

LESSON SKILL MATRIX

Skills	Exam Objective	Objective Number
Exploring Functions		
Displaying Dates and Times with Functions		
Summarizing Data with Functions	Demonstrate how to apply the SUM function.	4.2.1
	Demonstrate how to apply the COUNT function.	4.2.3
	Demonstrate how to apply the AVERAGE function.	4.2.4
	Demonstrate how to apply the MIN and MAX functions.	4.2.2
Using a Financial Function		
Using Formulas to Create Subtotals		
Uncovering Formula Errors		
Displaying and Printing Formulas		



KEY TERMS

- argument
- AutoSum
- AVERAGE function
- COUNT function
- COUNTA function
- function
- MAX function
- MIN function
- NOW function
- PMT function
- SUBTOTAL function
- SUM function
- TODAY function
- trace arrow



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Creating and maintaining a personal budget requires more than simply estimating and tracking expenses. You often want to see subtotals of certain data, for example, to determine how much you spend quarterly. Sometimes you want to know your average payment per month for expenses that vary throughout the year. Budgets are also working documents—they change over time and might require modifications to the structure. Creating proper formulas builds flexibility into your worksheets. Excel provides a wealth of predefined functions to help you enter formulas quickly and accurately. In this lesson, you learn how to use simple Excel functions by working on an annual budget of household expenses.

SOFTWARE ORIENTATION

FORMULAS Tab

The FORMULAS tab in Excel 2013, shown in Figure 5-1, provides access to a library of formulas and functions. On this tab, you can use commands for quickly inserting functions, inserting totals, and displaying a visual map of cells that are dependent on a formula.

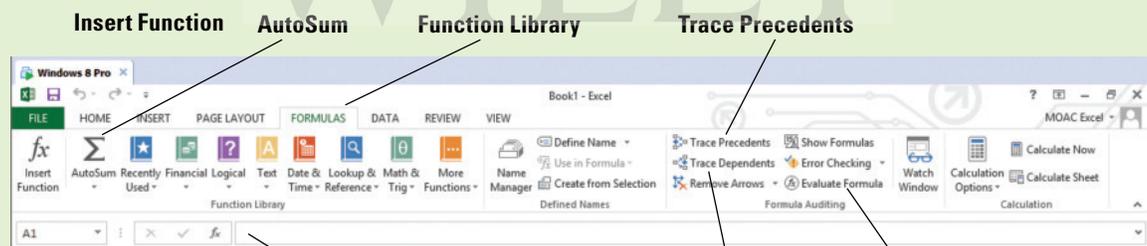


Figure 5-1

The FORMULAS tab in Excel 2013

Insert Function button next to formula bar

Trace Dependents Evaluate Formula

In this lesson, you learn how to use a variety of simple functions to perform calculations in a budgeting worksheet. You also learn subtotaling techniques, how to work with formula errors, and how to print formulas.

Bottom Line

EXPLORING FUNCTIONS

A **function** is a predefined formula that performs a calculation. Excel's built-in functions are designed to perform different types of calculations—from simple to complex. When you apply a function to specific data, you eliminate the time involved in manually constructing a formula. Using functions ensures the accuracy of the formula's results. You can type functions directly into Excel or use the tools on the FORMULAS tab to help you fill in formulas with the correct syntax.

STEP BY STEP

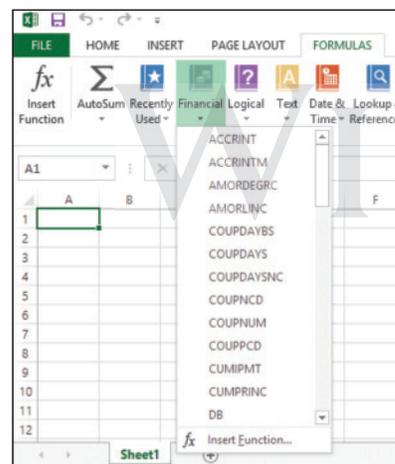
Explore Functions

GET READY. LAUNCH Excel and open a new, blank workbook.

1. To become familiar with the tools available to build formulas and insert functions, click the **FORMULAS** tab. Excel arranges functions by category in the Function Library group, such as Financial, Logical, Text, and so on. Click the **Financial** button arrow to display a drop-down list of functions (see Figure 5-2). If you create a financial function, you can simply scroll through the list and select the function you want.

Figure 5-2

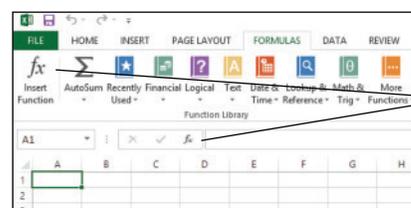
The Financial group menu of functions



2. You can also find a function using the Insert Function dialog box. On the FORMULAS tab or on the formula bar, click the **Insert Function** button. The buttons are shown in Figure 5-3.

Figure 5-3

The Insert Function buttons

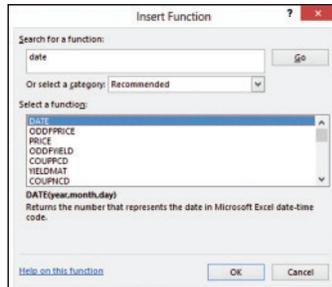


Insert Function button

3. In the Insert Function dialog box, type a description of what you want to do. For example, type **date** and click **Go**. Excel returns a list of functions that most closely match your description (see Figure 5-4).

Figure 5-4

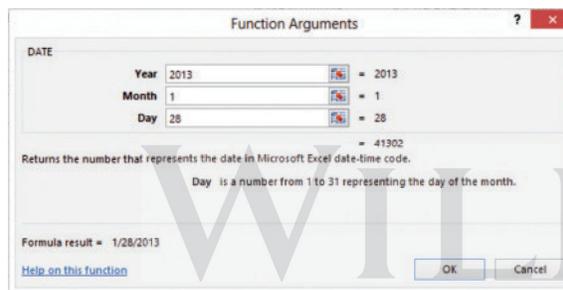
The Insert Function dialog box displaying a list of functions in response to your request



4. With DATE selected in the Select a function list, click **OK**. The Function Arguments dialog box opens.
5. Enter the current year, the number of the current month, and the number of the current day (see Figure 5-5). Click **OK**. The date is entered into the worksheet in cell A1.

Figure 5-5

Entering data into the Function Arguments dialog box



6. **SAVE** the workbook to your Lesson 5 folder as **05 Practice Solution**.

PAUSE. LEAVE the workbook open to use in the next exercise.

Functions are a simplified way of entering formulas. The parameters of a function are called **arguments**. Each function name is followed by parentheses, which let Excel know where the arguments begin and end. Arguments appear within the parentheses and are performed from left to right. Depending on the function, an argument can be a constant value, a single-cell reference, a range of cells, or even another function. If a function contains multiple arguments, the arguments are separated by commas.

Even functions that require no arguments must still have parentheses following the name, as in =TODAY(). Table 5-1 lists common Excel functions, all of which are covered in this lesson.

Table 5-1
Common Excel functions

Function	Description	Formula Syntax
AVERAGE	Calculates the arithmetic mean, or average, for the values in a range of cells.	=AVERAGE(first value, second value,...)
MAX	Analyzes an argument list to determine the highest value (the opposite of the MIN function).	=MAX(first value, second value,...)
MIN	Determines the smallest value of a given list of numbers or arguments.	=MIN(first value, second value,...)
NOW	Returns the current date and time.	=NOW()
PMT	Determines the payment for a loan based on the interest rate of a loan, the number of payments to be made, and the loan amount.	=PMT(rate, nper, pv)

Table 5-1
Common Excel functions

Function	Description	Formula Syntax
SUBTOTAL	Returns a subtotal for a list	=SUBTOTAL(function number,ref1,[ref2],...)
SUM	Takes all of the values in each of the specified cells and totals their values.	=SUM(first value, second value,...)
TODAY	Returns the current date.	=TODAY()

Bottom Line

DISPLAYING DATES AND TIMES WITH FUNCTIONS

In Excel, dates are numbers. When you see a date in a worksheet, it's actually a numeric value formatted to look like a date. The same principle applies to time. Two functions display the current date and/or time in a worksheet: NOW and TODAY. NOW returns the current date and time, whereas TODAY returns the current date but not the time. Neither of these functions uses arguments, so you insert blank parentheses after them. With NOW and TODAY, you can create automatically updated dates and times in worksheets that you frequently revisit and update.

Exploring Dates

Excel stores dates as sequential serial numbers. By default, January 1, 1900 is serial number 1, January 2, 1900 is serial number 2, and so on. Each date is a number that represents the number of days that have elapsed since January 1, 1900. You can add, subtract, multiply, and divide using a date, just as you can with any other number. How the date is displayed depends on the format you assign to it.

STEP BY STEP

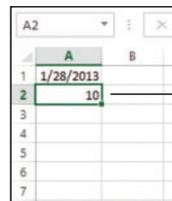
Explore Dates

GET READY. USE the workbook you created in the previous exercise.

1. In cell A2, type **1/10/1900** and press **Enter**.
2. Select cell **A2**.
3. On the HOME tab, in the Number group, open the **Number Format** menu and select **General**. The value in A2 changes to **10** (see Figure 5-6). When you enter a date manually into Excel, the format of the cell automatically changes to Date. Because the date 1/10/1900 is the tenth day after (and including) January 1, 1900, the value is 10. Excel's Date format displays the value as a date, and the General format displays the value as a number.

Figure 5-6

In Excel, a date is actually a serial number.



A date displayed as a serial number

4. With A2 still selected, change the number format to **Short Date** using the Number Format menu. The cell displays **1/10/1900**.
5. Click cell **A3**, type **40000** and press **Enter**. Because the cell is formatted as General by default, the value appears as a number.
6. Click cell **A2**.
7. On the HOME tab, in the Clipboard group, click the **Format Painter**, and then click cell **A3**. The formatting of A2 is copied to A3. The value in A3 now appears as a date: **7/6/2009**.
8. In cell A4, type **=A3-A2** and press **Enter**. The result is **39990**, which is the number of days between the two dates.

9. SAVE the workbook.

PAUSE. LEAVE the workbook open to use in the next exercise.

Using TODAY

The **TODAY function** returns the current date in a worksheet. The value returned by the TODAY function automatically updates every time you change the worksheet. To specify a date that doesn't change, enter the date you want to use manually.

STEP BY STEP

Use the TODAY Function

GET READY. USE the workbook you modified in the previous exercise.

1. In cell A5, type **=TODAY()** and press **Enter**. The current date displays (see Figure 5-7).

Figure 5-7

The result of the TODAY function



2. SAVE the workbook.

PAUSE. LEAVE the workbook open to use in the next exercise.

The default format for the TODAY function is mm/dd/yyyy, but you can have it appear in any date format.

You can also use TODAY to calculate an interval. For example, you can enter a formula to calculate the number of years you have lived by creating a formula to subtract your birth date from today's date, like this: **=YEAR(TODAY())-1993**.

Using NOW

The **NOW function** returns today's date and the current time, in the default format of mm/dd/yyyy hh:mm. You can apply any date or time format to values returned by the NOW function.

STEP BY STEP

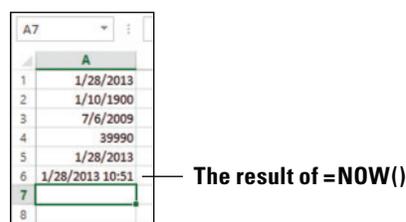
Use the NOW Function

GET READY. USE the workbook you modified in the previous exercise.

1. In cell A6, type **=NOW()** and press **Enter**. The column width automatically expands, and the current date and time display (see Figure 5-8).

Figure 5-8

The result of the NOW function



2. Copy cell A6 to A7.
3. Select cell A7.
4. On the HOME tab, in the Number group, from the Number Format menu, select **Time**. The current time without the date appears in A7 (see Figure 5-9).

Figure 5-9

The result of the NOW function with the Time format applied

	A
1	1/28/2013
2	1/10/1900
3	7/6/2009
4	39990
5	1/28/2013
6	1/28/2013 10:52
7	10:52:29 AM
8	

5. SAVE the workbook and CLOSE it.

PAUSE. LEAVE Excel open to use in the next exercise.

Like TODAY, the NOW function also updates automatically every time you change the worksheet. However, because it also reports the time, its value changes every time you save the worksheet, even if that is several times during a single day.

In addition to simply displaying the current date and time, you might use the NOW function in a calculation that requires a value based on the current date and time.



Workplace Ready

USING DATES AT WORK

The Excel TODAY and NOW functions are handy when you simply want to display the current date, the date and time, or the date in a calculation. However, using TODAY or NOW means the date changes every time someone opens the workbook. Sometimes it's important that the date remains static. For example, you create an invoice with the invoice date at the top. You also have a line that says, "Terms: Net 30." A Net 30 term means you expect your customer to pay your invoice within 30 days of the date of your invoice. It's important that your invoice date never changes to avoid confusing your customer and so you get paid on time.

	A	B	C	D
1	Proseware, Inc.		Invoice	11839
2			Date	5/1/2014
3			Terms	Net 30
4				
5	Description	Number of Hours	Rate	Total
6	Custom project A	10	\$100.00	\$ 1,000.00
7	Custom project B	5	\$100.00	\$ 500.00
8	Custom project C	15	\$100.00	\$ 1,500.00
9	Custom project D	12	\$100.00	\$ 1,200.00
10	Custom project E	10	\$100.00	\$ 1,000.00
11	TOTAL			\$ 5,200.00

Enter a date, not the TODAY or NOW function.

SUMMARIZING DATA WITH FUNCTIONS

Bottom Line

Functions provide an easy way to perform mathematical work on a range of cells, quickly and conveniently. This section shows you how to use some of the basic functions in Excel: SUM, COUNT, COUNTA, AVERAGE, MIN, and MAX.

Using the SUM Function

Adding a range of cells is one of the most common calculations performed on worksheet data. The **SUM function** totals all of the cells in a range, easily and accurately. **AutoSum** makes that even easier by calculating (by default) the total from the adjacent cell through the first nonnumeric cell, using the SUM function in its formula. SUM is usually the first function most people learn how to use in Excel. In fact, you already saw it in action in Lesson 4, “Using Basic Formulas.”

STEP BY STEP

Use the SUM Function



GET READY. LAUNCH Excel if it is not already running.

1. OPEN the **05 Budget Start** data file for this lesson. Click **Enable Editing**, if prompted. This workbook is similar to the **04 Budget Start** workbook used in Lesson 4, but with modifications to accommodate the current lesson.
2. In cell B7, type **=SUM(B3:B6)** and press **Enter**. The result, 2140, is the sum of January nonutility expenses.



Troubleshooting

If you get an error message when entering a basic Excel formula, remember that all formulas must start with an equal sign (=). A function is simply a predefined formula, so you must use the equal sign.

3. Click in cell C7. Click the **FORMULAS** tab and then click the top part of the **AutoSum** button. The SUM function appears with arguments filled in, but only C6 is included. Type **C3:** before C6 to correct the range (see Figure 5-10). Press **Enter**. The result, 1340, is the sum of February nonutility expenses.

Figure 5-10

Using the SUM function

	A	B	C	D	E	F
1	2013 Housing Expenses					
2	Expense Category	Jan	Feb	Mar	Apr	May
3	Rent	1200	1200	1200	1200	1200
4	Renter's Insurance	40	40	40	40	40
5	Furnishings	500				
6	Miscellaneous	400	100	200		100
7	Nonutility Subtotals	2140	=SUM(C3:C6)			
8	Utilities		SUM(number1, [number2], ...)			
9	Electricity	180	180	180	150	150
10	Gas	120	120	110	90	80
11	Water	35	35	35	35	35

CERTIFICATION READY? 4.2.1

How do you create a formula with the SUM function?

4. Copy cell C7 to D7:M7 to enter the remaining subtotals.
5. Copy cell N6 to N7 to enter the total nonutility expenses.
6. SAVE the workbook to your Lesson 5 folder as **05 Budget Math Solution**.

PAUSE. LEAVE the workbook open to use in the next exercise.

The alternative to the SUM function is to create an addition formula using cell references for every cell value to be added, such as the following:

=B7+C7+D7+E7+F7+G7+H7+I7+J7+K7+L7+M7

The easier way to achieve the same result is to use the SUM function or AutoSum. AutoSum is a built-in feature of Excel that recognizes adjacent cells in rows and columns as the logical selection to perform the AutoSum.

Using the COUNT Function

Statistical functions, such as SUM and COUNT, compile and classify data to present significant information. Use the **COUNT function** when you want to determine how many cells in a range contain a number.

STEP BY STEP

Use the COUNT Function

1. USE the workbook you modified in the previous exercise.
2. In cell O5, type **Count** and press **Enter**. This is the label identifying the formula you will enter in the next step.
3. In cell O6, type **=COUNT(B6:M6)** and press **Enter**. The result, **9**, is the number of months in which you budgeted for miscellaneous expenses (see Figure 5-11).

Figure 5-11

Result of the COUNT function

2013 Housing Expenses	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Expense Category													
Rent	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	14400
Renter's Insurance	40	40	40	40	40	40	40	40	40	40	40	40	480
Furnishings	500												500
Miscellaneous	400	100	200		100	100	300	200		100		100	1600
Nonutility Subtotals	2140	1340	1440	1240	1340	1340	1540	1440	1240	1340	1240	1340	16980
Utilities													
Electricity	180	180	180	150	150	180	230	230	160	150	160	170	2110
Gas	120	120	110	90	80	70	70	70	80	90	100	120	1120
Water	35	35	35	35	35	35	35	35	35	35	35	35	420

CERTIFICATION READY? 4.2.3

How do you create a formula with the COUNT function?

4. SAVE the workbook.

PAUSE. LEAVE the workbook open to use in the next exercise.

In this exercise, you could have included the row heading—Nonutility Subtotals—in the formula range, along with the data in cells B6 through M6. The COUNT function disregards A6 because it doesn't contain a number, and the function disregards blank cells. You'll see this effect using COUNTA in the next exercise.

Using the COUNTA Function

The **COUNTA function** returns the number of cells in the selected range that contain text or values, but not blank cells. In this exercise, you use the Insert Function button on the formula bar to enter the function.

STEP BY STEP

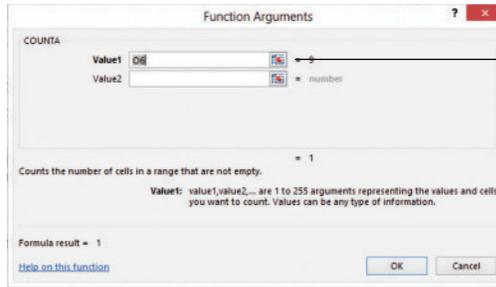
Use the COUNTA Function

GET READY. USE the workbook you modified in the previous exercise.

1. In cell P5, type **CountA** and press **Enter**. This is the label identifying the formula you will enter in the next step.
2. In cell P6, on the formula bar, click the **Insert Function** button.
3. In the Insert Function dialog box, in the Search for a function text box, type **counta** and then click **Go**.
4. Select **COUNTA** in the results list and click **OK**. The Function Arguments dialog box opens.
5. Click **Collapse Dialog** (see Figure 5-12). The box collapses to a single entry box.

Figure 5-12

The Function Arguments dialog box

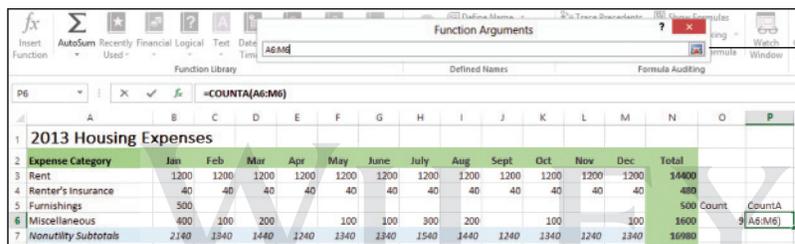


Collapse Dialog

6. Select **A6:M6**. The new range appears in the dialog box.
7. Click **Expand Dialog** shown in Figure 5-13, and click **OK** to close the dialog box. The result, **10**, is the number of nonblank cells in the range.

Figure 5-13

Expand Dialog



Expand Dialog

8. **SAVE** the workbook.

PAUSE. LEAVE the workbook open to use in the next exercise.

Using the AVERAGE Function

The **AVERAGE function** adds a range of cells and then divides by the number of cell entries, determining the mean value of all values in the range. Regarding your personal budget, because the cost of electricity and gas fluctuates seasonally, it might be interesting to know the average monthly amount you might spend over the course of an entire year.

STEP BY STEP

Use the AVERAGE Function

GET READY. USE the workbook you modified in the previous exercise.

1. In cell O8, type **Average** and press **Enter**.
2. In cell O9, type **=AVERAGE(B9:M9)** and press **Enter**. The result, **175.8333**, is your average expected monthly electricity bill.
3. In cell O10, type **=AVERAGE(B10:M10)** and press **Enter**. The result, **93.33333**, is your average expected monthly gas bill (see Figure 5-14).

Figure 5-14

The results of the AVERAGE function

L	M	N	O	P
Nov	Dec	Total		
1200	1200	14400		
40	40	480		
		500	Count	CountA
	100	1600	9	10
1240	1340	16980		
		Average		
160	170	2110	175.8333	
100	120	1120	93.33333	
35	35	420		
50	50	600		
50	50	600		

AVERAGE function results

**CERTIFICATION
READY? 4.2.4**

How do you create a formula with the AVERAGE function?

4. SAVE the workbook.

PAUSE. LEAVE the workbook open to use in the next exercise.

Using the MIN Function

The **MIN function** allows you to determine the minimum value in a range of cells. Let's use this function to determine what your minimum electricity and gas bills will be. Instead of entering the formula manually, you'll use the Function Library group on the FORMULAS tab to build the formula.

STEP BY STEP**Use the MIN Function**

GET READY. USE the workbook you modified in the previous exercise.

1. In cell P8, type **Min** and press **Enter**.
2. Click in cell P9 and then click the **FORMULAS** tab.
3. Click the **AutoSum** button arrow, and then select **Min** from the menu. The range B9:O9 is automatically selected (see Figure 5-15). This range is incorrect, so you need to edit it.

Figure 5-15

The wrong range is selected for the MIN function.

	2140	1340	1440	1240	1340	1340	1540	1440	1240	1340	1240	1340	16980
Average	180	180	180	150	150	180	220	230	160	150	160	170	2110
Min	120	120	110	90	80	70	70	70	80	90	100	120	93.33333
	35	35	35	35	35	35	35	35	35	35	35	35	420
	50	50	50	50	50	50	50	50	50	50	50	50	600
	50	50	50	50	50	50	50	50	50	50	50	50	600

4. Click cell B9, hold down the **Shift** key, and click cell M9. The range B9:M9 appears in the function, which now looks like **=MIN(B9:M9)**. See Figure 5-16. Press **Enter**. The result, **150**, appears, which is the lowest expected electricity bill for the year.

Figure 5-16

Modifying the MIN function

	2140	1340	1440	1240	1340	1340	1540	1440	1240	1340	1240	1340	16980
Average	180	180	180	150	150	180	220	230	160	150	160	170	2110
Min	120	120	110	90	80	70	70	70	80	90	100	120	93.33333
	35	35	35	35	35	35	35	35	35	35	35	35	420
	50	50	50	50	50	50	50	50	50	50	50	50	600
	50	50	50	50	50	50	50	50	50	50	50	50	600

**CERTIFICATION
READY? 4.2.2**

How do you create a formula with the MIN function?

5. Copy cell P9 to cell P10. The result, **70**, is the lowest expected gas bill for the year.

6. SAVE the workbook.

PAUSE. LEAVE the workbook open to use in the next exercise.

Using the MAX Function

The **MAX function** returns the largest value in a set of values. The MAX function works the same way as MIN, except MAX determines the maximum value in a range of cells. To use MAX in a formula, let's enter the function manually.

STEP BY STEP**Use the MAX Function****CERTIFICATION
READY? 4.2.2**

How do you create a formula with the MAX function?

GET READY. USE the workbook you modified in the previous exercise.

1. In cell Q8, type **Max** and press **Enter**.
2. In cell Q9, type **=MAX(B9:M9)** and press **Enter**. The result, **230**, is the highest monthly electricity bill that you expect to receive.
3. Copy cell **Q9** to **Q10**. The result, **120**, is the highest monthly gas bill that you expect to receive (see Figure 5-17).

Figure 5-17

The results of the MAX function

	N	O	P	Q
Total				
14400				
480				
500	Count	CountA		
1600	9	10		
16980				
	Average	Min	Max	
2110	175.8333	150	230	
1120	99.33333	70	120	
420				
600				
600				

**MAX function
results**

4. SAVE the workbook to your Lesson 5 folder and CLOSE it.

PAUSE. LEAVE Excel open to use in the next exercise.

USING A FINANCIAL FUNCTION**Bottom Line**

Functions provide a wide variety of pre-determined calculations for you to choose from, allowing you to easily perform a complex calculation and use it in your worksheet. So far, you have worked with mathematical and statistical functions. Financial functions, in contrast, are designed specifically for various finance tasks that you might want to work on.

Use PMT

The **PMT function** requires a series of inputs regarding interest rate, loan amount (principal), and loan duration, and then calculates the resulting loan payment. In this exercise, you're interested in purchasing a large flat-panel television, a sound system, and a game box with several games. You calculate the payments you need to make on a two-year loan to purchase the equipment.

STEP BY STEP**Use the PMT Function**

GET READY. LAUNCH Excel if it is not already running.



1. OPEN the **05 Budget PMT** data file for this lesson.
2. In cell R2, type **Electronics** and press **Enter**.
3. In cell R3, type **Interest** and press **Enter**.
4. In cell R4, type **Years** and press **Enter**.
5. In cell R5, type **Loan Amt** and press **Enter**.
6. In cell R6, type **Payment** and press **Enter**.
7. In cell S3, type **7.5%** and press **Enter**. This is the interest rate on the loan.
8. In cell S4, type **2** and press **Enter**. This is the number of years in which the loan will be repaid.
9. In cell S5, type **2500** and press **Enter**. This is the loan amount, which will cover the total cost of the equipment.
10. In cell S6, type **=-PMT(S3/12,S4*12,S5)** and press **Enter**. The result, **\$112.50**, is your calculated monthly payment (see Figure 5-18).

Figure 5-18

The result of the PMT function

R	S
Electronics	
Interest	7.50%
Years	2
Loan Amt	2500
Payment	\$112.50

11. SAVE the workbook to your Lesson 5 folder as **05 Budget PMT Solution** and CLOSE it.

PAUSE. LEAVE Excel open to use in the next exercise.

The PMT function calculates a loan payment and uses the syntax `=PMT(rate, nper, pv, [fv], [type])`. The three required arguments for the PMT function are:

- **Rate:** The interest rate charged per period (for example, per month)
- **Nper:** The total number of payments for the loan
- **Pv:** The present value of the loan—in other words, how much you owe; also known as the *principal*

Optional arguments include the future value (fv), which is a cash balance you want to attain after the last payment is made, and type, which indicates when payments are due using the number 1 (due at the beginning of a period) or 0 (due at the end of a period).

When functions take more than one argument, you enter them in a single set of parentheses, separated by commas.

For the purposes of your budget, you include the negative sign (–) at the beginning of the PMT function (`=-PMT(S3/12, S4*12,S5)`) because the function calculates a payment as a negative value by default. By including the negative sign, the payment appears as a positive number. This follows a basic rule of mathematics: The negative of a negative is a positive.

You divide the first set of values by 12 because 7.5% is the annual interest rate, and dividing it by 12 gives you the monthly interest rate. You multiply the second set of values by 12 to convert the loan term from years to months.

USING FORMULAS TO CREATE SUBTOTALS

Bottom Line

Many Excel veterans use formulas to create subtotals. Subtotaling lets you more easily analyze large sets of data. You can specify ranges for subtotals even if the ranges are not contiguous. In this section, you learn how to use the SUBTOTAL function applied to cell ranges and named ranges.

Selecting and Creating Ranges for Subtotaling

You learn how to select ranges and name them in Lesson 4. You use those skills in this section to prepare to subtotal parts of your budget worksheet.

STEP BY STEP

Select and Create Ranges for Subtotaling



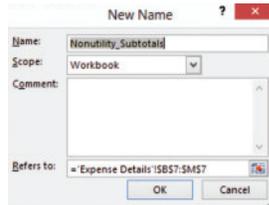
GET READY. LAUNCH Excel if it is not already running.

1. OPEN the **05 Budget Subtotals** data file for this lesson.
2. Select **B7:M7**.
3. On the FORMULAS tab, in the Defined Names group, click the **Define Name** button. The New Name dialog box opens.

- In the Name text box, verify that Nonutility_Subtotals appears (see Figure 5-19). Click **OK**. This names a range for the nonutility subtotal figures.

Figure 5-19

The New Name dialog box



- SAVE the workbook to your lesson 5 folder as **05 Budget Subtotals Solution**.

PAUSE. LEAVE the workbook open to use in the next exercise.

Building Formulas for Subtotaling

You can calculate subtotals using the **SUBTOTAL function**, which returns a subtotal for a list. This function recognizes values, cell references, ranges, and named ranges, and totals values created using SUM, AVERAGE, COUNT, and many other functions. This exercise shows you how to use the SUBTOTAL function to sum ranges of cells, both named and unnamed.

STEP BY STEP

Build Formulas to Subtotal

GET READY. USE the workbook you modified in the previous exercise.



Cross Ref

This lesson shows you how to build subtotals using the SUBTOTAL function. Lesson 9, “Working with Data and Macros,” covers grouping and outlining to produce subtotals.

- In cell B17, type **=SUBTOTAL(9,B7:B16)**, as shown in Figure 5-20. Press **Enter**. This formula adds the nonutility subtotal and utility subtotal for January.

Figure 5-20

Entering the SUBTOTAL formula to add two cells that include SUM functions

	A	B	C	D
7	Nonutility Subtotals	2140	1340	3480
8	Utilities			
9	Electricity	180	180	180
10	Gas	120	120	110
11	Water	35	35	35
12	Garbage Service	50	50	50
13	Phone	50	50	50
14	Internet	65	65	65
15	Cable TV	135	135	135
16	Utility Subtotals	635	635	625
17	Monthly Subtotals	=SUBTOTAL(9,B7:B16)		

Cell B7

Cell B16

SUBTOTAL formula

- Copy cell B17 to C17:M17. All monthly subtotals are entered.
- In cell N17, type **=SUBTOTAL(9,B7:M7,B16:M16)**, as shown in Figure 5-21. Press **Enter**. This formula adds all nonutility and utility expenses for the year.

Figure 5-21

Entering the SUBTOTAL function to add two cell ranges

135	1620		
625			
1965	=SUBTOTAL(9,B7:M7,B16:M16)		

4. SAVE the workbook.

PAUSE. LEAVE the workbook open to use in the next exercise.

The SUBTOTAL function uses the syntax =SUBTOTAL(*function_num,ref1,[ref2],...*).

As you enter the SUBTOTAL function, Excel, displays a list of the function numbers for the first argument. The function number for SUM is 9. You can learn the function numbers for other functions, such as AVERAGE, COUNT, and COUNTA, when entering the SUBTOTAL function or by searching for SUBTOTAL in Excel Help.

Ref1 is the first cell reference, cell range, or named range you want to subtotal. You can include additional cells or ranges by separating them with commas.

In the exercise, you also used the SUBTOTAL function to calculate the total for the budget in cell N17. Creating a total is a standard bookkeeping technique, and allows you to track and adjust subtotals while keeping the final total current.

Modifying Ranges for Subtotaling

Once you create a range in a subtotal, you can easily modify it by editing the range in the formula. You can also modify ranges that are already used in formulas that include the SUBTOTAL function.

STEP BY STEP

Modify Ranges for Subtotaling

GET READY. USE the workbook you modified in the previous exercise.

1. In cell N17, notice that the result of the current formulas is **24,230**.
2. Use the formula bar to modify the formula in N17 like this: **=SUBTOTAL(9,Nonutility_Subtotals,Utility_Subtotals)**. See Figure 5-22. Press **Enter**. This formula replaces the cell ranges with named ranges to add all nonutility and utility expenses for the year, and the result remains the same at **24,230**.

Figure 5-22

Modifying the SUBTOTAL function to use named ranges

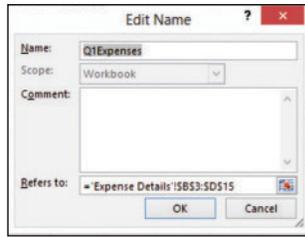
	B	C	D	E	F	G	H	I	J	K	L	M	N
	180	180	180	150	150	180	220	230	160	150	160	170	2110
	120	120	110	90	80	70	70	70	80	90	100	120	1120
	35	35	35	35	35	35	35	35	35	35	35	35	420
	50	50	50	50	50	50	50	50	50	50	50	50	600
	50	50	50	50	50	50	50	50	50	50	50	50	600
	65	65	65	65	65	65	65	65	65	65	65	65	780
	135	135	135	135	135	135	135	135	135	135	135	135	1620
	635	635	625	575	565	585	625	635	575	575	595	625	
	2775	1975	2065	1815	1905	1825	2165	2075	1815	1915	1835	1965	(btotals)

Modifying the formula

3. Click in cell **B19** and then click in the formula bar. Change the formula from =SUM(Q1Expenses) to **=SUBTOTAL(9,Q1Expenses)**. This cell sums the named range Q1Expenses. Because the named range includes monthly data and subtotals, you need to correct the range to include only subtotal figures.
4. On the FORMULAS tab, in the Defined Names group, click **Name Manager**.
5. Select **Q1Expenses** in the list and click **Edit**. The Edit Name dialog box opens (see Figure 5-23).

Figure 5-23

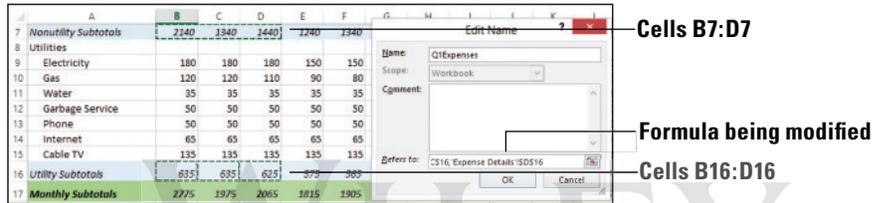
The Edit Name dialog box



6. Highlight everything in the Refers to text box and press **Backspace** to delete it.
7. Click cell **B7**, press and hold the **Shift** key, and click **D7**. The range B7:D7 is highlighted.
8. Press and hold the **Ctrl** key while clicking cells **B16**, **C16**, and **D16**. The selections are shown in Figure 5-24.

Figure 5-24

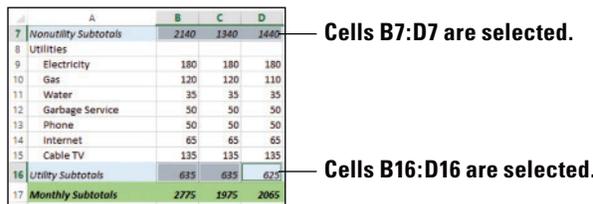
Selecting multiple ranges to include in the Q1Expenses named range



9. In the Edit Name dialog box, click **OK**.
10. In the Name Manager dialog box, click **Close**.
11. To verify that you selected the proper ranges for the Q1Expenses range, open the **Name** box drop-down list (to the left of the formula bar) and select **Q1Expenses**. The ranges B7:D7 and B16:D16 are selected (see Figure 5-25).

Figure 5-25

Verifying the new ranges for Q1Expenses



12. Create named ranges for **Q2Expenses (E7:G7, E16:G16)**, **Q3Expenses (H7:J7, H16:J16)**, and **Q4Expenses (K7:M7, K16:M16)**.
13. Copy the formula from cell **B19** to **B20:B22**. Edit the formulas in cells **B20**, **B21**, and **B22** to use the appropriate named range. For example, the formula in cell B20 should be =SUBTOTAL(9,Q2Expenses).
14. **SAVE** the workbook to your Lesson 5 folder and **CLOSE** it.

PAUSE. LEAVE Excel open to use in the next exercise.

UNCOVERING FORMULA ERRORS

Bottom Line

Formulas, because of the sometimes-complex mathematics behind them, are prone to errors when you enter them manually. Fortunately, Excel provides easy-to-use tools to find and correct problems. In this exercise, you intentionally create an error, and then learn how to correct that error.

Reviewing Error Messages

The best way to resolve an error is to analyze, or audit, the error message Excel provides for you. A warning icon appears to the left of cell errors, and clicking that icon provides a pop-up menu with formula evaluation and formula editing commands, and access to Excel Help.

STEP BY STEP

Review an Error Message

GET READY. LAUNCH Excel if it is not already running.



1. OPEN the *05 Budget Error* data file for this lesson.
2. Click in cell **S6**.
3. Edit the formula to change S3 to **R3** and press **Enter**. The first cell reference in the PMT formula now points to the wrong cell. A #VALUE! error displays in cell S6 (see Figure 5-26).

Figure 5-26

An error displays in cell S6.

R	S
Electronics	
Interest	7.50%
Years	2
Loan Amt	2500
Payment	#VALUE!

4. Click in cell **S6**. Click the small, yellow warning icon to the left of the cell. A pop-up menu appears (see Figure 5-27). The first item tells you that there is a value error in the function.

Figure 5-27

The pop-up menu for the error

R	S	T	U
Interest	7.50%		
Years	2		
Loan Amt	2500		
Payr	#VALUE!		

Error in Value

- Help on this error
- Show Calculation Steps...
- Ignore Error
- Edit in Formula Bar
- Error Checking Options...

5. In the menu, select **Help on this error**. Excel Help opens to a page on information regarding formula errors. Browse the help topics to see if any of the potential solutions apply to your situation.
6. CLOSE the Excel Help window.
7. SAVE the workbook to your Lesson 5 folder as *05 Budget Error Solution*.

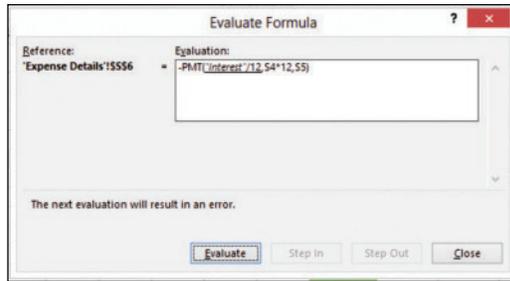
PAUSE. LEAVE the workbook open to use in the next exercise.

Notice the small green triangle in the upper-left corner of cell S6. This means the cell contains a formula error.

To evaluate the error in the formula, select the Show Calculation Steps option from the pop-up menu that appears after you click the warning icon. The Evaluate Formula dialog box, shown in Figure 5-28, indicates the first part of the function is incorrect. In this case, the reference to cell R3 points to a cell containing text. The cell reference should be S3, which contains the interest figure.

Figure 5-28

The Evaluate Formula dialog box



Once you know how to correct an error, you can click the warning icon and select Edit in Formula Bar from the pop-up menu. Make the necessary corrections directly in the formula.

Tracing and Removing Trace Arrows

It's not always easy to resolve a formula error, even using the Show Calculation Steps command, the Evaluate Formula dialog box, and Excel Help. Another method is to use **trace arrows**, which show the relationship between formulas and the cells they refer to.

STEP BY STEP

Trace a Formula and Remove Trace Arrows

GET READY. USE the workbook you modified in the previous exercise.

1. Select cell **S6** if it's not already selected.
2. On the FORMULAS tab, in the Formula Auditing group, click **Trace Precedents**. Two arrows appear (see Figure 5-29). One arrow extends from cell R3 to cell S6, and another (combined) arrow extends from cells S4 and S5 to S6. The arrows indicate that the formula in cell S6 refers to cells R3, S4, and S5, referred to as *precedent cells*.

Figure 5-29

The worksheet showing trace precedents

R	S
Electronics	
Interest	7.50%
Years	2
Loan Amt	2500
Payment	#VALUE!

3. On the FORMULAS tab, in the Formula Auditing group, click **Remove Arrows**. The trace arrows disappear from the worksheet.
4. Click cell **S4**. On the FORMULAS tab, in the Formula Auditing group, click **Trace Dependents**. One arrow appears from cell S4 to cell S6 (see Figure 5-30). The arrow indicates that cell S4 is part of the formula in cell S6.

Figure 5-30

The worksheet showing trace dependents

R	S
Electronics	
Interest	7.50%
Years	2
Loan Amt	2500
Payment	#VALUE!

5. SAVE the workbook and CLOSE it.

PAUSE. LEAVE Excel open to use in the next exercise.

You can use trace precedents and trace dependents for formulas that reference cells in another workbook. However, the external workbook must be open before you use the trace commands.

DISPLAYING AND PRINTING FORMULAS

Bottom Line

When you audit the formulas in a worksheet, you might find it useful to print the worksheet with the formulas displayed. In this exercise, you display formulas for printing.

STEP BY STEP

Print Formulas

GET READY. LAUNCH Excel if it is not already running.



1. OPEN *05 Budget Print* from your Lesson 5 folder.
2. On the FORMULAS tab, in the Formula Auditing group, click **Show Formulas**. The formulas appear in the worksheet (see Figure 5-31).

Figure 5-31

Formulas displayed in the worksheet

Expense Category	Jan	Feb	Mar	Apr	May	June	July	Aug
Rent	1200	1200	1200	1200	1200	1200	1200	1200
Renter's Insurance	40	40	40	40	40	40	40	40
Furnishings	500							
Miscellaneous	400	100	200		100	100	300	200
Nonutility Subtotals	=SUM(B3:B6)	=SUM(C3:C6)	=SUM(D3:D6)	=SUM(E3:E6)	=SUM(F3:F6)	=SUM(G3:G6)	=SUM(H3:H6)	=SUM(I3:I6)
Utilities								
Electricity	180	180	180	150	150	180	220	230
Gas	120	120	110	90	80	70	70	70
Water	35	35	35	35	35	35	35	35



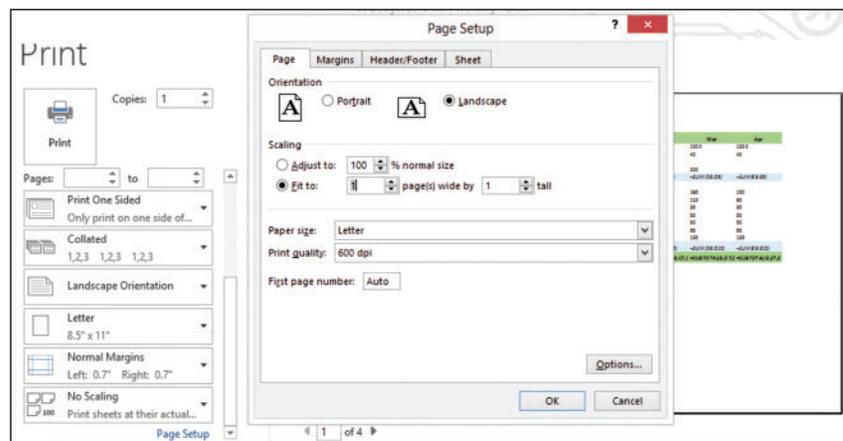
Another Way

You can also display formulas in the worksheet by pressing **Ctrl + `** (the grave accent mark). The grave accent mark is usually located on a key on the upper-left part of the keyboard.

3. Click the **FILE** tab. Click **Print** and view the Print Preview.
4. Click the **Portrait Orientation** button and select **Landscape Orientation**.
5. At the bottom of the print settings, click the **Page Setup** link to open the Page Setup dialog box.
6. On the Page tab of the dialog box, click **Fit to:** and leave the defaults as **1 page(s) wide** by **1 tall** (see Figure 5-32). Click **OK** to close the dialog box.

Figure 5-32

Settings in the Page Setup dialog box



7. At the top-left corner of the Backstage view window, click the **Print** button to print the worksheet with formulas displayed.



You learn more about print options in Lesson 7, “Formatting Worksheets.”

8. On the FORMULAS tab, in the Formula Auditing group, click **Show Formulas** again to stop displaying formulas in the worksheet.
9. SAVE the workbook to your Lesson 5 folder as **05 Budget Print Solution** and CLOSE it.

CLOSE Excel.

SKILL SUMMARY

In this lesson you learned how:	Exam Objective	Objective Number
To find tools for building functions on the FORMULAS tab.		
To display dates and times with functions.		
To use the SUM function.	Demonstrate how to apply the SUM function.	4.2.1
To use the COUNT function.	Demonstrate how to apply the COUNT function.	4.2.3
To use the AVERAGE function.	Demonstrate how to apply the AVERAGE function.	4.2.4
To use the MIN and MAX functions.	Demonstrate how to apply the MIN and MAX functions.	4.2.2
To use the PMT financial function.		
To use formulas to create subtotals.		
To respond to formula errors.		
To display and print formulas.		

Knowledge Assessment

Multiple Choice

Select the best response for the following statements.

- Which of the following calculates the total from the adjacent cell through the first nonnumeric cell by default, using the SUM function in its formula?
 - AVERAGE
 - AutoSum
 - COUNTA
 - MAX
- The arguments of a function are contained within which of the following?
 - brackets
 - asterisks
 - commas
 - parentheses

3. When using the SUBTOTAL function, which is the function number for the SUM function?
 - a. 1
 - b. 4
 - c. 9
 - d. 11
4. You want to add a range of cells and then divide by the number of cell entries, determining the mean value of all values in the range. Which function do you use?
 - a. SUBTOTAL
 - b. AVERAGE
 - c. COUNT
 - d. PMT
5. Which of the following is *not* a required argument for the PMT function?
 - a. Fv
 - b. Rate
 - c. Nper
 - d. Pv
6. You want to calculate the number of nonblank cells in your worksheet. Which function do you use?
 - a. SUM
 - b. COUNT
 - c. COUNTA
 - d. MAX
7. You want to create a formula that calculates the number of years you have lived. You were born in 1991. Which of the following formulas is correct?
 - a. =YEAR(TODAY())-1991
 - b. =YEAR(TODAY()+1991
 - c. =YEAR(COUNT())-1991
 - d. =YEAR(COUNT()+1991
8. Which of the following statements accurately describes the default selection for AutoSum?
 - a. You must make the selection before clicking AutoSum.
 - b. By default, AutoSum totals all entries above the cell in which the formula is located, even if the cells contain a mix of numeric and nonnumeric content.
 - c. By default, AutoSum calculates the total from the adjacent cell through the first nonnumeric cell.
 - d. AutoSum does not have a default selection.
9. You want to sum multiple noncontiguous cell ranges that are named. Which of the following is best to use?
 - a. AutoSum
 - b. SUBTOTAL
 - c. MAX
 - d. MIN
10. The COUNT and MIN functions are examples of which category of functions?
 - a. text
 - b. statistical
 - c. financial
 - d. logical

True / False

Circle T if the statement is true or F if the statement is false.

- T F 1. All functions require arguments within parentheses.
- T F 2. Using functions helps to ensure the accuracy of a formula's results.
- T F 3. The TODAY function returns the current date in a worksheet.
- T F 4. The AVERAGE function returns the number of cells in the selected range that contain text or values, but not blank cells.
- T F 5. When functions take more than one argument, you should enter them in multiple sets of nested parentheses, separated by commas.

- T F 6.** In the PMT function, the Nper argument is the total number of payments for the loan.
- T F 7.** You can use a range in the SUBTOTAL function, but you cannot modify the range once it's in use.
- T F 8.** A cell cannot be a trace dependent and a trace precedent for the same formula.
- T F 9.** You can refer to the TODAY and NOW functions in other formulas to perform calculations.
- T F 10.** To evaluate the error in the formula, select the Edit in Formula Bar option from the pop-up menu that appears after you click the warning icon.

Competency Assessment

Project 5-1: Use Statistical Functions to Analyze Game Wins and Losses

You work for Wingtip Toys and have been playing three new games each day to master them, hoping to demo the games in the retail store. You've been keeping track of your wins and losses in a worksheet. A "1" indicates a win, and a "0" indicates a loss.



GET READY. LAUNCH Excel if it is not already running.

1. OPEN the *05 Game Stats* data file for this lesson.
2. In cell E3, type `=AVERAGE(B3:D3)` and press **Enter**.
3. Copy the formula in E3 to E4:E12.
4. Click cell G2.
5. On the FORMULAS tab, in the Function Library group, click the **AutoSum** button arrow and select **Count Numbers**.
6. Click cell B3 and drag the mouse pointer to cell D12.
7. Release the mouse and press **Enter** to accept the range B3:D12. The result, 30, is the total number of times you played the games in 10 days.
8. In cell G3, type `=SUM(B3:D12)` and press **Enter**. The result, 17, represents the total number of times you won the games.
9. In cell G4, type `=G2-G3` and press **Enter**. The result, 13, represents the total number of times you lost the games.
10. On the FORMULAS tab, in the Formula Auditing group, click **Show Formulas**. The formulas appear in the worksheet.
11. Click the **Show Formulas** button again to turn off the display of formulas.
12. SAVE the workbook to your Lesson 5 folder as *05 Game Stats Solution* and then CLOSE the file.

LEAVE Excel open to use in the next project.

Project 5-2: Create Formulas to Calculate Totals and Averages

An employee at Wingtip Toys has entered second quarter sales data into a worksheet. You will enter formulas to calculate monthly and quarterly totals and average sales.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN *05 Wingtip Toys Sales* from the data files for this lesson.
2. Click cell B11, type `=SUM(B4:B10)`, and press **Enter**.

3. Click cell **C11**. On the FORMULAS tab, in the Function Library group, click **Insert Function**.
4. In the Insert Function dialog box, select **SUM** and click **OK**.
5. In the Function Arguments dialog box, click **Collapse Dialog** and select **C4:C10**, if it's not already entered.
6. Click the **Expand Dialog** button and click **OK** to close the dialog box.
7. Copy the formula from **C11** to **D11**.
8. Click cell **E4**. On the FORMULAS tab, in the Function Library group, click the **AutoSum** button. Press **Enter** to accept **B4:D4** as the cells to total.
9. Click cell **E5** and then in the Function Library group click **Insert Function**. In the Insert Function dialog box, **SUM** will be the default. Click **OK**.
10. The range B5:D5 should appear in the Number1 box in the Function Arguments dialog box. Click **OK** to close the dialog box.
11. Click cell **E5** and use the fill handle to copy the formula to **E6:E10**.
12. Click cell **E11**. In the Function Library group click **AutoSum**. Press **Enter** to accept the range as **E4:E10**.
13. Click cell **F4**. Click the **Insert Function** button. Select **AVERAGE** in the Insert Function dialog box and click **OK**. In the Function Arguments dialog box, click **OK**.
14. Click in the formula bar and change **E4** to **D4**. Click **OK**.
15. Click cell **F4** and use the fill handle to copy the formula to **F5:F11**.
16. SAVE the workbook to your Lesson 5 folder as **05 Wingtip Toys Sales Solution** and then CLOSE the file.

LEAVE Excel open to use in the next project.

Proficiency Assessment

Project 5-3: Compare Payments

Monica recently graduated from college and needs to replace her current vehicle. She wants to use Excel 2013 to help her decide whether she should buy a lower priced vehicle or something newer.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN **05 Compare Payments** from the data files for this lesson.
2. Enter a formula that displays today's date in cell B2.
3. Enter a formula in cell B4 that calculates a monthly interest rate based on the rate displayed in B3. Be sure to use an absolute cell reference to B3.
4. Use the PMT function to calculate loan payments for each dollar amount below the Amount Borrowed heading. Be sure to use absolute cell references for the rate and nper arguments, and add a minus sign before PMT in the formula so the result is a positive value.
5. SAVE the workbook to your Lesson 5 folder as **05 Compare Payments Solution** and then CLOSE the file.

LEAVE Excel open for the next project.

Project 5-4: Resolve Formula Errors

You work for the School of Fine Arts and have been asked to correct errors in a student GPA worksheet.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN *05 Fine Art Formulas* from the data files for this lesson.
2. An error occurs in cell F4. Examine the formula in the formula bar and correct the error manually.
3. For the error in cell F6, click the **warning icon** and use one of the options in the pop-up list to correct the error.
4. For the error in cell F12, use the Show Calculation Steps command to determine the source of the error and then correct the error using the formula bar.
5. One of the formulas at the bottom of the worksheet needs to be corrected. Use trace arrows to determine which formula's range includes an extra cell and correct the formula.
6. SAVE the workbook to your Lesson 5 folder as *05 Fine Art Formulas Solution* and then CLOSE the file.

LEAVE Excel open for the next project.

Mastery Assessment

Project 5-5: Build Formulas to Track Merchandise Stock Levels

Wide World Importers sells a variety of fine wool rugs, textiles, ceramics, furniture, and statues from the Middle East. The company tracks levels of stock in nine different categories, and keeps several units of each type of stock in five warehouses spread across the region. You have been asked to track all 45 stock levels.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN *05 Importers Stock* from the data files for this lesson.
2. Use the SUM formula to total the number of stock units in each warehouse.
3. Calculate the number of stock units that are at zero (0) across all six warehouses in cell B14.
4. Calculate the maximum number of stock units in any warehouse in cell B15.
5. Calculate the minimum number of stock units in any warehouse in cell B16.
6. SAVE the workbook to your Lesson 5 folder as *05 Importers Stock Solution* and then CLOSE the file.

LEAVE Excel open for the next project.

Project 5-6: Complete the Analysis Sheet in the Budget Workbook

Blue Yonder Airlines wants to analyze the sales and expense data from its four-year history. You will complete the Analysis sheet to summarize the data.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN *05 Income Analysis Start* from the data files for this lesson.
2. On the Analysis sheet, calculate average sales for each of the four service categories using range names. Use Name Manager to examine range names in the workbook before you enter the formulas.
3. Calculate the average expenses for each of the four service categories.
4. Calculate the maximum sales for each of the four service categories.
5. Calculate the maximum expenses for each of the four service categories.
6. SAVE the workbook to your Lesson 5 folder as *05 Income Analysis Solution* and then CLOSE the file.

CLOSE Excel.

WILEY

Circling Back 1

The Graphic Design Institute offers associate's and bachelor's degrees in graphic design, with a full slate of in-classroom and online classes. Students from the United States and several other countries attend the Institute as full-time students during fall and spring semesters, or by participating in accelerated programs offered twice a year.

As an employee in the organization's home office, you create workbooks related to the Institute's programs and fundraising efforts.

Project 1: Creating a Workbook and Entering Data

Your first task is to create a workbook that can serve as the initial structure for recording students' GPAs. The student names you type in the worksheet are in an accelerated program and work with a specific instructor.

GET READY. LAUNCH Excel if it is not already running.

1. Open a new, blank workbook.
2. In cell A1, type **Graphic Design Institute** and press **Enter**.
3. In cell A2, type **Instructor: Sachin Karnik** and press **Enter**.
4. In cells A3:F3, type the following:
Name
ID
GD1
DM1
Type1
GPA
5. In cells A4:A14, type the following:
Con, Aaron
Cunha, Goncalo
Byham, Richard A.
Klimov, Sergey
Chopra, Manish
Davison, Eric
Hensien, Kari
Levitan, Michal
Paschke, Dorena
Wang, Tony
Ribaute, Delphine
6. Double-click the right border of column **A** to expand the column width.
7. In cell B4, type **13001**.
8. Copy cell **B4** to B5. In cell in B5, change 13001 to **13002**.
9. Highlight cells **B4:B5**, point to the fill handle in the lower-right corner of cell B5, drag it to cell **B14**, and release the mouse.
10. Click the **FILE** tab to open Backstage view. In the left pane, click **Save As** to display the save options.
11. Under Save As, click **Computer**, and then click **Browse**.
12. Use the left navigation pane in the Save As dialog box to navigate to your student data folder.

13. In the toolbar near the top of the Save As dialog box, click **New folder**. A folder icon appears with the words *New folder* selected.
14. Type **Circling Back** and press **Enter**.
15. Double-click the **Circling Back** folder.
16. In the File Name box, type **GPA Solution**.
17. Click the **Save** button.
18. CLOSE the file.

LEAVE Excel open for the next project.

Project 2: Using Basic Formulas and Functions

The Graphic Design Institute is supported in part by individual and corporate tax-deductible contributions. Contributors are asked to select a fund to which their contribution applies. It is your responsibility to create some simple statistics to help senior management understand the number of contributors, the average amount contributed per organization and per individual, and the minimum and maximum dollar amounts of all contributions.

GET READY. LAUNCH Excel if it is not already running.



1. Open **Contributions** from the student data files.
2. In cell A33, type **Total Contributions** and press **Enter**.
3. In cell C33, type **=SUM(C4:C32)** and press **Enter**.
4. Select cells **C4:C32**. On the FORMULAS tab, in the Defined Names group, click the **Define Name** button arrow and select **Define Name**.
5. In the New Name dialog box, accept the defaults and click **OK**. A range named Amount is created.
6. In cell B35, type **=COUNT(C4:C32)** and press **Enter**. The result represents the number of contributions made to Graphic Design Institute.
7. Click in **B36**. On the FORMULAS tab, in the Function Library group, click **Insert Function**. In the Insert Function dialog box, search for **AVERAGE**, select it in the Select a function list box, and click **OK**.
8. In the Function Arguments dialog box, click **Collapse Dialog** and select **C4:C21**.
9. Click the **Expand Dialog** button and click **OK** to close the dialog box. A triangle appears in the upper left corner of B36 and an error message button is displayed. Click the **button arrow**, and then click **Ignore Error**. The result in B36 represents the average dollar amount contributed by organizations.
10. Copy the formula in cell B36 to **B37**.
11. With B37 selected, change the range in the formula to **C22:C32**. A triangle appears in the upper left corner of B37 and an error message button is displayed. Click the **button arrow**, and then click **Ignore Error**. The result in B37 represents the average dollar amount contributed by individuals.
12. In cell B38, type **=MIN(Amount)** and press **Enter**. This formula uses the named range and displays the minimum dollar amount contributed by an organization or individual.
13. In cell B39, type **=MAX(Amount)** and press **Enter**. This formula displays the maximum dollar amount contributed by an organization or individual.
14. SAVE the workbook to your Lesson 5 folder as **Contributions Solution** in the Circling Back folder.

LEAVE the workbook open for the next project.

Project 3: Configuring a Workbook for Printing

You have prepared a workbook with data related to contributions to the Institute and have been asked to print copies for a meeting to be attended by senior management.

GET READY. USE the workbook you saved in the previous project.

1. Select cells **A1:C39**.
2. Click the **PAGE LAYOUT** tab, and in the Page Setup group, click the **Print Area** button and select **Set Print Area**.
3. Click the **FILE** tab to access Backstage view.
4. Click **Print** and view the document in the Print Preview pane.
5. Click the **Scaling** button arrow, and then click **Custom Scaling Options**.
6. In the Page Setup dialog box, in the Adjust to box, type **110**. This action makes the text a little larger without having to change the font in the document. Click **OK**.
7. Click **Print**.
8. Click anywhere in the worksheet to remove highlighting from the selection.
9. Check the Quick Access Toolbar. If you do not see the Quick Print button, click the **Customize Quick Access Toolbar** arrow at the end of the toolbar and select **Quick Print**. The Quick Print button appears on the toolbar, which you can use to print any Excel document in the future.
10. **SAVE** the workbook to your Lesson 5 folder as **Contributions Print Solution** in the Circling Back folder, and then **CLOSE** the file.

CLOSE Excel.
