



Instructor-Led Training

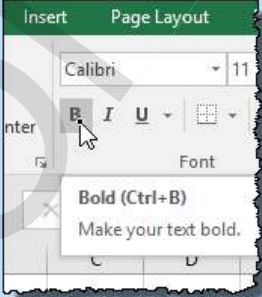

# Microsoft Excel 2016

*Level 1*

- ✓ Maps to Microsoft Office Specialist (MOS) objectives for exam for Excel 2016
- ✓ Realistic, hands-on exercises
- ✓ Downloadable ancillaries at [30bird.com](http://30bird.com)

## Exercise: Checking out Excel

Before you start, be sure that your computer is on and Windows is running. You'll start Excel and take a look around its interface.

Do This	How & Why
1. Follow your instructor's directions to start Excel.	The method you use depends on your version of Windows and how it is set up. In Windows 10, you can simply click the Excel icon on the taskbar at the bottom of the screen, or click <b>Start &gt; All Apps</b> and then click the Excel 2016 tile.
2. Click <b>Blank workbook</b> .	To open a new, blank workbook.
3. Observe the Excel window.	Most of the window is taken up by a worksheet, which is just a grid of cells.
4. Observe the column letters and row numbers.	The column letters identify the columns in an Excel workbook. They start at A, go to Z, then start again with AA to AZ, BA to BZ, and so on. There are 16,384 columns in an Excel worksheet, the last one being column XFD. The rows are numbered, and there are well over a million of them. The rows and columns intersect to form cells, which is where you enter and view data.
5. Observe the ribbon.	This is the large area of buttons, lists, menus, and palettes at the top of the window. It's organized into tabs (File, Home, Insert, and so on), and within in a tab, into groups.
6. Observe the Home tab.	It contains the most common commands, and is organized into groups (Clipboard, Font, Alignment, and so on).
7. Point to the <b>Bold</b> button.	To display a screen tip, explaining what the tool does.
8. Observe the Quick Access toolbar.	 <p>This is the small toolbar at the top left. It has just a few of the most useful commands. You can customize it however you like.</p> 
9. Observe the formula bar.	The formula bar is essentially an editing area for the data in a worksheet. Excel has many features to make data entry simple.

## Exercise: Opening and moving through a workbook

Excel is open and the sample data files for this exercise are accessible. In this exercise, you'll open a workbook containing invoice data and reports on that data, and learn to move around using various keyboard and mouse techniques.



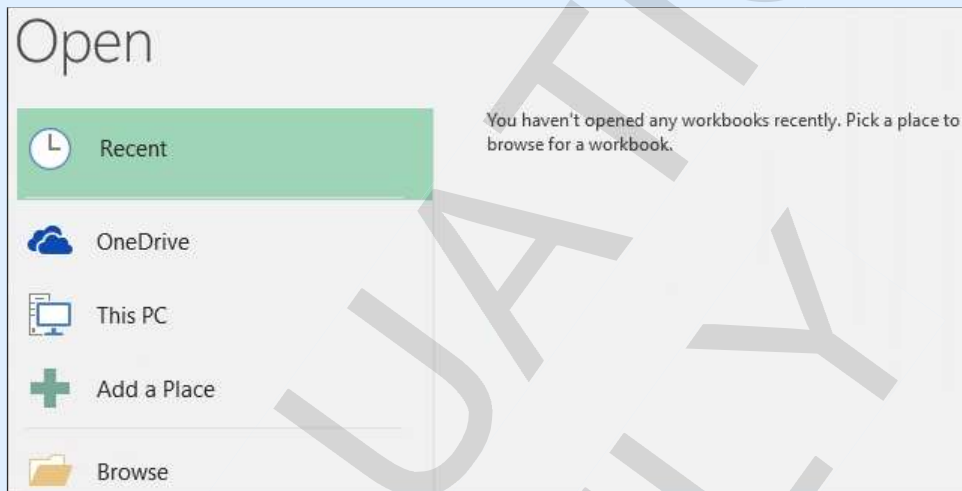
**Exam Objective:** MOS Excel Core 1.2.2, 1.4.7

### Do This

### How & Why

#### 1. Click the **File** tab.

To display Excel's Backstage view. This is the one ribbon tab that takes you off the ribbon. Backstage view is where you perform actions on files or change settings for workbooks, worksheets, or Excel itself. By default, the Open screen appears, giving you options for opening workbooks. If you've recently opened some workbooks, you'll see them listed here.



#### 2. Click **Browse**.

On the left, under **Open** in the list of places. Excel's Open window appears.

#### 3. Navigate to the current data folder.

Click **This PC** on the left, then use the list on folders and files on the right. The folder is called "Fundamentals." Your instructor can help you.

#### 4. Select **Invoice Data**, and click **Open**.

#### 5. Observe the workbook.

It contains invoice data for Java Tucana's sales of boxes of individual servings of coffees and teas for offices. Each row represents one invoice, showing the customer, sales representative, sales region, product, quantity, and amount.


#### 6. Click cell A6.

To select the cell and make it active. This cell contains a label, "Date," that identifies the data in the column below.

#### 7. Observe the Name box.

In the upper left. It shows the *address* of the active cell, which is the column letter followed by the row number.



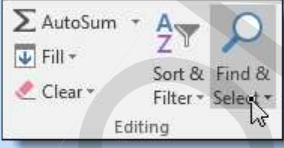
Do This	How & Why
8. Experiment with the arrow keys.	Pressing an arrow key moves the active cell one row or column in the direction of the arrow.
9. Drag over a range of cells.	To select them. Dragging selects a range, which is a rectangular block of cells. You refer to a range by its upper-left and lower-right corner cells, separated by a colon. For example, A2:C4.
10. Press <b>Ctrl+Home</b> .	To make cell A1 active. This can be very handy when you're far from home.
11. Press <b>Ctrl+End</b> .	To move to the last cell that contains data, cell H1004. This worksheet has about 1,000 rows of data. That might seem like a lot, but a worksheet can contain far more.
12. Press <b>Ctrl+Right Arrow</b> , then <b>Ctrl+Down Arrow</b> .	To move to the last cell in the worksheet. A worksheet has over 16,000 columns and over a million rows. That's room for a great deal of data.
13. Experiment with the scroll bars.	The scroll bars allow you to move your view of the worksheet without moving the active cell. The arrows at the top and bottom of the vertical scroll bar move on row up or down, while the arrows to the left and right of the horizontal scroll bar move one column left or right. Dragging the scroll boxes lets you move your view quickly.
14. Experiment with the Zoom control, and then return to 100% magnification.	The zoom control is in the lower-right corner of the Excel window. You drag it to change the level of magnification in the workbook. 
15. Click the <b>Reps</b> worksheet tab.	At the bottom of the screen. To activate the Reps worksheet. This worksheet contains a type of Excel report called a PivotTable which summarizes data by sales rep from the large list of invoices.
16. Activate the Customers worksheet.	Click its worksheet tab. This PivotTable summarizes by Customer.
17. Press <b>Ctrl+Page Up</b> .	To move one worksheet up in the stack. The Reps worksheet is now active.
18. Return to cell A1 on the Invoices worksheet.	Activate the worksheet by clicking its tab, then press <b>Ctrl+Home</b> .

## Exercise: Finding information in a workbook

The Invoice Data workbook is open, and the Invoices worksheet is active.



**Exam Objective:** MOS Excel Core 1.2.1, 1.2.2

Do This	How & Why
<p>1. On the Home tab, in the Editing group, click <b>Find &amp; Select</b>.</p>	 <p>These commands help you find data and move to certain places in the worksheet.</p>
<p>2. Click <b>Go To</b>.</p>	<p>You can also press <b>F5</b>. To display the Go To window. You can select a location or enter a reference to a cell you want to select.</p>
<p>3. In the Reference box, type H1004, then click <b>OK</b>.</p>	<p>To select cell H1004, the last cell in the worksheet that contains data.</p>
<p>4. Find an invoice that is associated with the Rep named "Franklin."</p>	
<p>a) Click <b>Find &amp; Select</b>, then click <b>Find</b>.</p>	
<p>b) In the Find what box, type Franklin.</p>	
<p>c) Click <b>Find Next</b>.</p>	<p>To find the first instance of the rep name, "Franklin." Note that the Find &amp; Replace window remains open.</p>
<p>5. Click <b>Find Next</b>.</p>	<p>To find another instance of the text, "Franklin," in the worksheet.</p>
<p>6. Click <b>Close</b>.</p>	<p>To close the Find &amp; Replace window.</p>

## Entering data

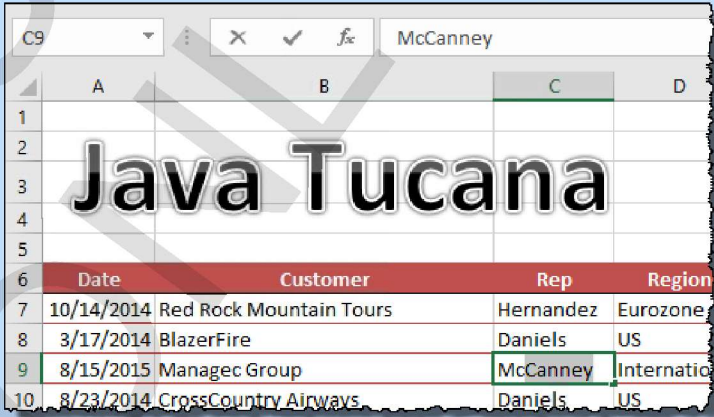

Entering and editing data is most of what you do in Excel. There are many kinds of data: numbers, text, dates, and formulas, for example. But the basics of entering data are always the same.

1. Select the cell or range where you want to enter data.
2. Type the data you want to enter.
3. Press **Enter** or click the Enter box (the check mark) on the formula bar.





### Exercise: Entering data in a cell

The Invoice Data workbook is open, and the Invoices worksheet is active.

Do This	How & Why
<ol style="list-style-type: none"> <li>1. Select cell C9.</li> <li>2. Type Mc and observe the screen.</li> </ol>	<p>Lloyd is not the correct sales representative for this invoice, so you will change the data.</p> <p>Several things happen as Excel goes into editing mode. What you type is beginning to show up in the cell as well as on the formula bar. Excel is also guessing that you want to enter a name that is already in this column, "McCanney."</p> 
<ol style="list-style-type: none"> <li>3. Press <b>Enter</b>.</li> <li>4. Select cell F9.</li> <li>5. Type 15 and observe the formula bar.</li> </ol>	<p>To accept "McCanney" as what you want to enter in the cell.</p> <p>This is the Units data for the same invoice. You'll change this number.</p> <p>When you are entering data in a cell, the formula bar gives you options for what to do with what you are entering.</p> 
<ol style="list-style-type: none"> <li>6. Click <input checked="" type="checkbox"/>.</li> </ol>	<p>To enter the new units figure. The Enter button is on the formula bar. You also could have pressed Enter.</p>

## Exercise: Saving and closing a workbook

The Invoice Data workbook is open, and you've made changes to it in a previous exercise. You'll save the changes you made to the Invoice Data workbook and then close it.

Do This	How & Why
1. Click <b>File</b> .	To display Backstage view. This is where you save, print, and perform other actions on workbooks and files.
2. Click <b>Save As</b> .	To display locations to which you can save the workbook.
3. On the right, under Current Folder, click <b>Fundamentals</b> .	To display the Save As window, with the Fundamentals folder selected. Here, you can change the name, location, or type of file for the workbook. When you open a file, the first save location you see will always be the currently folder.
4. Change the file name to My Invoice Data.	Click in the File Name box, and simply add the word "My" at the beginning. You can edit text in this box as you would anywhere in Windows.
5. Click <b>Save</b> .	Note that the title bar now displays the new name of the workbook. 
6. Change the product in cell E9 to Vela Herbal.	Select the cell, type "Vela Herbal," and press Enter. Just to make a change in the workbook.
7. Click  .	To save, or update, the file in the current location with the current name. Excel has an automatic saving feature, but it's safest to save periodically so you don't lose any work.
8. Click <b>File</b> .	To display Backstage view.
9. Click <b>Close</b> .	To close the workbook.

## Do This

## How &amp; Why

c) Press **Enter**.

4. In cell A4, enter *Rent*.

5. Enter labels in column A as shown.

Select cell A4, type "Rent," and press Enter. This is the first category of budget item. Notice that Excel left-aligns text by default. You can control alignment, though.

These labels identify the categories of expenses.

	A	B
3	Category	
4	Rent	
5	Remodeling	
6	Legal	
7	Equipment	
8	Supplies	
9	Advertising	
10	Payroll	
11	Miscellaneous	
12	Totals:	

6. Widen column A.

a) Observe cell A11.

The text spills into column B. That's fine now, but won't be when you put figures in that column.

b) Point to the border between column headings A and B.

The pointer looks like a two-headed arrow.

	A	B
3	Category	
4	Rent	

c) Drag the border to the right.

To widen the column enough to fit all the labels.

7. Enter labels in row 3 as shown.

These are the year labels for the budget.

	A	B	C
3	Category	Year 1	Year 2
4	Rent		

8. Save the workbook as *My Cafe Budget* in the *Creating Workbooks* folder.

a) Click **File**, then click **Save**.

b) Click **Browse**, then navigate to the *Creating Workbooks* data folder.

Your instructor can help you find it.

c) In the *File name* box, type *My Cafe Budget*.

d) Click **Save**.





## Entering numbers

You enter numbers the same way you enter any other data, by selecting a cell and typing. The main difference between text and numbers is that Excel can perform calculations on numbers (you can manipulate text as well, though). If you enter a number that has too many digits to display in a cell, Excel handles that in one of a few ways. You might see number signs rather than a partial number, which would be misleading.

A screenshot of an Excel spreadsheet. The formula bar at the top shows the value '972861069729873'. The spreadsheet grid shows columns A through E and rows 3 through 5. Row 3 has 'Category' in A, 'Year 1' in B, and 'Year 2' in C. Row 4 has 'Rent' in A and '#####' in B. Row 5 has 'Remodeling' in A.

In that case, you can simply widen the cell. If you enter a very large number, Excel might display it in scientific notation:

A screenshot of an Excel spreadsheet. The formula bar at the top shows the value '2000000000000000000'. The spreadsheet grid shows columns A through E and rows 3 through 5. Row 3 has 'Category' in A, 'Year 1' in B, and 'Year 2' in C. Row 4 has 'Rent' in A and '2E+18' in B. Row 5 has 'Remodeling' in A.

Scientific notation expresses a large number as a small one multiplied by 10 raised to a particular power. Here, Excel represented 2,000,000,000,000,000,000 as 2 times  $10^{18}$ .

If you enter a number with too many decimals to display, Excel rounds off the display, but does not actually round the stored number. Excel also allows you great control over the display of numbers.

By default, Excel right-aligns numbers, which allows them to line up better in a column.

### Entering data in a range

You can select a whole range and then quickly enter data in that range.

1. Select the range in which you want to enter the data.
2. Type the data for the first cell, and then press **Enter** or **Tab**.
3. Continue until you've entered all the data you want.

### Exercise: Entering numbers in a workbook

The My Cafe Budget workbook is open, and category and year labels have been entered.

Do This	How & Why
1. In cell B4, enter 24000.	Select cell B4, type 24000, and press Enter. To enter a Year 1 rent figure in the budget.
2. Observe cell B4.	The number appears right-aligned in the cell.
3. Select the range B5:B11.	To prepare to enter numbers in the rest of the range. Notice that the range is highlighted, indicated that it is selected. But only the first cell, B5, is active.
4. Type 1200 and press <b>Enter</b> .	To enter a Year 1 remodeling budget figure and to move the active cell to B6.

## Do This

## How &amp; Why



5. Enter the rest of the Year 1 budget figures as shown.

	A	B
3	Category	Year 1
4	Rent	24000
5	Remodeling	1200
6	Legal	5000
7	Equipment	9000
8	Supplies	12000
9	Advertising	4000
10	Payroll	60000
11	Miscellaneous	10000

6. Click  .

To save the workbook with its current name in its current location. You could instead press **Ctrl+S**, or click **Save** in Backstage view.

7. Close the workbook.

Click **File**, then click **Close**.

## Assessment: Entering data

By default, Excel left-aligns all **data that you enter**. True or false?

- True
- False

How does Excel handle text that is too wide for the column in which it appears?

- By cutting it off at the right-hand border of the cell.
- By spilling the text over into the next column.
- **It depends on what is in the next cell to the right.**

You can change the width of a column by using the mouse. True or false?

- True
- False

Which of the following are ways that Excel handles numbers that are too wide for a cell? Choose all that apply.

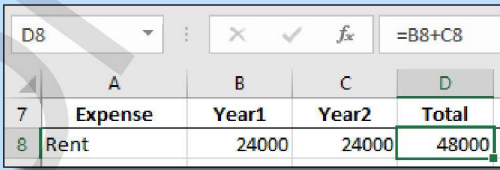
- **Scientific notation**
- Binary
- **Number signs (#####)**
- Rounding the stored number

## Exercise: Performing calculations with formulas

In this exercise, you'll open the framework of a café budget, and then enter simple formulas to calculate totals and monthly figures.



**Exam Objective:** MOS Excel Core 4.1.1

Do This	How & Why
1. Open Formula Basics.	It is in the Creating Worksheets data folder. The first worksheet in the workbook has labels and some values for a café budget.
2. Enter a total formula in D8.	
a) Select cell D8.	You'll enter a formula to total the Year 1 and Year 2 rent values.
b) Type =.	To begin to enter a formula. All formulas start with any equal sign.
c) Type B8.	This is the cell reference for the Year 1 rent value. Always use cell references in formulas, if you can. Notice that after you type the reference, Excel highlights the cell.
d) Type +C8.	The formula will add the value cell B8 to the value in cell C8. Excel highlights C8 in a different color. In this way, Excel lets you see all the cells or ranges to which your formula refers.
e) Press <b>Enter</b> .	To enter the formula. The cell now displays the correct total, 48000.
3. Select D8.	The cell displays the result, but if you look at the formula bar, you see the formula that you entered.
	
4. How would you calculate the monthly average rent?	You would divide the two-year total by 24, the number of months in two years.
5. In E8, enter the correct formula.	
a) Select E8 and type =.	
b) Click cell D8.	To enter a reference to it in the formula you are creating. You can enter references using the mouse, and it's often much easier to do it that way.
c) Type /24.	

## Do This

## How &amp; Why

d) Enter the formula.

Either by pressing Enter or clicking the Enter button on the formula bar. The average monthly rent for the first two years is 2000.

6. Enter the total and monthly formulas for remodeling.

The worksheet should look like this when you finish. You could enter the rest of the formulas in the same manner, but you'll be learning better ways.



	B	C	D	E
7	Year1	Year2	Total	Monthly
8	24000	24000	48000	2000
9	12000	2000	14000	583.3333

7. Save the workbook as My Formula Basics.

8. In C9, enter 4000.

To change the Year 2 remodeling expense figure. Notice that the formulas in cells D9 and E9 display updated values. This is the power of using formulas that operate on cell references.

	B	C	D	E
7	Year1	Year2	Total	Monthly
8	24000	24000	48000	2000
9	12000	4000	16000	666.6667

9. Save the workbook.

Click the Save button.

## Order of operations

Excel evaluates the operations in a formula according to its *order of operations*. If you remember a bit of basic algebra, this will be familiar to you. The order is summarized in the following table.

### Order of operations

Order	Operation	Operator	Example
1	Parentheses	()	=3*(A2+A3)
2	Negation	-	=-2
3	Percentage	%	=25%
4	Exponents	^	=A4^2
5	Multiplication	*	=A2*A3
5	Division	/	=A2/A3
6	Addition	+	=A2+A3
6	Subtraction	-	=A2-A3

## Exercise: Controlling the order of operations

The My Formula Basics workbook is open. You'll experiment with the order of operations in Excel formulas.



**Exam Objective:** MOS Excel Core 4.1.2

Do This	How & Why
1. Click the <b>Order of Operations</b> worksheet tab.	To activate the worksheet. The worksheet tabs are at the bottom of the window. This worksheet has some very simple sample data for experimenting with the order of operations.
2. Observe A1:D2.	This range contains a cost for an order of boxes, a cost for an order of wrapping paper, and the number of wrapped boxes that resulted from those orders. You'll calculate the average cost per wrapped box.
3. In D2, enter <code>=A2+B2/C2</code> .	To calculate the average cost. This seems like a reasonable formula, but it gets the wrong result, 2.75, because Excel evaluates the division ( <code>B2/C2</code> ) before the addition. You want to evaluate the addition first.
4. Revise the formula to read <code>=(A2+B2)/C2</code> .	
a) Select D2, and click in the formula bar.	To begin to edit the formula.
b) Insert parentheses as shown.	Click where you want each character, then type it. If you make a mistake, press Esc and start again.
c) Enter the formula.	Now, the calculation is correct (1.25).
5. Observe F1:H2.	Here, you see the costs of two items. In cell H2, you'll enter a formula to calculate the tax, at a rate of 8%, on both items.
6. In H2, enter <code>=8%*F2+G2</code> .	The result, 8.32, is incorrect. Excel first converts 8% to .08, then multiplies it by the value in F2. You need to force Excel to add F2 and G2 first.
7. Revise the formula to read <code>=8%*(F2+G2)</code> .	Now the formula shows the correct result, 0.96.
8. Save and close the workbook.	

	C	D
Cost	Wrapped Boxes	Cost per Wrapp
3		4=A2+B2/C2

`= (A2+B2)/C2`

## Entering functions

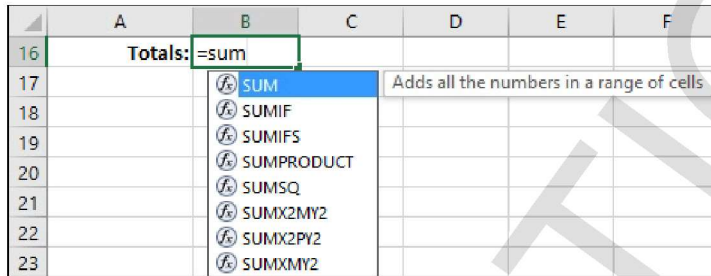
Excel provides many tools to help you enter functions. The basic process works like this.



**Exam Objective:** MOS Excel Core 4.2.1

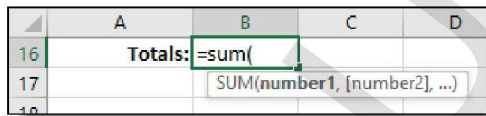
1. Select the cell where you want the function.
2. Type = and begin to type the name of the function.

As you begin to type letters, Excel displays a list of function names from which you can choose. If you're editing on the formula bar, the list appears there rather than next to the cell.



3. Finish typing the name of the function by typing an opening parenthesis, or select the name from the list, and press **Tab**.

Excel displays a tip box showing you what kinds of arguments the function expects. Required arguments are bold, while optional ones aren't. The SUM() function, for example, requires at least one number argument but can take many more, if you like.



4. Enter the arguments for the function.
  - Type values or cell references.
  - Click cells or drag over ranges to enter references to them.
  - Separate arguments by typing a comma.
5. Type a closing parenthesis, then press **Enter**.

If you've entered a valid function with valid arguments, it will be entered and the result will appear in the cell. If you've entered an invalid function, Excel might prompt you to fix it before you can enter it, or you might see an error value in the cell.

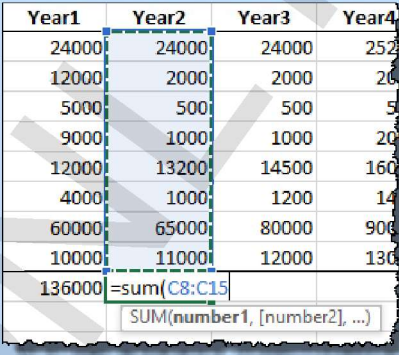
## Exercise: Using functions to calculate sums and averages

In this exercise, you'll open a budget workbook and enter functions to calculate totals and averages.



**Exam Objective:** MOS Excel Core 4.1.2, 4.1.5

Do This	How & Why
1. Open Budget Functions.	From the Creating Workbooks data folder. This workbook contains the sample cafe budget figures for five years.
2. In B16, enter the correct SUM() function.	

Do This	How & Why
<p>a) Select cell B16 and type =.</p> <p>b) Type <code>sum</code>.</p> <p>c) Type <code>(</code>.</p> <p>d) Type <code>B8:B15</code>.</p> <p>e) Type <code>)</code> and press <b>Enter</b>.</p>	<p>To begin to enter the function.</p> <p>As you type, Excel displays a list of functions that begin with the letters "sum." You can simply type the whole function name, or select it from this list.</p> <p>The open parenthesis signals that you have completed the function name and will now enter arguments for the function.</p> <p>The function will calculate the total Year1 expenses.</p> <p>To complete the function. The closing parenthesis is the last piece of every function, enclosing the arguments. The cell displays the correct total, 136000.</p>
<p>3. In C16, enter the <code>SUM()</code> function.</p> <p>a) In C16, type <code>=sum(</code>.</p> <p>b) Select C8:C15.</p>	<p>The name of the function and the opening parentheses. You'll enter the argument with the mouse this time.</p> <p>To enter a reference to that range as the argument for the <code>SUM()</code> function. In most cases, this is much easier and more accurate than typing the reference.</p>
	
<p>c) Type <code>)</code> and press <b>Enter</b>.</p>	<p>To complete and enter the function.</p>
<p>4. In G8, enter the correct <code>AVERAGE()</code> function.</p> <p>a) Select G8, click the formula bar, and type <code>=av</code>.</p> <p>b) In the list, click <b>AVERAGE</b>, then press <b>Tab</b>.</p> <p>c) Enter <code>B8:F8</code> as the argument.</p> <p>d) Complete and enter the function.</p>	<p>This time, you'll enter the function on the formula bar. Excel displays a list of functions beginning with "av."</p> <p>Notice that when you use this method, Excel inserts the opening parenthesis for you.</p> <p>Either by typing or by using the mouse.</p> <p>Type the closing parenthesis and press Enter.</p>
<p>5. Save the workbook as My Budget Functions.</p>	


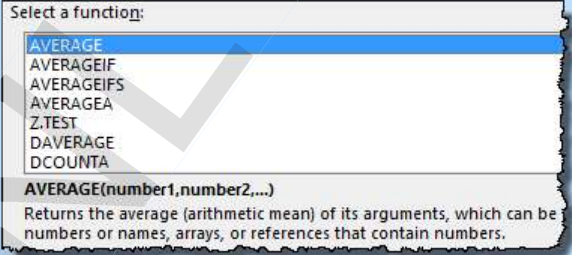
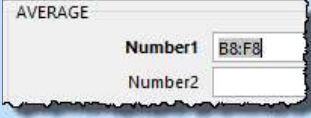
## 5. Enter the arguments you want.

You can type in the argument boxes or use the mouse. If the window is in the way, use the collapse buttons to make it smaller.

6. Click **OK**.

## Exercise: Inserting a function

The My Budget Functions workbook is open. You'll calculate an average by using the Insert Function feature.

Do This	How & Why
1. Clear the contents of G8.	Select G8 and press <b>Delete</b> . You're going to enter the function in a different way.
2. Select G8, then, on the formula bar, click  .	To display the Insert Function window.
3. Search for AVERAGE(). a) In the Search for a function box, type average. b) Click <b>Go</b> .	To display a list of functions relating to averages.
4. In the Select a function list, click <b>AVERAGE</b> .	The window shows a description of the selected function. 
5. Click <b>OK</b> .	To display the Function Arguments window. Here, you can enter arguments in a variety of ways. The window also tells you what kind of argument is expected (number, text, etc.). Notice that Excel has correctly guessed that you want to use the range of values immediately to the left (B8:F8). If it guessed wrong, you can type a reference or use the mouse to enter one. 
6. Click <b>OK</b> .	The correct formula is entered and the result, 24480, appears in the cell.
7. Save the workbook.	

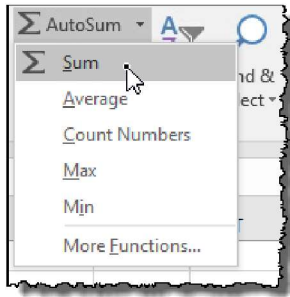


## Using AutoSum to enter functions

AutoSum is a wonderful time-saving feature that allows you to enter functions like SUM() and AVERAGE() in a single click. You can use AutoSum on a single cell, or to enter a similar function in a range of cells all at once.

1. Select the cell or cells in which you want the function or functions to go.
2. Click the **AutoSum** button to enter the SUM() function, or click the button's drop-down arrow to select a different function.

The AutoSum button is on the far right of the Home tab, in the Editing group.



The function appears in the cell, with a guess at the range you want to use as the argument.

3. If necessary, edit the argument.
4. Press **Enter**.

If you selected a range of cells, Excel goes ahead and enters all the functions without a separate step for editing the arguments. This gives you less control, but it gets a lot done quickly.

### Exercise: Using AutoSum to enter SUM() and AVERAGE()

My Budget Functions is open.

Do This	How & Why
1. Select D16.	
2. On the Home tab, in the Editing group, click <b>AutoSum</b> .	The Editing group is on the far right of the ribbon. Excel enters the SUM() function, and guesses, correctly, that you want to use D8:D15 as the argument.
3. Press <b>Enter</b> .	
4. Select E16:F16.	Next, you'll enter the remaining SUM() functions in a single step.
5. Click <b>AutoSum</b> .	Excel enters the correct function in both cells with a single click.
6. Delete the contents of D8.	Select G8 and press <b>Delete</b> . You'll enter the remaining AVERAGE() functions with a single click.
7. Select G8:G16.	

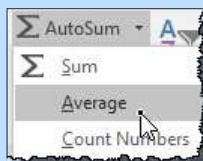
## Do This

## How &amp; Why



**Note:** This method works nicely when all of the data are well ordered. Sometimes, however, trying to enter multiple functions in this manner can lead to unexpected results.

8. Click the drop-down arrow next to the AutoSum button, then click **Average**.
9. Save and close the workbook.



Excel enters the correct AVERAGE() functions in the entire selected range.

### The completed My Budget Functions workbook





	B	C	D	E	F	G
7	Year1	Year2	Year3	Year4	Year5	Average
8	24000	24000	24000	25200	25200	24480
9	12000	2000	2000	2000	2000	4000
10	5000	500	500	500	500	1400
11	9000	1000	1000	2000	1000	2800
12	12000	13200	14500	16000	17600	14660
13	4000	1000	1200	1400	1600	1840
14	60000	65000	80000	90000	100000	79000
15	10000	11000	12000	13000	14000	12000
16	136000	117700	135200	150100	161900	140180

## Exercise: Moving data in a worksheet

In this exercise, you'll open a workbook showing a year of a café budget, and move that data using a couple of techniques.



**Exam Objective:** MOS Excel Core 2.1.3

Do This	How & Why
<p>1. Open Moving and Copying.</p>	<p>From the Creating Worksheets data folder, This workbook contains a first-year budget for a café. We'd like to move the budget info down a few rows.</p>
<p>2. Move the budget info down three rows.</p> <p>a) Select A7:N16.</p> <p>b) Click  .</p> <p>c) Select A10.</p> <p>d) Click the <b>Paste</b> button.</p>	<p>The Cut button is on the ribbon's Home tab, in the Clipboard group. A marquee appears around the cut data, telling you that you've placed it on the clipboard, ready to move.</p> <p>The Paste button is next to the Cut button.</p>
<p>3. On the Quick Launch toolbar, click  .</p>	<p>The budget data now begins in row 10.</p> <p>This is the Undo button. Very useful. You can also press <b>Ctrl+Z</b> to undo the last action. The budget moves back where it was.</p>
<p>4. Select A7:N16.</p> <p>5. Move the data down by dragging.</p> <p>a) Point to the border of the selected data.</p>	<p>This time, you'll move the data down by dragging it.</p> <p>This pointer shape, a four-headed arrow, tells you that you can drag the data.</p>
<p>b) Drag the data down a few rows.</p> <p>6. Undo the move.</p>	<p>Simply release the mouse when the data is where you want it. The data appears where you release the mouse.</p> <p>Click the Undo button or press <b>Ctrl+Z</b>.</p>
<p>7. Save the workbook as My Moving and Copying.</p>	

## Copying data

Often, you want to create data that is identical to or similar to data you already have. For example, you'll likely use similar labels for similar budgets. You can copy and paste data to avoid having to enter the same information over and over.



**Exam Objective:** MOS Excel Core 2.1.2

1. Select the data you want to copy.
2. Click the **Copy** button, or press **Ctrl+C**.
3. Select the destination for the copied data.
4. Click the **Paste** button, or press **Ctrl+V**.

The data appears both in its original location and in the new location. The data is also still on the clipboard, in case you want to put it somewhere else as well.

### Copying data by dragging

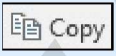
Just as you can move data by dragging, you can copy it that way as well. The only difference is that you need to hold down **Ctrl** while dragging. When you hold **Ctrl** and point to the border of selected data, the pointer takes the shape of an arrow with a plus sign.

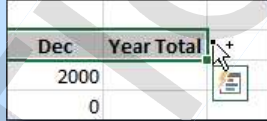
### Exercise: Copying data in a worksheet

My Moving and Copying is open.



**Exam Objective:** MOS Excel Core 2.1.2

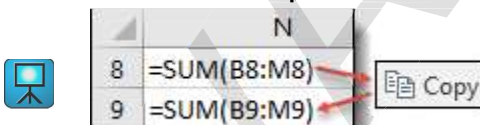
Do This	How & Why
1. Select A7:N7.	You'll make a copy of the budget monthly headings to use on the other worksheets, which will contain budget data for years 2 and 3.
2. Click  .	The Copy button is on the Home tab, in the Clipboard group, below the Cut button. A marquee appears, telling you that the data has been copied to the clipboard.
3. Click the Year 2 worksheet tab.	You'll paste the headings on this worksheet.
4. Select A7, and press <b>Ctrl+V</b> .	The headings appear on this worksheet.
5. Activate the Year 1 worksheet.	Click its worksheet tab. Notice that the headings are still there, because you copied, rather than cut them. Also, the marquee is still showing, meaning you can paste the copied headings again.
6. Paste the copied headings onto the Year 3 worksheet.	
a) On the Year 3 worksheet, select A7.	
b) Press <b>Ctrl+V</b> .	The headings appear on this worksheet.

Do This	How & Why
7. Update the workbook.	
8. Activate the Year 1 worksheet.	Notice that the marquee is gone. When you save, the clipboard is cleared. You can also clear it by pressing Esc.
9. Copy the monthly headings to row 20 by dragging.	
a) Select A7:N7.	If necessary.
b) While holding <b>Ctrl</b> , point to the border of the selected data.	The pointer takes the shape of an arrow with a plus sign.
	
c) Drag the selected headings to row 20.	When you get where you want the headings, release the mouse. A copy of the headings now appears in row 20.
10. Drag a copy of the row headings in A8:A16 below the new column headings.	Select them, point to the border while holding Ctrl, and drag them down.
11. Save the workbook.	

## Copying formulas

When you copy a formula that contains cell references, and then paste it into another location, Excel updates the references in the pasted formula relative to the new location.

### References in a copied formula



Because the formula in N8 was moved down one row, Excel increases the row numbers in the pasted formula by 1 each. So, B8 becomes B9, and M8 becomes M9. In this way, the formula continues to sum the values to the left of it. This kind of reference is called a *relative reference*.

## Exercise: Copying a formula in a worksheet

My Copying and Pasting is open. You'll copy formulas and observe how references are updated when you do.

Do This	How & Why
1. In N8, enter a function to calculate the sum.	You can use AutoSum, or enter the function manually, =SUM(B8:M8).
2. Copy N8 to N9.	Select N8, copy it, select N9, and paste.
3. Select N9.	Notice that the pasted formula refers to B9:M9. These are the correct references relative to the new location of the formula. That's because Excel uses relative references by default. When you paste a copied formula, Excel updates the references in the new formula.
4. Copy N9 to N10:N15.	
a) Select N9.	
b) Copy.	
c) Select N10:N15.	
d) Paste.	You can copy from one cell and paste into a range of cells in a single paste step.
5. In B16, calculate the Jan sum.	Use the SUM() function.
6. Copy B16 to C16:N16.	Select B16, copy it, select C16:N16, and paste.
7. Select N16.	Because this cell is 12 columns to the right of the copied cell, Excel changed the references from B8:B15 to N8:N15. Column N is 12 columns over from column B.
8. Save and close the workbook.	

### The completed budget

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
7	Expense	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
8	Rent	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	24000
9	Remodeling	10000	0	0	0	0	0	2000	0	0	0	0	0	12000
10	Legal	4000	500	0	0	0	0	0	500	0	0	0	0	5000
11	Equipment	8000	1000	0	0	0	0	0	0	0	0	0	0	9000
12	Supplies	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000
13	Advertising	3000	100	100	100	100	100	100	100	100	100	100	100	4100
14	Payroll	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
15	Miscellaneous	800	800	800	800	800	800	800	800	800	800	800	800	9600
16	Totals:	33800	10400	8900	8900	8900	8900	10900	9400	8900	8900	8900	8900	135700

## Exercise: Experimenting with the limitations of relative references

In this exercise, you'll predict future years' values in a budget by using multiplier percentages. Then you'll copy those formulas to see the limitations of relative references.



**Exam Objective:** MOS Excel Core 4.1.1

Do This	How & Why
<p>1. Open Reference Types.</p>	<p>From the current data folder. This is a version of the café budget, projecting for five years. You're going to use the yearly modifier percentages in column I to project the future figures for rent, supplies, and payroll.</p>
<p>2. In C8, enter =B8*I8.</p>	<p>The formula calculates the projected rent for Year 2.</p>
<p>3. Copy C8 to D8:F8.</p>	<p>There is a problem with the copied formulas. D8, E8, and F8 all display 0.</p>
<p>4. Select D8.</p> <p>In the copied formula, the reference to B8 was correctly adjusted to C8. But Excel also adjusted the reference to the multiplier in I8, which is now referring to J8, a blank cell. Relative references always adjust relatively to their new location, and when you have single values like a multiplier, that's not what you want to happen.</p>	
<p>5. Undo the pasting of the formulas and the entry of the formula in C8.</p>	
<p>6. Save the workbook as My Reference Types.</p>	

## Exercise: Using an absolute reference in a formula

The My Reference Types workbook is open. You'll use an absolute reference in a future year projection formula, then copy that formulas to the remaining year's projections.



**Exam Objective:** MOS Excel Core 4.1.1

Do This	How & Why
<p>1. Enter the projection formula in C8.</p> <p>a) In C8, type =B8*.</p> <p>b) Type \$I\$8.</p> <p>c) Enter the formula.</p>	<p>This time, you'll use an absolute reference to the projection percentage.</p> <p>But don't press Enter yet.</p> <p>To enter an absolute reference to cell I8.</p>
<p>2. Copy C8 to D8:F8.</p>	<p>The results now look good.</p>
<p>3. Select D8.</p>	<p>In the copied formula, the relative reference to B8 was adjusted to C8, but the absolute reference to \$I\$8 was not changed, so the formula is correct.</p>
<p>4. Enter the projection formula in C12.</p> <p>a) In C12, type =B12*I12.</p> <p>b) Press F4.</p> <p>c) Enter the formula.</p>	<p>This time, don't type the dollar signs. And don't press Enter yet.</p> <p>The reference to I12 changes to absolute, "\$I\$12."</p>
<p>5. Copy C12 to D12:F12.</p>	<p>The projections for supplies are correct, because the absolute reference to I12 is not being adjusted in the copied formulas.</p>
<p>6. Save the workbook.</p>	



## Exercise: Using a mixed reference in a formula

My Reference Types is open. You'll see a limitation of an absolute reference and use a mixed reference to get a better result.



**Exam Objective:** MOS Excel Core 4.1.1

Do This	How & Why
1. Copy C12 to C14.	On the surface, this looks reasonable as a projection for payroll in Year 2.
2. Select C14.	The formula is using I12 as the multiplier, because the formula uses an absolute reference to it. You actually want the reference in the copied formula to be in the same column, but to a different row. This is a perfect case for using a mixed reference.
3. Undo the copied formula.	
4. Delete the Rent and Supplies projection formulas.	In C8:F8 and C12:F12. By using a mixed reference, you're going to make a single formula in C8 that can be copied to all the projections.
5. In C8, enter the projection formula.	
a) In C8, type =B8*I8.	Don't press Enter yet.
b) Press F4.	The reference changes to absolute, "\$I\$8," which is not what you want.
c) Press F4 again.	Now, you have a mixed reference, "I\$8." If you use this, when the reference is copied, the column letter will adjust, while the row number will stay fixed. That's not what you want.
d) Press F4 again.	This is the mixed reference you want, "\$I8." When this is copied, the column letter will stay fixed, but the row will adjust relatively to the new location.
e) Enter the formula.	
6. Copy C8 to D8:F8.	The formula works well when copied.
7. Copy C8 to C12:F12.	The formula also works when copied here. The mixed reference to \$I8 changes relatively to the row, but the column stays fixed, giving the correct \$I12 reference.
8. Copy C8 to C14:F14.	
9. Save and close the workbook.	