

2. Formulas and Series



In this chapter you will learn how to automatically complete a series of numbers, dates, or other items and work with more complex formulas in *Excel*. You will notice that creating an *Excel* data model is sometimes quite a considerable task. Therefore, these models are best used for regularly recurring calculations, such as monthly summaries or cost breakdowns.

The big advantage of a calculation model in *Excel* is that you can immediately see what the consequences are if the values change. For instance, you can view what happens if you implement a price increase or a cost savings without having to recalculate the figures all over again.

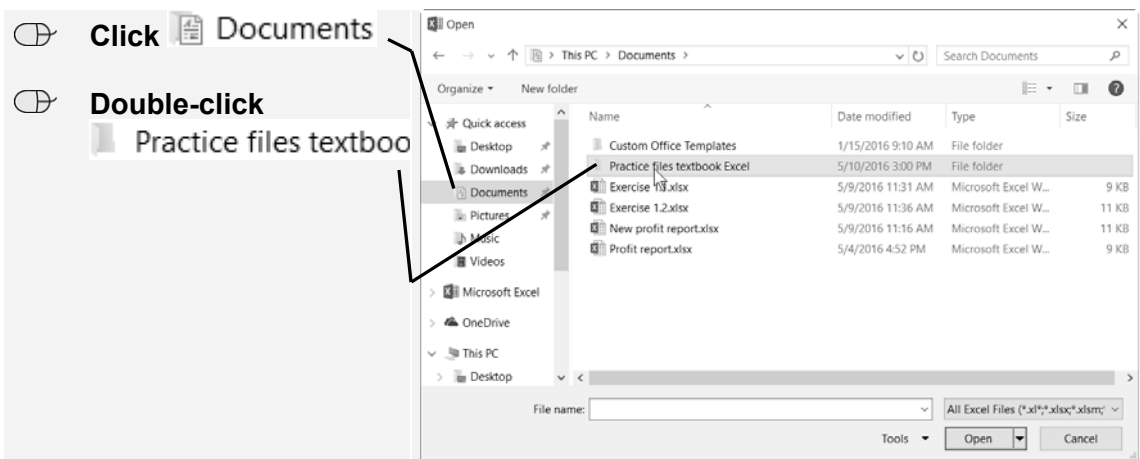
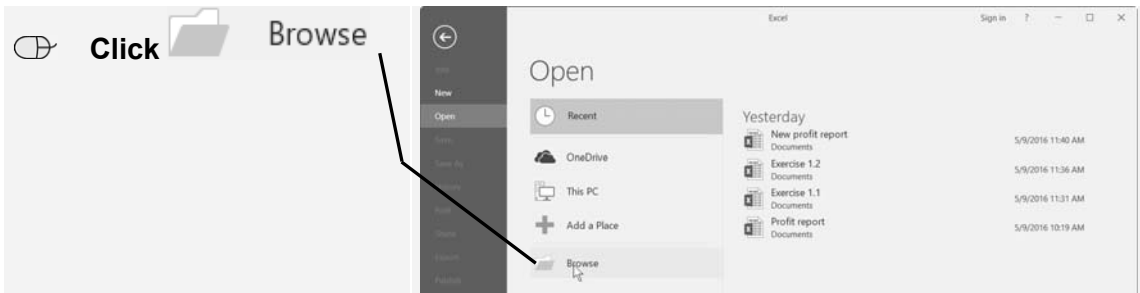
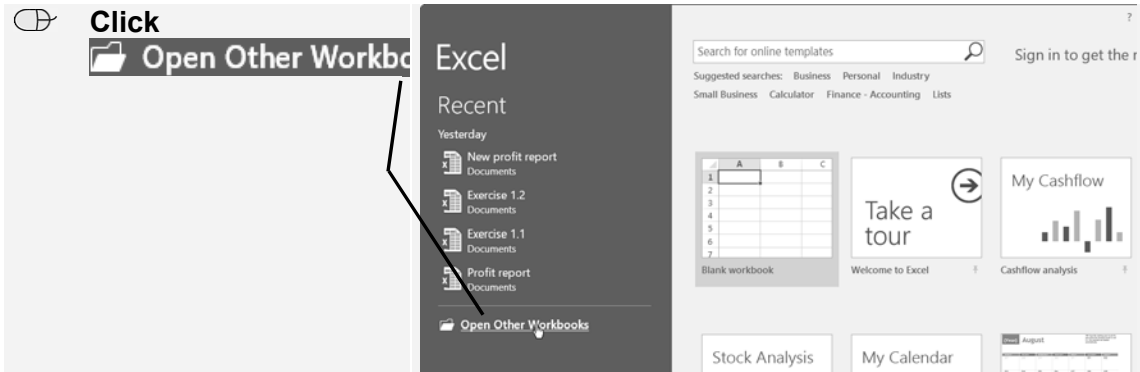
In this chapter you will learn:

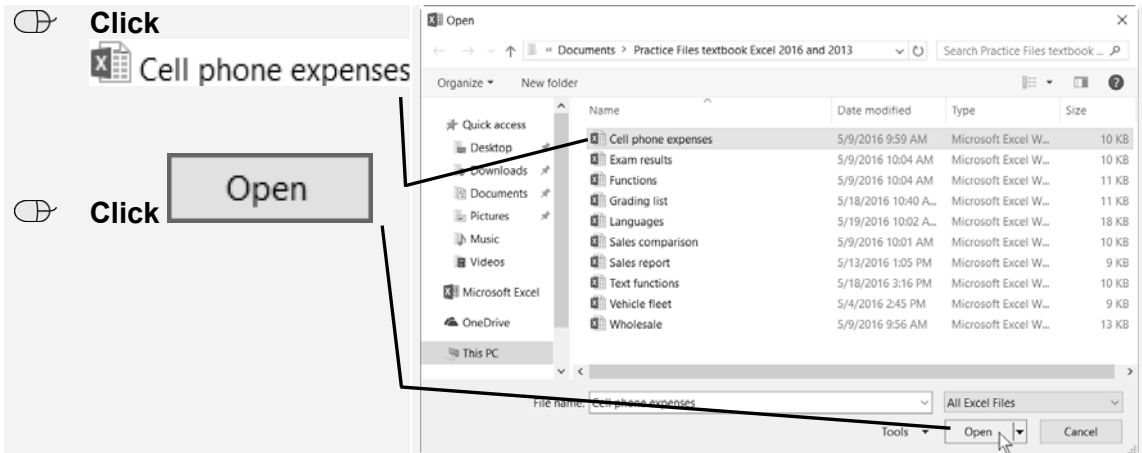
- how to copy a worksheet;
- how to automatically complete a sequence of months;
- what an absolute reference is;
- how *Excel* calculates;
- how to change the order of operation in a calculation;
- how to link cells to other worksheets;
- how to calculate a percentage;
- how to change cells into hyperlinks;
- how to protect worksheets;
- how to create unprotected cells;
- how to change the default settings of a workbook;
- how to set the number of worksheets;
- how to create a date series;
- how to create a series of weekdays;
- how to add your own series.

2.1 Copying a Worksheet

In the following exercise, you will need to open the practice file called *Telephone costs*:

 **Open Excel**  1

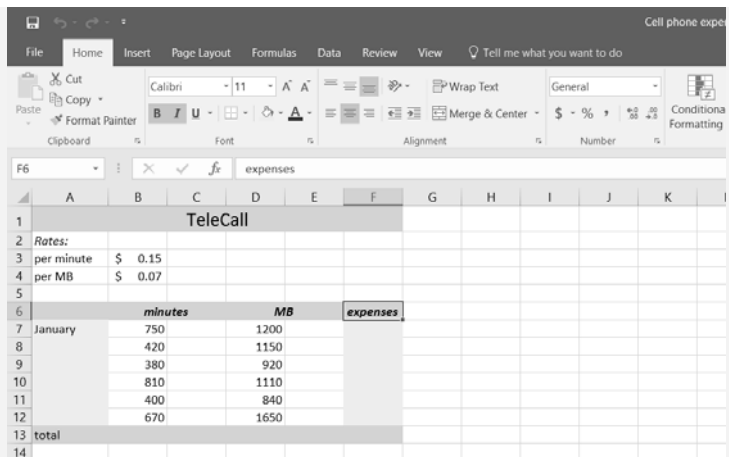




You will see the following worksheet about a fictitious cell phone plan:

First save this worksheet with a different name:

Save the worksheet in the folder (My Documents as My cell phone expenses

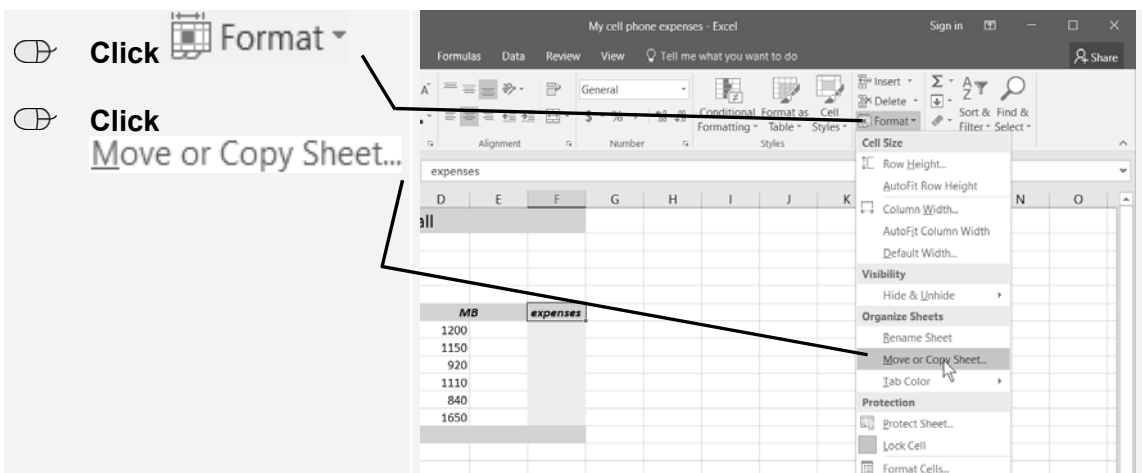


Tip

Save it first

Try to make a habit of first saving original workbooks with a different name before you change them. In case anything goes wrong while working on the workbook, you can always revert to the original. This also prevents you from overwrite the original if you accidentally use *Save* instead of *Save As*.

First copy this worksheet to two new worksheets so that you can calculate the data of two other providers in those sheets:



Click to check by
Create a copy

The sheet must be placed after sheet 1:

Click (move to end)

Click

The sheet has been copied:


In cell A1, type:
 BelAbo


Change the name of the worksheet to
 BelAbo

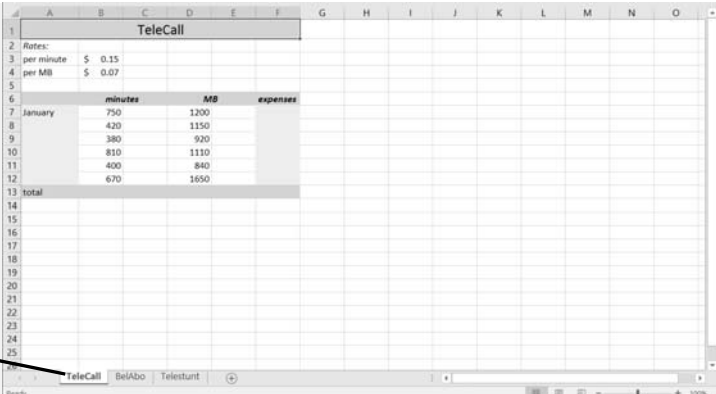
Copy this worksheet once more

In cell A1, type:
 Telestunt

Change the name of the worksheet to
 Telestunt


Go to the Sheet1 worksheet  41


Change the name of the worksheet to TeleCall  12

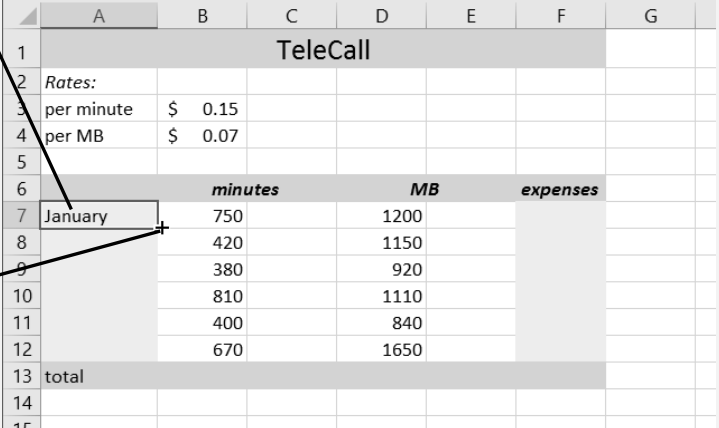


2.2 AutoFill


Excel can automatically complete several common sequences of data such as days and months. By typing a single day or month, *Excel* can fill in the subsequent days or months by itself. In this overview you will calculate the costs of a cell phone plan for the first half year. To do this, you can use the *AutoFill* function. This will automatically place the months February through June below January:

 **Click cell A7**

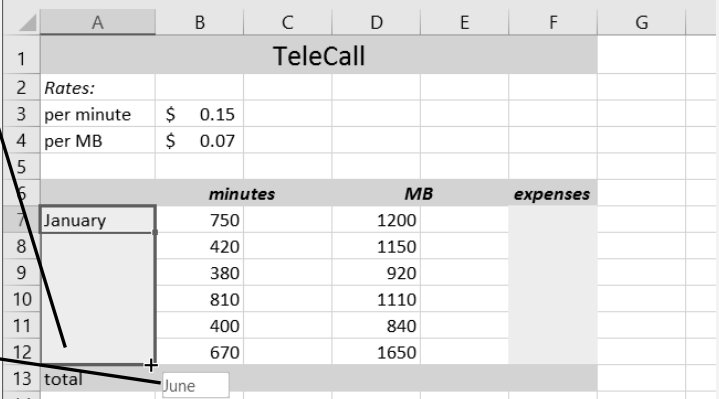
 **Point to the fill handle in the right-corner of cell A7**



	A	B	C	D	E	F	G
1	TeleCall						
2	Rates:						
3	per minute	\$	0.15				
4	per MB	\$	0.07				
5							
6		minutes	MB	expenses			
7	January	750	1200				
8		420	1150				
9		380	920				
10		810	1110				
11		400	840				
12		670	1650				
13	total						
14							
15							

 **Drag the pointer to cell A12**

You can see the month of June shown at the last cell:



	A	B	C	D	E	F	G
1	TeleCall						
2	Rates:						
3	per minute	\$	0.15				
4	per MB	\$	0.07				
5							
6		minutes	MB	expenses			
7	January	750	1200				
8		420	1150				
9		380	920				
10		810	1110				
11		400	840				
12		670	1650				
13	total						
14		June					

Release the mouse button

The months have now been completed:

	minutes	MB	expenses
January	750	1200	
February	420	1150	
March	380	920	
April	810	1110	
May	400	840	
June	670	1650	
total			

You can also do the same thing by using the ribbon. To do that:

Go to the BelAbo worksheet

Select cells A7:A12

In the **Editing** group of the **Home** tab:

Click [Down Arrow]

Click **Series...**

Click the radio button by **AutoFill**

Click [OK]

The months have now been completed:

	A	B	C	D	E	F	G
1	BelAbo						
2	Rates:						
3	per minute	\$	0.15				
4	per MB	\$	0.07				
5							
6		minutes		MB		expenses	
7	January	750		1200			
8	February	420		1150			
9	March	380		920			
10	April	810		1110			
11	May	400		840			
12	June	670		1650			
13	total						
14							



Tip

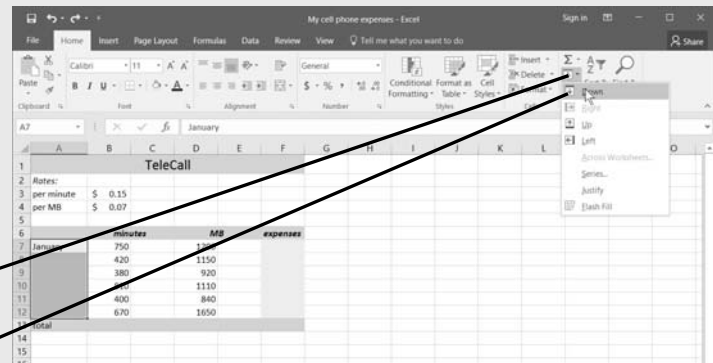
The same contents for all cells

You can add the same contents to all cells:

Select the source cell and the target cells for the contents 19

Click

Click **Down**




Now all cells have the same contents:


	A	B	C	D	E	F	G	H
1	TeleCall							
2	Rates:							
3	per minute	\$	0.15					
4	per MB	\$	0.07					
5								
6		minutes		MB		expenses		
7	January	750		1200				
8	January	420		1150				
9	January	380		920				
10	January	810		1110				
11	January	400		840				
12	January	670		1650				
13	total							
14								


If a series has a regularity, you can use the *AutoFill* function to complete it automatically. The *Telestunt* bills are sent quarterly. In order to use *AutoFill*, you must enter at least the first two cells of the series. In this case: January and April:



Go to worksheet *Telestunt* 41


 In cell A8, type: April

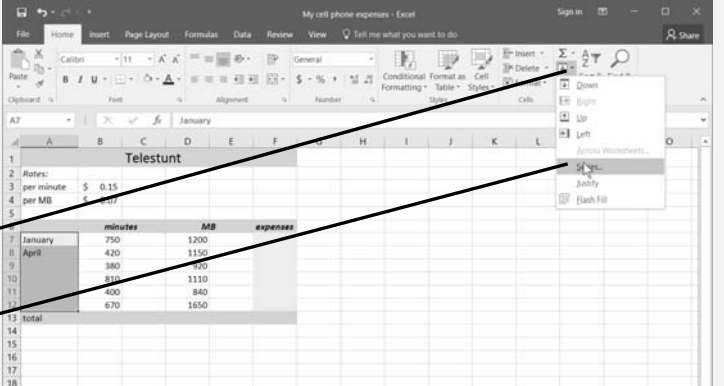
Telestunt			
1			
2	Rates:		
3	per minute	\$	0.15
4	per MB	\$	0.07
5			
6		minutes	MB
7	January	750	1200
8	April	420	1150
9		380	920
10		810	1110
11		400	840
12		670	1650
13	total		
14			


 Select cells A7:A12


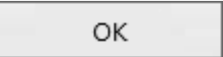
 19

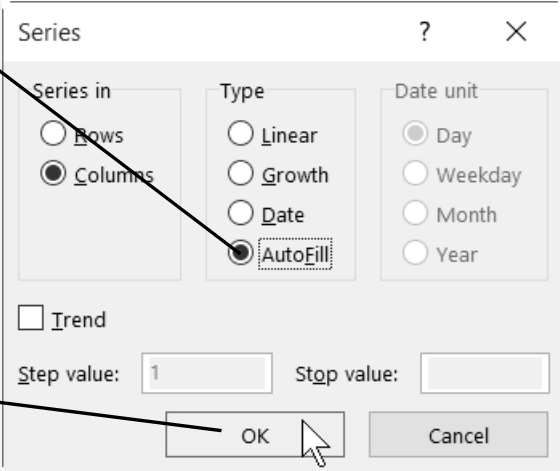
 Click 

 Click Series...





 Click the radio button by AutoFill

 Click 

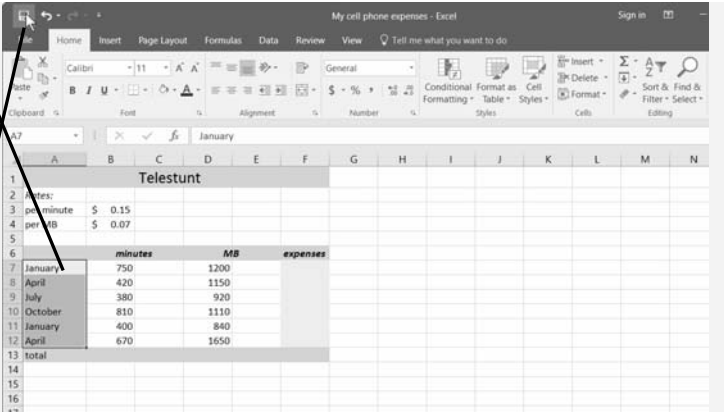


The months have now been completed:

First save the workbook:

 Click 

The previous version will be overwritten.



2.3 Absolute References

In *Section 1.9 Entering Simple Formulas* you learned to create simple formulas and in *section 1.10 Copying Formulas* you learned how to copy them. You will now calculate the call costs for the month of January by multiplying the number of minutes by the costs per minute:

Go to the TeleCall worksheet

In cell C7, type: =

Click cell B7

This is the number of called minutes. You will multiply this by the price per minute:

Type: *

Click cell B3

	A	B	C	D	E	F	G	H
1	TeleCall							
2	Rates:							
3	per minute	\$	0.15					
4	per MB	\$	0.07					
5								
6			minutes	MB	expenses			
7	January	750	=B7*B3	1200				
8	February	420		1150				
9	March	380		920				
10	April	810		1110				
11	May	400		840				
12	June	670		1650				
13	total							

Press Enter

You will see the call costs: \$ 112.50

Which is 750 minutes times \$ 0.15.

	A	B	C	D	E	F	G
1	TeleCall						
2	Rates:						
3	per minute	\$	0.15				
4	per MB	\$	0.07				
5							
6			minutes	MB	expenses		
7	January	750	\$ 112.50	1200			
8	February	420		1150			
9	March	380		920			
10	April	810		1110			
11	May	400		840			
12	June	670		1650			
13	total						
14							

Copy the formula from cell C7 to cell C12 by using the fill handle

	A	B	C	D	E	F	G
1	TeleCall						
2	Rates:						
3	per minute	\$	0.15				
4	per MB	\$	0.07				
5							
6			minutes	MB	expenses		
7	January	750	\$ 112.50	1200			
8	February	420		1150			
9	March	380		920			
10	April	810		1110			
11	May	400		840			
12	June	670		1650			
13	total						
14							

Extra Exercises

Foreword

This workbook is essential in preparing for the Microsoft Office Specialist® exam (MOS).

Once you have worked through the first chapters of this book, you will know how to perform the necessary actions in *Excel*. However, this does not mean that all actions have been mastered. The many exercises in this book allow you to practice even further with various types of assignments or tasks.

This additional training will ensure that you have the best possible preparation for the exam!


We wish you a lot of success with the exercises in this book and with the exam.

Studio Visual Steps

How to Use This Book

This book contains exercises to prepare you for the MOS exam *Excel*. The exercises are subdivided into footsteps exercises, do-it-yourself exercises and MOS exam exercises.

Footsteps Exercise

In this type of exercise all actions are marked by a footstep icon . This means the actions have already been handled earlier in the textbook. If you do not know how to perform an action, you can learn how to do so by looking for the corresponding number written next to the footstep icon in the appendix *How Do I Do That Again?* at the end of the book.

At the end of each exercise, reference is made to a file to compare the result with the program window, so you will see if you have done the exercise correctly. The final result files can be found in the practice files folder.

Do-It-Yourself Exercise

In this type of exercise, the required actions are not accompanied by the footstep icons. It is now expected that you can perform the necessary actions without the need of the footsteps. At the end of each exercise, reference is made to a file to compare the result with the program window. This will help you to see if you have done the exercise correctly.

MOS Exam Exercise

This exercise trains you through a simulation that is set on your PC. In this way, you get acquainted with how a MOS test will look like and be prepared for the test environment. At the end of the exercise, reference is made to a file to compare the result with the program window. You will be able to see right away if you have done the exercise correctly. On page 262 you can read how to do these exercises step by step.

The Website and Supplementary Materials

This book is accompanied by the website

www.visualstepsmosbooks.com/excel2016.php. The website features practice files and supplementary materials that you can download. Check the website often to see if there are any additions or errata published for this book.

Practice files

The practice files used in this book can be downloaded from

www.visualstepsmosbooks.com/excel2016-practicefiles.php. If these practice files are not yet on your computer, you will need to copy them first to your *(My) Documents* folder. A PDF file on the website explains how to do this. Carefully follow the instructions in the PDF file! If you do not do this, the practice files may end up in the wrong folder.

If you are working through this book at a school or other educational facility, then kindly ask your instructor where the practice files are located on the computer you are working on.


Results

The exercises in this books are accompanied by result files. You can use these files to check if you have done the exercises correctly. The result files are located in the practice files folder which can be downloaded from the web page listed above.

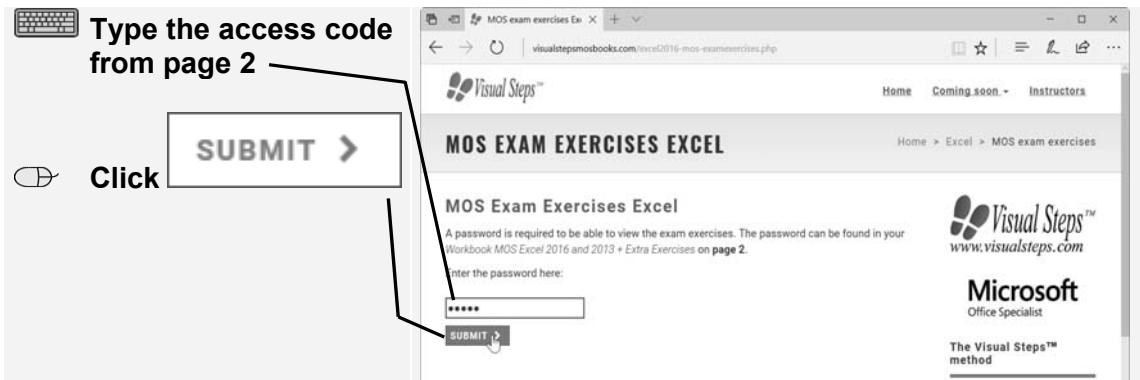
The MOS Exam Exercises


You can open the MOS exam exercises on the website for this book as follows:



 **Open the browser *Edge* or *Internet Explorer* on your desktop**

 **Open the web page www.visualstepsmosbooks.com/excel2016-mos-examexercises.php**

You will need to fill in the access code in order to open the MOS exam exercises:

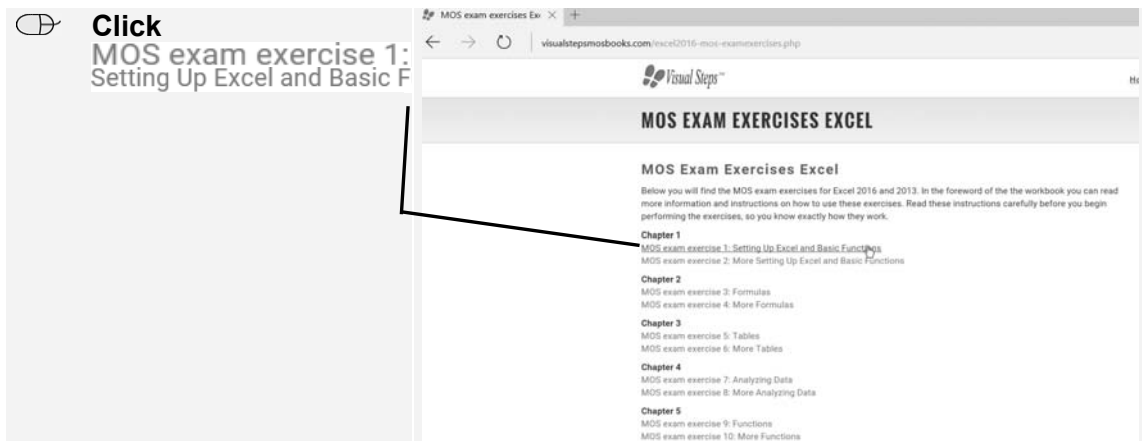


 **Type the access code from page 2**




 **Click** 

The screenshot shows a web browser window with the URL visualstepsmosbooks.com/excel2016-mos-examexercises.php. The page title is "MOS EXAM EXERCISES EXCEL". Below the title, it says "MOS Exam Exercises Excel" and "A password is required to be able to view the exam exercises. The password can be found in your Workbook MOS Excel 2016 and 2013 + Extra Exercises on page 2." There is a text input field for the password and a "SUBMIT >" button. The Visual Steps logo and Microsoft Office Specialist logo are also visible.

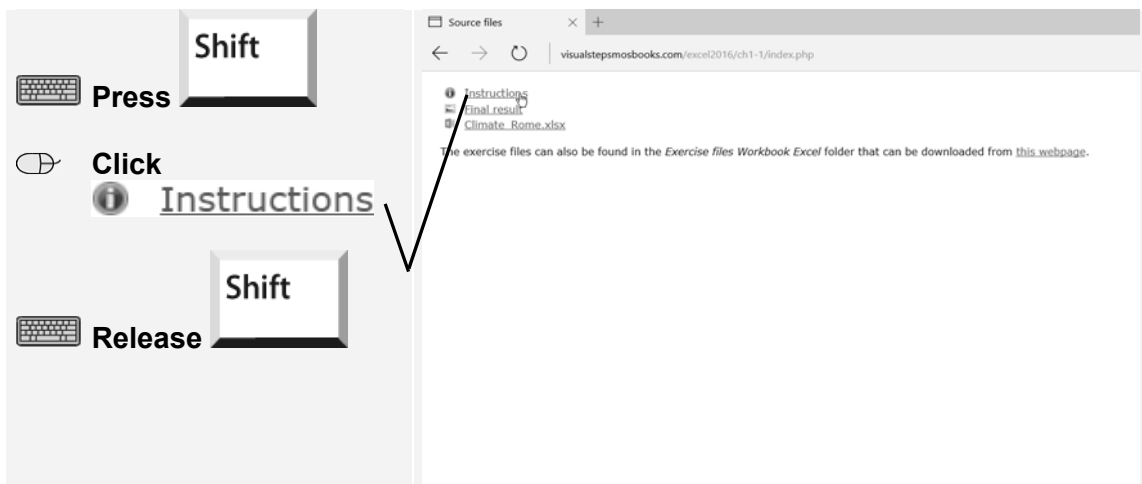
You see the web page with the MOS exam exercises. Open an exercise:



A new web page opens. This page contains links to the source files:

-  **Instructions:** opens a web page with instructions for the exercise.
-  **Final result:** Opens a web page with an image of the final result of the exercise. You can compare the picture on this page with your own result at the end of the exercise.
-  **Climate_Rome.xlsx:** This will open the *Excel* file needed for the exercise. You may also see links to additional files such as images and text files.

We recommend that you open each of these pages in a new window. Then you can place them on your computer screen in the following way:



The new window with the instructions for the exercise opens on top of the current window. Drag this window down to the left corner of your screen:

Drag the window down to the left corner of your screen

Reduce the size of the window:

Place the pointer on the top right corner of the window

The pointer changes in :

Press the mouse button

Drag the corner of the window downwards and to the left until it is as about a quarter or less of your screen's width

Release the mouse button

Open another window:

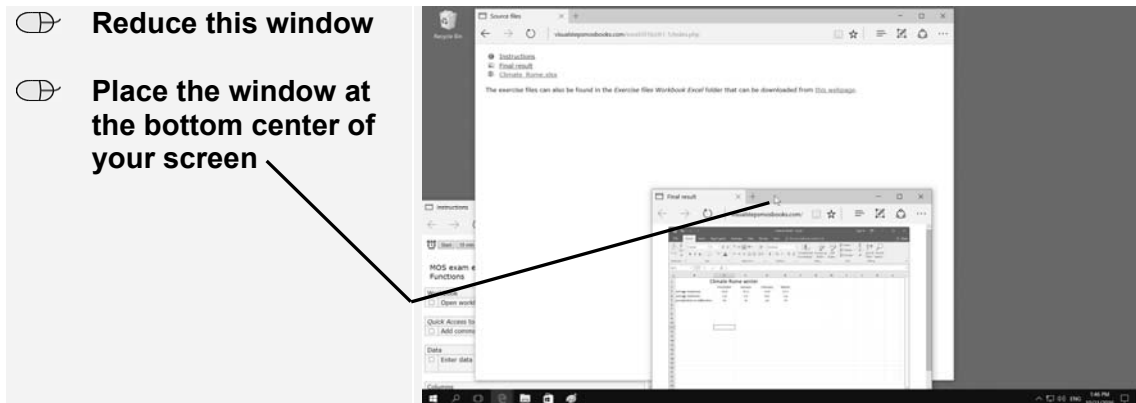
Click the bottom window

Press **Shift**

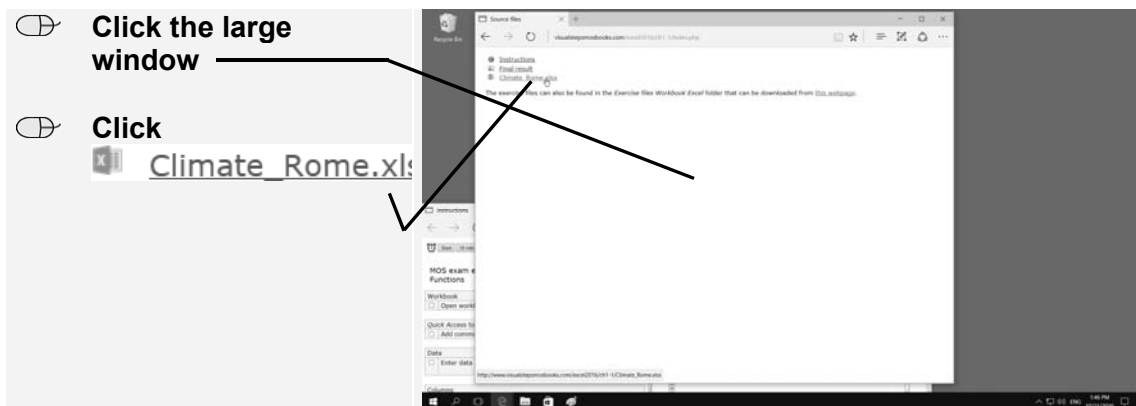
Click **Final result**

Release **Shift**

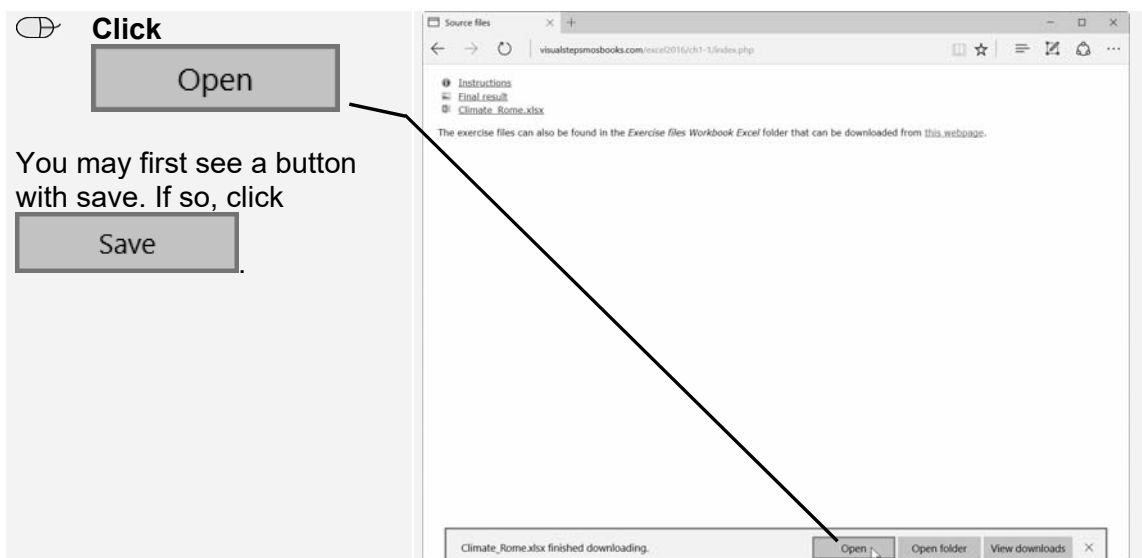
You see the window with a picture of the final result of the exercise. Place this window at the bottom center of your screen:



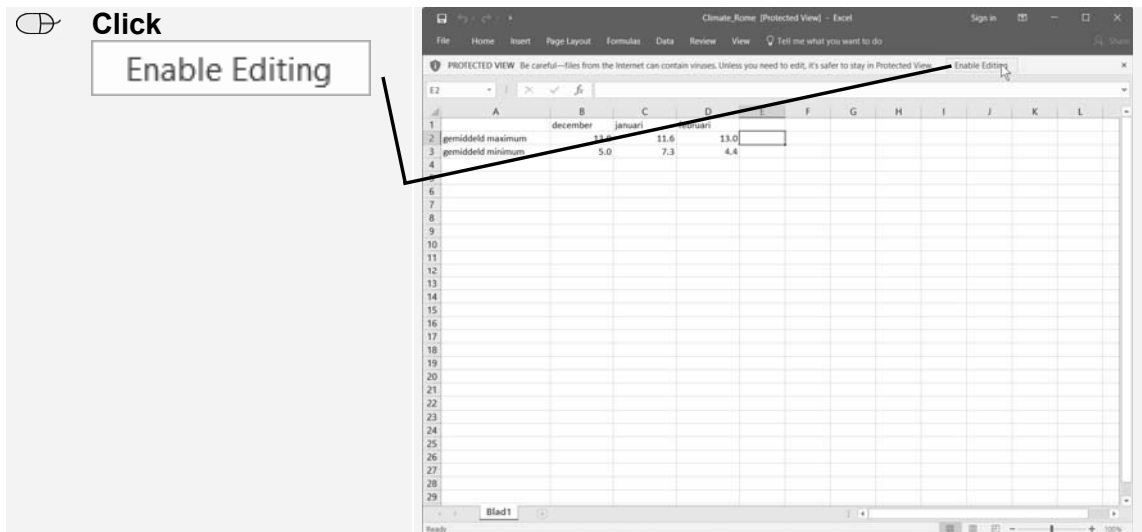
Now you can open the exercise file:



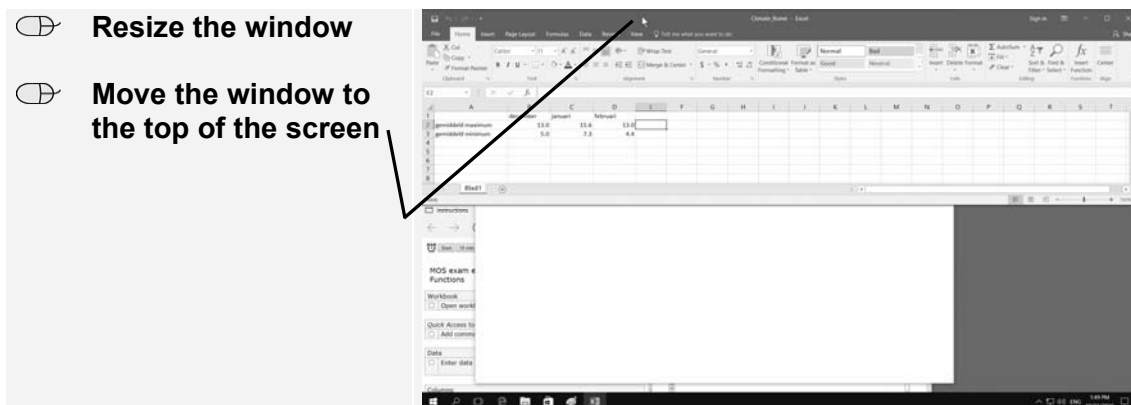
The file is downloaded from the Internet. This may take a while. At the bottom of the window a bar appears:



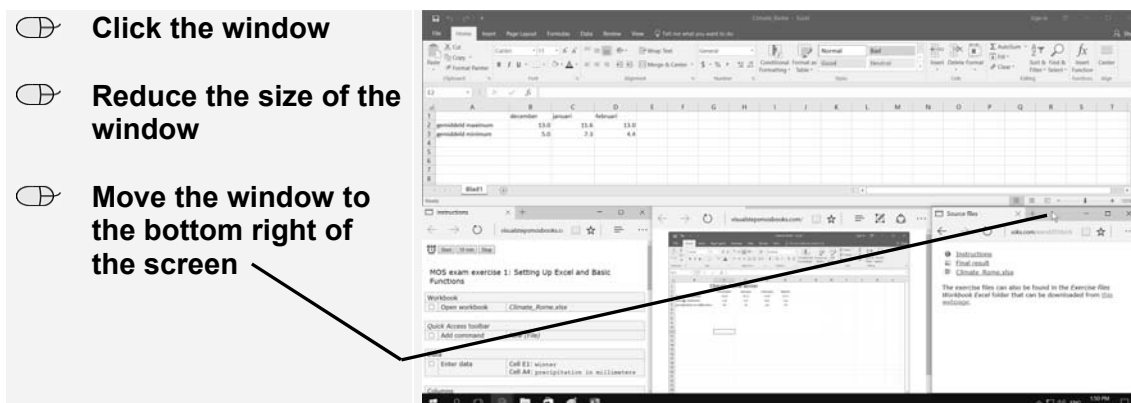
The *Excel* window opens. The file appears in Protected View because you have downloaded it from the Internet. You can turn the protected view off:




Allow the *Excel* window to fill the entire width of the top of your screen:



Place the window with the source files at the bottom right of your screen:



Now your screen looks almost the same as during the MOS exam. During the exam you will be expected to do the following:

1. Perform the actions described in the window at the bottom left side of the screen in the *Excel* window at the top.
2. If you have finished the exercise, you can compare your *Excel* window with the final results shown in the small window in the center of your screen.
3. When you are completely done you can close all windows by clicking the  in the top right corner of each window.



HELP! I have a small screen.

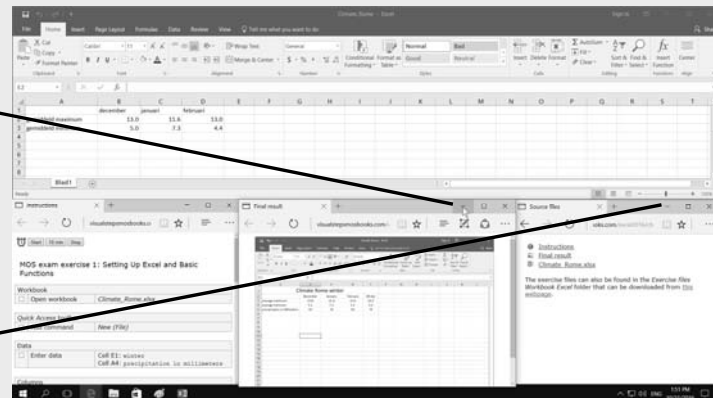
If you have a small screen, the setup as described above is not very convenient. In that case, it is better to place the *Excel* window on the left side of the screen and the instructions window on the right or vice versa. The windows will then be displayed larger.

You can minimize the windows with the final result and the source files. They will still remain open and you just need to click the taskbar button to view them again. You can set up your screen as follows:

 Click  in the center window


Do the same for the window on the right:

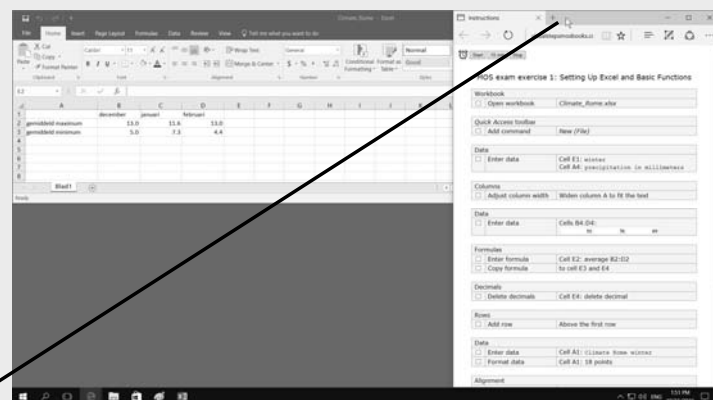
 Click  in the right window



Now place the window with the instructions on the right hand side of your screen, as shown here:




 **Resize the instruction window**

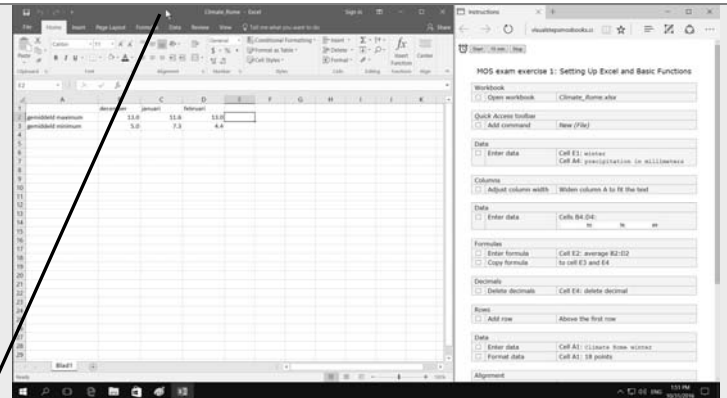
 **Place the window on the right hand side of your screen**




- Continue on the next page -


Place the *Excel* window on the left hand side of your screen, as shown here:

-  **Click the *Excel* window**
-  **Resize the window**
-  **Place the window on the left side of your screen**




You can now carry out the instructions from the window on the right into the *Excel*

window on the left. When you have finished the exercise, click  on the taskbar and then on the window with the result. Compare the result window with your own *Excel* window.

When you are completely done you can close all windows by clicking the  in the top right corner of each window.

Please note:




You can open the necessary *Excel* files by clicking the hyperlink on the web page with the source files, such as  [Climate_Rome.xlsx](#). But you can also find these files in the practice files folder which can be downloaded from the website www.visualstepsmosbook.com/excel2016-practicefiles.php. It will save you some time performing the exercises, if you have these files already downloaded to your computer. For example, some exercises require insertion of an image or the retrieval of data from a text(.csv) file. It also takes a little more time to download an *Excel* file from the Internet than to open one from your computer.

2. Formulas and Series

In chapter 2 of the textbook, you learned how to work with slightly more complicated formulas and how to add series automatically. You can continue practicing these skills in this chapter.



Footsteps Exercise 2: Formulas and Series



 15 minutes

 Open *Excel* ¹ and open a new blank workbook. ²

 Enter the following data: ¹⁷



	A	B	C
1	fixed costs:		
2	rent		
3	gas, water, light		
4	insurance		
5	total		
6			
7	variable costs:		
8	groceries		
9	clothing		
10	other		
11	total		
12			
13	Costs per month		



 Change the formatting of the cells A1 and A7 to font size 14. ²⁸



 Automatically adjust the width of the first column to the widest data. ¹⁸

 Enter the following data: ¹⁷



	A	B	C
1	fixed costs:		
2	rent	550	
3	gas, water, light	180	
4	insurance	200	
5	total		
6			

 In cell B5 add up the data from the cells B2:B4. ²²

 Insert an empty row between row 6 and 7. ³⁰

 In cell B7, type: January 17



 Automatically fill the cells C7:M7 with the other months. 42



 If necessary, widen the columns until the data fits exactly. 18

You will only fill in the data from the first three months.


 Enter the following data: 17



7		January	February	March	April
8	variable costs:				
9	groceries	140	150	160	
10	clothing	30	60	90	
11	other	80	100	120	
12	total				

 In cell B12 add up the data from the cells B9:B11. 22



 Copy the formula from cell B12 to the cells C12 and D12. 24



Now add up the fixed and variable costs for the month of January.

 In cell B14 add up the data from the cells B5 and B12. 22



 Copy the formula from cell B14 to the cells C14 and D14. 24

Notice that the results are incorrect.




 Change the reference to cell B5 in the formula in cell B14 to an absolute one. 38



 Copy the formula from cell B14 to the cells C14:D14. 25



The results are now correct.



 In cell A15, type: percentage fixed 17



Now, you can calculate the percentage of fixed costs per month.

 In cell B15, enter a formula to divide cell B5 by cell B14 22, where the reference to cell B5 is an absolute one. 38

 Convert the result in cell B15 to a percentage. 43


 Copy the formula from cell B15 to the cells C15 and D15. 25


 In cell A18, type: total costs 17

 In cell B18 add up the data from the cells B14:D14. 22



☞ Enter the following data: 17


20		March	June	
21	per quarter			
22				


☞ Select the cells B20:E20 and automatically fill the series using the ribbon with *September* and *December*. 49


☞ If necessary, widen the columns until the data fits exactly. 18

☞ Change the name of the *Sheet1* worksheet to *2015*. 12

☞ Create a new worksheet 11 and change the name of this worksheet to *Annual costs*. 12


☞ Place the *2015* worksheet before the *Annual costs* worksheet. 15


☞ On the *Annual costs* worksheet, in cell A1 type: 2015 17


☞ In cell B1, create a reference to cell B18 on the *2015* worksheet. 44


☞ Convert cell A1 to a hyperlink to the *2015* worksheet. 45


☞ Click the hyperlink to test whether it works.


☞ Protect the *2015* worksheet. 46


☞ Open the *Result Footsteps Exercise 2* workbook 36 and compare this to your own workbook.


☞ Close the *Result Footsteps Exercise 2* workbook and do not save any changes. 16

☞ Save the workbook with the name *Household Costs 1* in the *(My) Documents* folder. 26

☞ Remove the hyperlink in cell A1 on the *Annual costs* worksheet. 47

























☞ Cancel the protection of the worksheet *2015*. 48

☞ Save the changes. 40


☞ Close *Excel*. 16

Do-It-Yourself Exercise 3: Formulas and Series


 12 minutes

-  Open *Excel* and open the *Costs_cell_phone.xlsx* workbook from the *Practice Files Workbook Excel* folder.
-  Automatically fill the cells A10:A20 with the other months.
-  Enter a nested formula in cell C9, in which you first subtract cell C4 from cell B9 and then multiply the result by cell D4.
-  Change the references to cells C4:D4 in the formula in cell C9 to absolute ones.
-  Copy the formula from cell C9 to the cells C10:C20.
-  Enter a nested formula in cell E9, in which you first subtract cell C5 from cell D9 and then multiply the result by cell D5.
-  Change the references to cells C5:D5 in the formula in cell E9 to absolute ones.
-  Copy the formula from cell E9 to the cells E10:E20.
-  In cell F9 add up the data from the cells B4, B5, C9 and E9.
-  Change the references to cells B4 and B5 in the formula in cell F9 to absolute ones.
-  Copy the formula from cell F9 to the cells F10:F20.
-  In cell A21, type: `total`
-  In cell F21 add up the data from the cells F9:F20.
-  Change the name of the *Sheet1* worksheet to *2014*.
-  Create a new worksheet and change the name of this worksheet to *Annual summary*.
-  Place the *2014* worksheet before the *Annual summary* worksheet.
-  On the *Annual summary* worksheet, in cell A1 type: `2014`
-  In cell B1, create a reference to cell F21 on the *2014* worksheet.
-  Convert cell A1 to a hyperlink to the *2014* worksheet.
-  Click the hyperlink to test whether it works.
-  Open the *Result Do-It-Yourself Exercise 3* workbook and compare this to your own workbook.
-  Close the *Result Do-It-Yourself Exercise 3* workbook and do not save any changes.
-  Save the workbook with the name *Cell Phone Costs 1* in the *(My) Documents* folder.
-  Close *Excel*.


Do-It-Yourself Exercise 4: More about Formulas and Series


 10 minutes


 Open *Excel* and open a new blank workbook.


 Enter the following data, ensuring the columns have the correct width:

	A	B	C
1	fixed labor costs		
2		per month	
3	Knight	1800	
4	Parker	2300	
5	Jackson	1700	
6	total		
7			
8	variable labor costs		
9			
10	Brown		
11	Rogers		
12	total		
13			


 Change the formatting of cells A1 and A8 to bold.

 In cell B9, type: January


 Automatically fill the cells C9:M9 with the other months.


 Enter the following data:

9		January	February	March	April
10	Brown	2200	1800	800	
11	Rogers	1200	900	1100	
12	total				


 In cell B6 add up the data from the cells B3:B5.


 In cell B12 add up the data from the cells B10 and B11.


 Copy the formula from cell B12 to the cells C12 and D12.

 In cell A14, type: labor costs per month


 Change the formatting of cell A14 to bold.

 In cell B14, enter a formula to add up the data from the cells B6 and B12.

 Change the reference to cell B6 in the formula in cell B14 to an absolute one.

 Copy the formula from cell B14 to the cells C14 and D14.

 In cell A15, type: variable percentage

 In cell B15, enter a formula to divide cell B12 by cell B14.