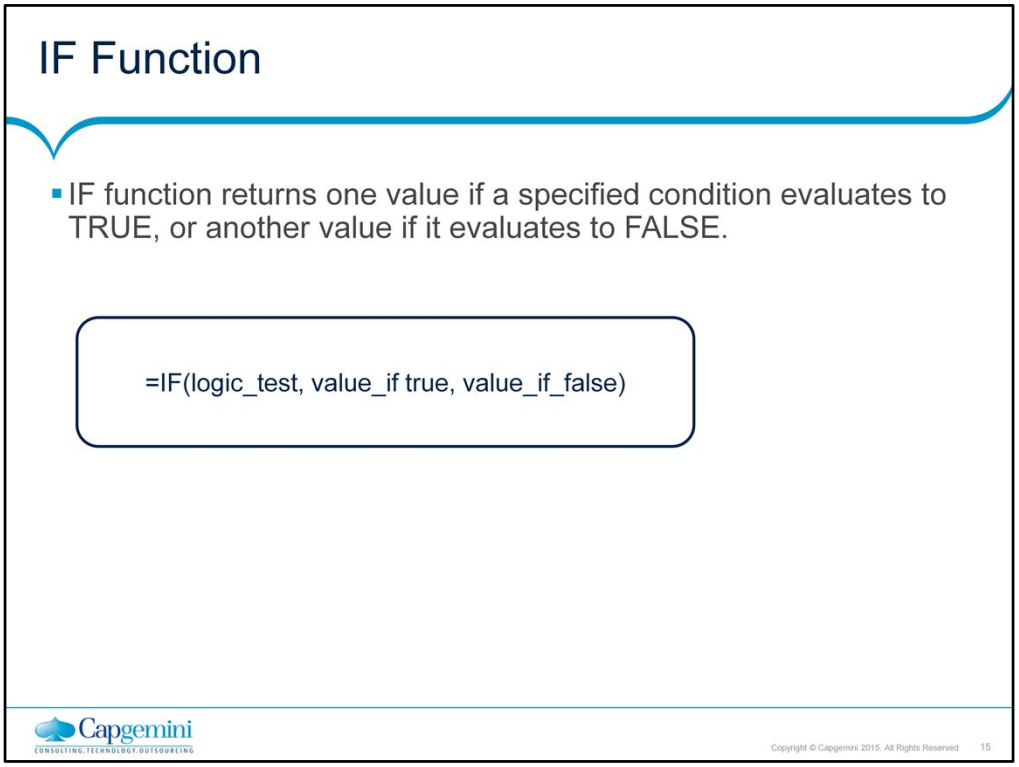
IF Function
IF function returns one value if a specified condition evaluates to TRUE, or another value if it evaluates to FALSE.
=IF(logic_test, value_if true, value_if_false)
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Lookup formula

- A lookup formula essentially returns a value from a table by looking up another related value. A common telephone directory provides a good analogy. If you want to find a person's telephone number, you first locate the name (look it up) and then retrieve the corresponding number.
- Three lookup functions :
  - Lookup()
  - Hlookup()
  - Vlookup()

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HLookup

- The Excel Hlookup function 'looks up' a given value in the top row of a data array (or table), and returns the corresponding value from another row of the array.

HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])

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HLookup

lookup_value	**The value that you want to look for, in the first row of the supplied data array**
table_array	The data array or table, that you want to search the first row of, for the supplied lookup_value
row_index_num	The row number, within the supplied array, that you want the corresponding value to be returned from
[range_lookup]	An optional logical argument, which can be set to TRUE or FALSE, meaning :
TRUE	if the function cannot find an exact match to the supplied lookup_value, it should use the closest match below the supplied value (Note: If range_lookup is set to TRUE, the top row of the table_array must be in ascending order)
FALSE	if the function cannot find an exact match to the supplied lookup_value, it should return an error

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VLOOKUP Function

- VLOOKUP function 'looks up' a given value in the left-hand column of a data array (or table), and returns the corresponding value from another column of the array.

VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

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Vlookup Function

lookup_value	**The value that you want to look for, in the left-hand column of the supplied data array**
table_array	The data array or table, that you want to search the left hand column of, for the supplied lookup_value
col_index_num	The column number, within the supplied array, that you want the corresponding value to be returned from
[range_lookup]	An optional logical argument, which can be set to TRUE or FALSE, meaning :
TRUE	If the function cannot find an exact match to the supplied lookup_value, it should use the closest match below the supplied value (Note: If range_lookup is set to TRUE, the left-hand column of the table_array must be in ascending order)
FALSE	if the function cannot find an exact match to the supplied lookup_value, it should return an error

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Demo

- Refer Chapter5_Functions_Formulae.xlsx to understand working with Range, Formula and Functions.

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Lab

- Refer Lab 3

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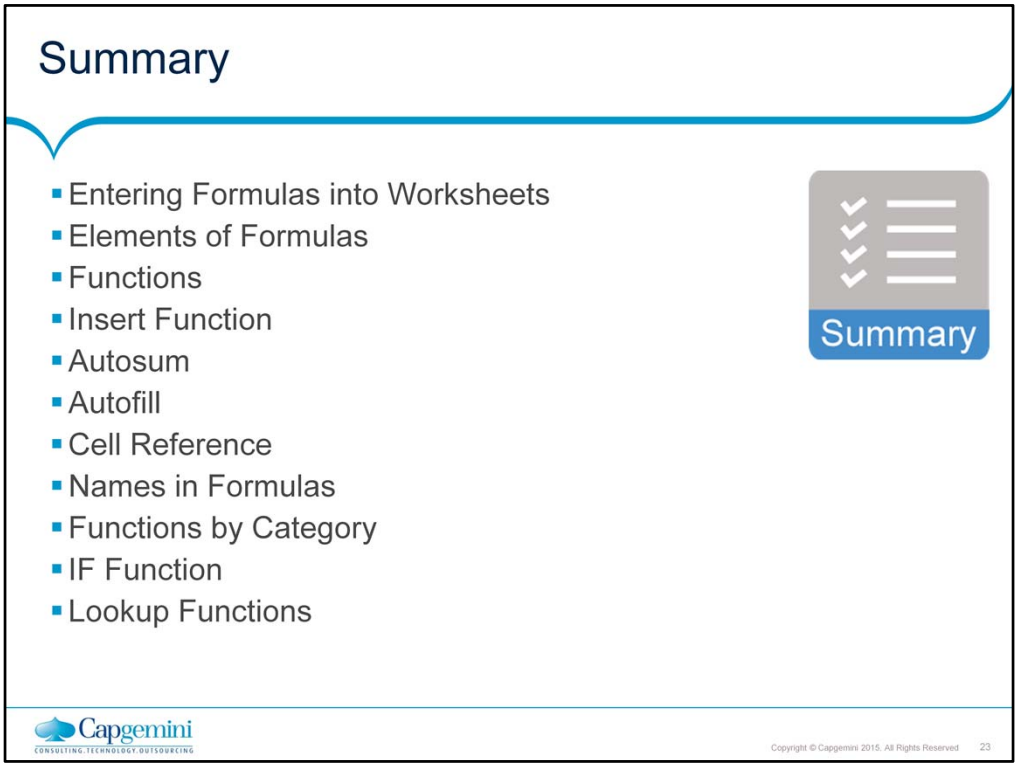

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Review Question

- Question 1 : What does the VLOOKUP function do?
  - Looks up text that contain 'v'
  - Checks whether text is the same in one cell as in the next
  - Finds related records
  - All of above

- Question 2 : Which of the following is correct?
  - =AVERAGE(4, 5, 6, 7)
  - =AVERAGE(A1, B1, C1)
  - =AVERAGE(A1:A9, B1:B9)
  - =All of the above

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