Excel Lesson 5
Using Functions

Microsoft Office 2010
Introductory

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Objectives

- Identify the parts of a function.
- Enter formulas with functions.
- Use functions to solve mathematical problems.
- Use functions to solve statistical problems.
- Use functions to solve financial problems.

Objectives (continued)

- Use logical functions to make decisions with worksheet data.

- Use functions to insert times and dates in a worksheet.

- Use text functions to format and display cell contents.

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Vocabulary

- argument
- date and time functions
- financial functions
- Formula AutoComplete
- function

- logical functions
- mathematical functions
- statistical functions
- text functions
- trigonometric functions

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What Are Functions?

- A **function** is a shorthand way to write an equation that performs a calculation.
- A formula with a function has three parts:
  - The equal sign identifies the cell contents as a formula.
  - The function name identifies the operation to be performed.
  - The **argument** is the value the function uses to perform a calculation.

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What Are Functions? (continued)
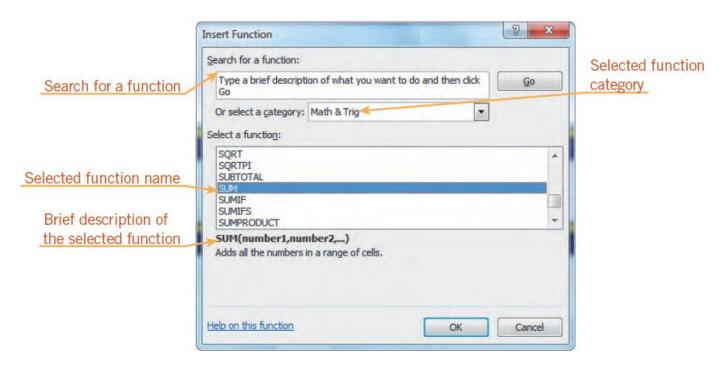
- Parts of a function

=SUM(F6:F11)

Equal sign / Function name \ Argument

Entering Formulas with Functions

- To enter a formula with a function, you need to do the following.
  - Start the formula with an equal sign.
  - Select or enter the function you want to use.
  - Select or enter the arguments.
  - Enter the completed formula.

- To open the Insert Function dialog box, click the Insert Function button on the Formula Bar.

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Entering Formulas with Functions (continued)

- Insert Function dialog box

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Entering Formulas with Functions (continued)

- You can also enter a formula with a function directly in a cell by typing an equal sign, the function name, and the argument.

- **Formula AutoComplete** helps you enter a formula with a valid function name and arguments.

  – As you begin to type the function name, a list of function names appears below the active cell.

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Types of Functions

- **Mathematical functions** and **trigonometric functions** manipulate quantitative data in a worksheet.

- Some mathematical operations, such as addition and subtraction, do not require functions.

- Mathematical and trigonometric functions are particularly useful when you need to determine values such as logarithms, factorials, and sines.

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Types of Functions (continued)

- Commonly used mathematical and trigonometric functions

FUNCTION	RETURNS
SQRT(number)	The square root of the number in the argument. For example, =SQRT(C4) returns the square root of the value in cell C4.
ROUND(number,num_digits)	The number in the first argument rounded to the number of decimal places designated in the second argument. For example, =ROUND(14.23433,2) returns 14.23, which rounds the number in the first argument to two decimal places. If the second argument is a negative number, the first argument is rounded to the left of the decimal point. For example, =ROUND(142.3433,−2) returns 100.
LN(number)	The natural logarithm of a number. For example, =LN(50) returns 3.912023.

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Types of Functions (continued)

- **Statistical functions** are used to describe quantities of data.
- For example, statistical functions can determine:
  - the average, standard deviation, or variance of a range of data.
  - the number of values in a range, the largest value in a range, and the smallest value in a range.

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Types of Functions (continued)

- Commonly used statistical functions

FUNCTION	RETURNS
AVERAGE(number1,number2...)	The average (or mean) of the range; for example, =AVERAGE(E4:E9) returns the average of the numbers in the range E4:E9
COUNT(value1,value2...)	The number of cells in the range that contain numbers; for example, =COUNT(D6:D21) returns 16 if all the cells in the range contain numbers
COUNTA(value1,value2...)	The number of cells in the range that are not empty; for example, =COUNT(B4:B15) returns 11 if all the cells in the range contain data
MAX(number1,number2...)	The largest number in the range
MIN(number1,number2...)	The smallest number in the range
STDEV.P(number1,number2...)	The estimated standard deviation of the numbers in the range
VAR.P(number1,number2...)	The estimated variance of the numbers in the range

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Types of Functions (continued)

- **Financial functions** are used to analyze loans and investments.

- Some commonly used financial functions are future value, present value, and payment.

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Types of Functions (continued)

- Commonly used financial functions

FUNCTION	RETURNS
FV(rate,nper,pmt,pv,type)	The future value of an investment based on equal payments (third argument), at a fixed interest rate (first argument), for a specified number of periods (second argument). (The fourth and fifth arguments for the present value of the investment and the timing of the payments are optional.) For example, =FV(.08,5,–100) determines the future value of five $100 payments earning an 8% interest rate at the end of five years.
PV(rate,nper,pmt,fv,type)	The present value of a loan or an investment based on equal payments (third argument), at a fixed interest rate (first argument), for a specified number of payments (second argument). (The fourth and fifth arguments for the future value of the investment and the timing of the payments are optional.) For example, =PV(.1,5,–500) displays the current value of five payments of $500 at a 10% interest rate.
PMT(rate,nper,pv,fv,type)	The equal payments needed to repay a loan (third argument), at a fixed interest rate (first argument), in a specified number of periods (second argument). (The fourth and fifth arguments for the future value of the loan and the timing of the payments are optional.) For example, =PMT(.01,36,10000) displays the monthly payment needed to repay a $10,000 loan at a 1% monthly interest rate (12% annual interest rate divided by 12 months), for 36 months (three years multiplied by 12 months).

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Types of Functions (continued)

- **Logical functions**, such as the IF function, display text or values if certain conditions exist.
  - The first argument sets a condition for comparison, called a logical test. The second argument determines the value if the logical test is true. The third argument determines the value if the logical test is false.
- For example, the formula =IF(C4>60,"PASS","FAIL") returns PASS if the value in cell C4 is greater than 60; otherwise the formula returns FAIL.

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Types of Functions (continued)

- Commonly used logical functions

FUNCTION	RETURNS
IF(logical_test,value_if_true,value_if_false)	One value if the condition in the logical test is true, and another value if the condition in the logical test is false; for example, =IF(2+2=4, "Over", "Under") returns *Over*
AND(logical1,logical2,…)	TRUE if all of the arguments are true, and FALSE if any or all of the arguments are false; for example, =AND(1+1=2,1+2=3) returns *TRUE*, but =AND(1+1=2,1+2=4) returns *FALSE*
OR(logical1,logical2,…)	TRUE if any of the arguments are true, and FALSE if none of the arguments is true; for example, =OR(1+1=2,1+2=3) returns *TRUE*, and =OR(1+1=2,1+2=4) returns *TRUE*, but =OR(1+1=3,1+2=4) returns *FALSE*
NOT(logical)	TRUE if the argument is false, and FALSE if the argument is true; for example, =NOT(2+2=1) returns *TRUE*, but =NOT(2+2=4) returns *FALSE*
IFERROR(value,value_if_error)	The formula results if the first argument contains no error, and the specified value if the argument is incorrect; for example, =IFERROR(2+2=1, "Error in calculation") returns *Error in calculation*

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Types of Functions (continued)

- **Date and Time functions** can also be used to insert dates and times in a worksheet.

FUNCTION	RETURNS
DATE(year,month,day)	The date specified in the year, month, and day arguments, which are entered as numbers. For example, =DATE(2013,5,23) returns 5/23/2013.
NOW()	The current date and time based on the computer's date and time settings. For example, =NOW() returns the current date and time, such as 5/23/2013 22:05. This function has no arguments.
TODAY()	The current date based on the computer's date setting and formatted as a date. For example, =TODAY() returns the current date, such as 5/23/2013. This function has no arguments.

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Types of Functions (continued)

- **Text functions** are used to format and display cell contents.

FUNCTION	OPERATION
PROPER(text)	Converts the first letter of each word in the specified cell to uppercase and the rest to lowercase.
LOWER(text)	Converts all letters in the specified cell to lowercase.
UPPER(text)	Converts all letters in the specified cell to uppercase.
SUBSTITUTE(text,old_text,new_text,instance_num)	Replaces existing text (the second argument) in a specified cell (the first argument) with new text (the third argument). If you omit the optional fourth argument, instance_num, every occurrence of the text is replaced. For example, =SUBSTITUTE(C2,"Income","Revenue") replaces every instance of the word *Income* in cell C2 with the word *Revenue*.
REPT(text,number_times)	Repeats the text (first argument) in the specified cell a specified number of times (second argument). For example, =REPT(B6,3) repeats the text in cell B6 three times.

Summary

In this lesson, you learned:

- A function is a shorthand way to write an equation that performs a calculation. A formula with a function has three parts: an equal sign, a function name, and for most functions one argument, which acts as an operand.

- The best way to select a function is from the Insert Function dialog box. The Function Arguments dialog box provides a description of each argument you enter for the function.

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Summary (continued)

- When you type a formula with a function directly in a worksheet cell, Formula AutoComplete helps you enter a formula with a valid function name and arguments.

- Functions can be used to perform mathematical, statistical, financial, and logical operations. They can also be used to insert and calculate dates and times and to format text.

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