



Excel 2007/ 2010 / 2013 Expert (Advanced)

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About this Course...

Microsoft Excel is the spread sheet application included with Microsoft Office. In this course you will learn about customizing Microsoft Excel as well as critical aspects (theory and practical) regarding designing successful and efficient spread sheets in Microsoft Excel. In this courseware you will learn how to master the advanced features of this powerful spread sheet application, increasing your productivity, efficiency and overall spread sheet skills.



Chapters in the Workbook...

Chapter 1 – CONSOLIDATION, TEMPLATES, AUDITING

Chapter 2 – ADVANCED CODE FORMATTING

Chapter 3 – SUBTOTAL, OUTLINES, NAMES

Chapter 4 – DATA INTEGRITY AND SHARING

Chapter 5 – PIVOT TABLES AND PIVOT CHARTS

Chapter 6 – MACROS

Chapter 7 – IMPORTING AND EXPORTING DATA



What you Will Need...

In order to complete the exercises in this workbook, the following is required...

- A desktop computer (or laptop) running Microsoft Windows 2000, XP, Vista or Windows 7 (or later)
- Microsoft Office Excel 2007 or 2010 / 2013
- A set of MANUAL Masters / Mobile MOUSE Practice Files

Table of Contents

Chapter 1 -CONSOLIDATION, TEMPLATES, AUDITING	1
1.1 Consolidation	1
1.2 Go To Special.....	3
1.3 Creating and Applying Templates	7
1.3.1 Creating a Template	7
1.3.2 Editing the Template.....	8
1.4 Formula Auditing.....	10
1.4.1 Precedents and Dependants.....	10
1.4.2 Locating and Resolving Errors.....	14
1.4.3 Using the Formula / Error Checker to Find Errors	16
1.4.4 The Watch Window.....	19
1.5 Forecasting (What-If) and Other Business Analysis Tools	20
1.5.1 Single Variable Data Table	20
1.5.2 Creating a Two Variable Data Table	22
1.5.3 Forecasting and Modelling Using Goal Seek and Scenarios.....	23
1.5.4 Using Goal Seek	24
1.5.5 Working with Scenarios	26
1.5.6 Using Solver.....	28
Chapter 2 -ADVANCED CODE FORMATTING	34
2.1 Custom Formatting Codes.....	34
2.1.1 Creating Custom Formatting Codes	35
2.1.2 Creating More Complex Formatting Codes	40
Chapter 3 -SUBTOTAL, OUTLINES, NAMES & FUNCTIONS.....	45
3.1 Subtotals.....	45
3.2 Grouping and Outlining	50
3.2.1 Manually Applying and Removing an Outline	51
3.2.2 Auto Outlining.....	53
3.3 Named Ranges	54
3.3.1 Benefits of Named Ranges.....	54
3.3.2 Rules for using Range Names	54
3.3.3 The Name Box.....	55
3.3.4 Create Names with the Create Names from Selection dialog box.....	56
3.3.5 Create / Modify / Delete Names using the New Name dialog box.....	58
3.4 Statistical Functions.....	61
3.4.1 SUMIF	61
3.4.2 AVERAGEIF	63
3.4.3 COUNTIF	64
3.5 Common Lookup Functions.....	65
3.5.1 VLOOKUP.....	66
3.5.2 HLOOKUP.....	70
3.5.3 LOOKUP	71
Chapter 4 -DATA INTEGRITY AND SHARING.....	75
4.1 Protection	75
4.1.1 Protect Sheet	76
4.1.2 Allow Users to Edit Ranges	79
4.1.3 Protect Workbook	81
4.1.4 Setting a Workbook Password.....	82
4.2 Sharing.....	83
4.2.1 Sharing a Workbook	83
4.2.2 Track Changes	87

Table of Contents

4.2.3	Merging Workbooks.....	90
4.3	Removing Duplicates	92
4.3.1	Advanced Filter to Remove Duplicates	92
4.3.2	Remove Duplicates Utility.....	94
<hr/>		
Chapter 5 -PIVOT TABLES AND PIVOT CHARTS		98
5.1	Pivot Tables.....	98
5.1.1	General Guidelines for Pivot Tables and Pivot Charts	100
5.1.2	Creating and Modifying PivotTables	101
5.2	Use Slicers to filter PivotTable data	120
5.2.1	Using Slicers	121
5.2.2	Formatting Slicers for a consistent look.....	121
5.2.3	Sharing Slicers between PivotTables.....	122
5.2.4	Creating a Slicer.....	122
5.2.5	Format a slicer	124
5.2.6	Sharing a Slicer.....	124
5.2.7	Use a Slicer from another PivotTable.....	124
5.2.8	Disconnect or Delete a Slicer	126
5.3	Pivot Charts.....	126
<hr/>		
Chapter 6 -MACROS		133
6.1	Macros.....	133
6.1.1	Macro Security Settings	134
6.1.2	Recording a Macro	135
6.1.3	Editing or Deleting a Macro	145
6.1.4	Assigning Buttons to Macros	152
6.1.5	Error Trapping.....	157
<hr/>		
Chapter 7 -IMPORTING AND EXPORTING DATA		163
7.1	Queries	163
7.1.1	Data Queries	164
7.1.2	Web Queries	171
7.1.3	Text Queries	173
7.1.4	XML Queries.....	179
7.1.5	Enabling Data Connections	180
7.2	Text to Columns	182
7.3	Concatenation	184
7.4	Exporting Data	186
7.5	Working with Workspaces	188

① How to Use this Manual

When you see this...

It means...



You **MUST** read this, because it could have an effect on the final outcome of an action you perform.



This is optional to read, but these tips often point out quicker ways of doing things, or alternative methods.



You are about to start an exercise in the workbook.

Bold Text

Objects that you click on, like buttons, tabs or menus are often listed in **Bold**. Locations and folders are also listed in **Bold**.

Where is Waldo?

Type the text that is formatted this way...



Keyboard shortcuts are displayed like this. In this example you would press and hold **CTRL**, hold **SHIFT** and then press **ESC** once (while still holding **CTRL** and **SHIFT**).

This is an example of a more detailed explanation for the reasoning behind your actions.

Paragraphs that are formatted like this usually contain explanations and reasoning behind the actions you are being instructed to perform.

Home > Copy

Click the  tab, click the  button

"This is a paragraph..."

This is existing typed text in a document you are currently working on.

How To Download and Install the Exercise Files

In addition to the exercises you will complete in class, there are also exercises in this workbook. These workbook exercises can only be completed in conjunction with your practice files. In order to locate your exercise files visit: www.mobilemouse.com.au/downloads.php

To install the practice files perform the following steps...

1. Start **Internet Explorer** (or whichever web browser you use), click in the **Address Bar** and type the following address: <http://www.mobilemouse.com.au/downloads.php> and then press **ENTER**
2. Scroll down the page and click the link: **Excel Practice Files (2007 / 2010 / 2013 Versions)**
3. At the screen that appears, click the **Save** button



Figure A : File Download Security

4. At the **Save As** dialog box, click the **Desktop** link on the left hand side of the screen, click **Save**



Figure B : Saving The File To Be Downloaded

How To Download and Install the Exercise Files

- Depending on your internet connection, the time it takes to download the practice files may vary. Once the download completes, close any open programs.
- On your **Windows Desktop** you should see **Manual Masters – Excel Practice Files.exe** (or **Manual Masters - Excel Practice Files**). Double click this file to start the installation process; you may be presented with the following screen...

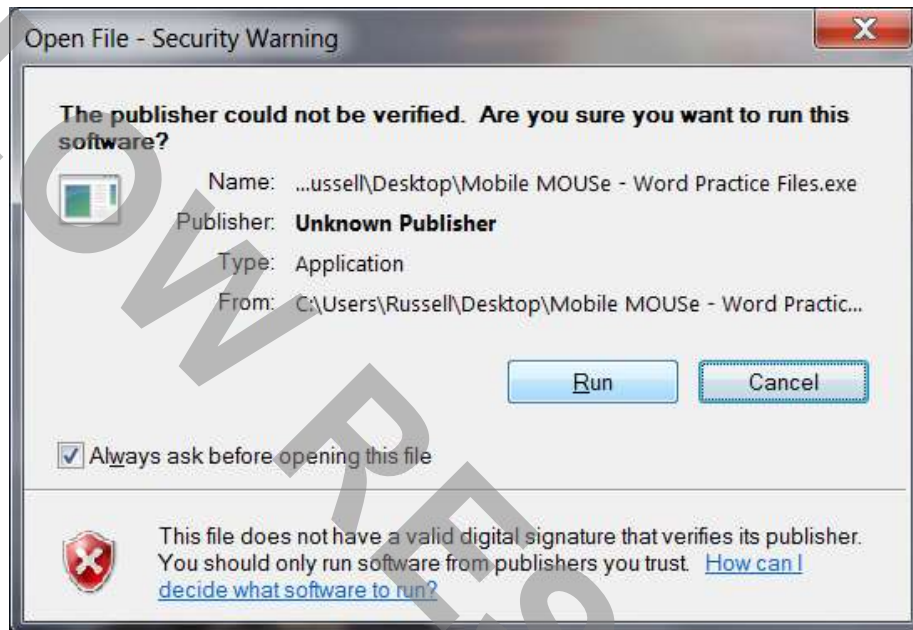


Figure C : Security Warning

- If presented with the above image, click the **Run** button, which will present the following screen...



Figure D : Starting The Installation

- Click **Next**
- Click **Next**, which takes you to the following screen...

How To Download and Install the Exercise Files

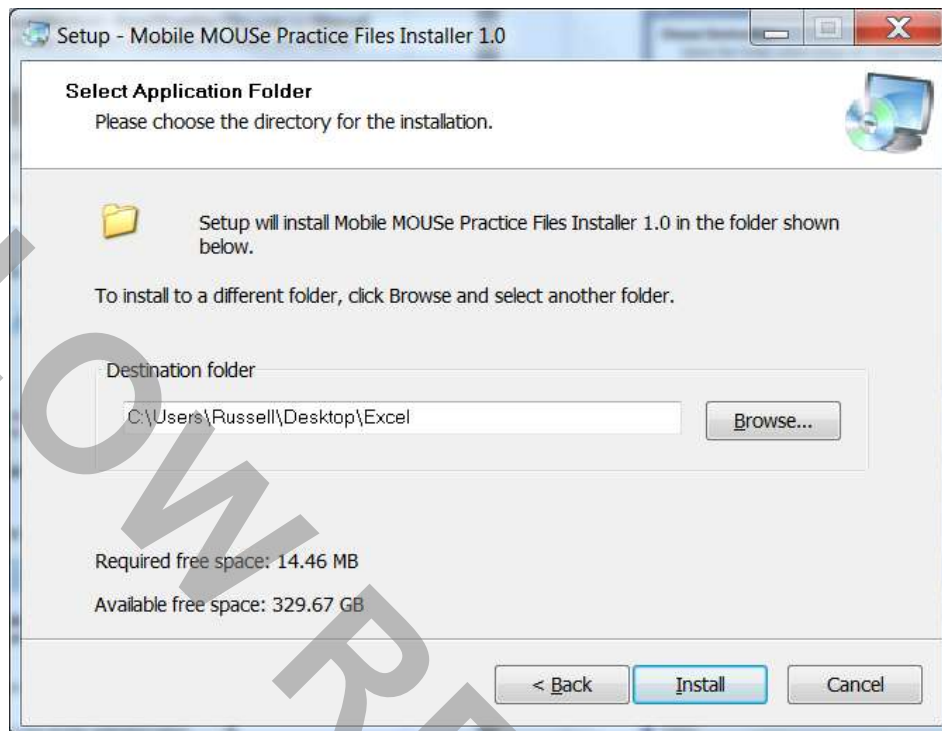


Figure E : The Default Installation Location

10. At this screen, you would typically choose **Next**. This will install the practice files onto your **Windows Desktop** (the location referred to in the exercises in this manual). You can however choose a different location if you like, however we would recommend that you click **Next...** (so click **Next**)
11. Click **Next** to install the files

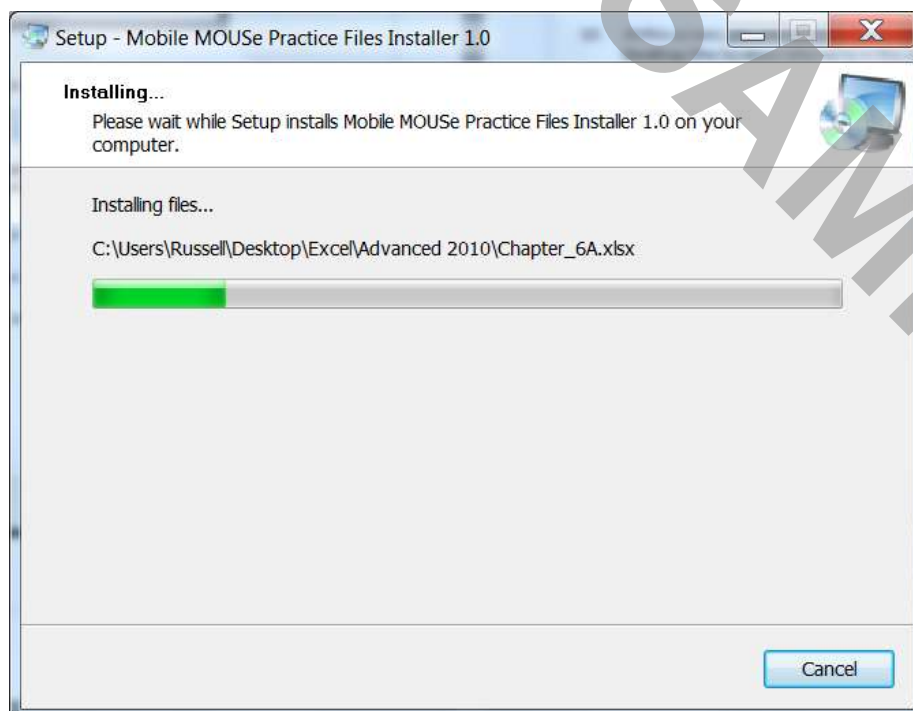


Figure F : Completing The Installation

12. At the final screen click **Finish** to complete the installation. Your practice files are now installed within the **Excel** folder (on your **Desktop**) and you can commence the exercises in this manual

Chapter 1 - CONSOLIDATION, TEMPLATES, AUDITING

This chapter covers the following concepts...

- CONSOLIDATION
- GO TO SPECIAL
- CREATING AND EDITING TEMPLATES
- UTILISE EXCELS FORMULA AUDITING UTILITY
- UTILISE THE VARIOUS WHAT-IF ANALYSIS TOOLS WITHIN EXCEL

Outcomes of this chapter (what you will learn)...

- CALCULATE DATA ACROSS SHEETS AND BUILD A SUMMARY SHEET WITH CONSOLIDATION
- QUICKLY LOCATE SPECIFIC TYPES OF CELLS USING GO TO SPECIAL
- CREATE AND EDIT TEMPLATES
- TRACK AND TRACE FORMULAS (AS WELL AS RESOLVE ERRORS IN FORMULAS)
- USE WHAT-IF TOOLS COMMONLY USED IN MODELLING AND FORECASTING

1.1 Consolidation

If two or more worksheets have identical layouts or use the same row and column labels, you can consolidate them using the **Consolidate** tool on the **Data** tab. Consolidation can be used to summarize multiple worksheets, as you'll see in the following exercise where you will sum data stored on different tabs. Consolidation allows you to perform the following calculations; **Sum, Count, Average, Max, Min, Product, Count Numbers, StdDev, StdDevp, Var, VarP**



Exercise Time

Exercise 1.a. CONSOLIDATION

1. Open the file: **Chapter_1A.xlsx** located in the **Desktop \ Excel \ Expert** folder

Before we begin the process, lets quickly review the layout of the various tabs within this spread sheet.

- The **Jan** tab has two columns and 15 rows of data to be consolidated (the shaded cells).
- The **Feb** tab has three columns and 23 rows of data to be consolidated (the shaded cells).
- The **Mar** tab has three columns and 33 rows of data to be consolidated (the shaded cells).

Note that each of these sheets has a different numbers of rows or columns. Therefore the only thing that can be used to identify the various numbers are their text tiles (labels) in column A and row 3.

2. Navigate to the **Summary** sheet, and click cell **A3**
3. Click the **Data** tab, click **Consolidate**
4. From the **Function:** drop down list and choose **Sum**
5. Click within the **Reference:** box and within the spread sheet, click the **Jan** tab
6. Select cells **A3:C15**, click the **Add** button

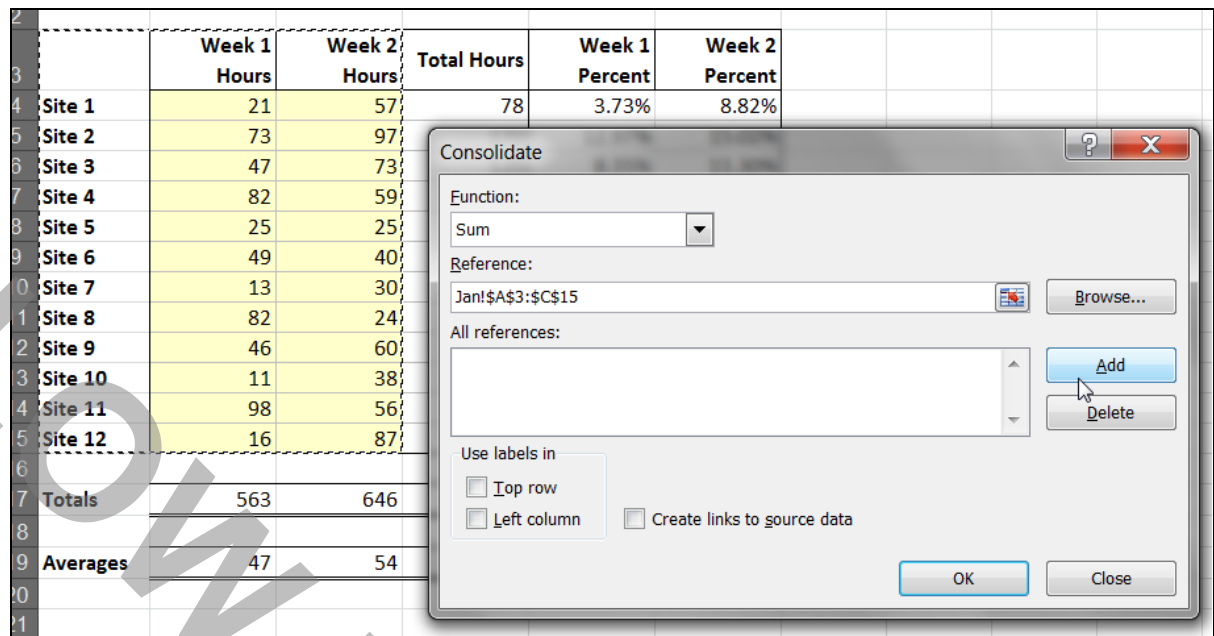


Figure 1-1: Select The Range For Consolidation

7. Click the **Feb** tab
8. Select cells **A3:D23**, click the **Add** button
9. Click the **Mar** tab
10. Select cells **A3:D33**, click the **Add** button

Once again, note that each of these sheets has a different numbers of rows or columns. Therefore the only thing that can be used to identify the various numbers are their text tiles (labels) in column A and row 3.

11. Enable the **Use labels in:** ☐ **Top row** and ☐ **Left column** checkboxes, click **OK**

You will notice that the results of the consolidation process are currently simply stored as values (you do not see a formula behind the returned totals).

12. Click cell **A3** and once again choose **Data > Consolidate**
13. Enable the ☐ **Create links to source data** checkbox, click **OK**

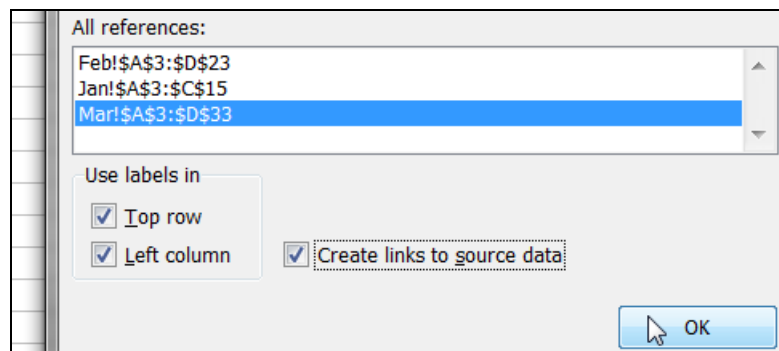


Figure 1-2: Create Links To Source Data

Important Note



When you enable the **Create links to source data** checkbox, Excel adds a series of outlining symbols to the left of your row numbers (+ plus and / or - minus signs). By clicking the + symbol left of row 7, Excel expands the outline and displays the three new rows (one for each sheet used in the consolidation process).



Enabling **Create links to source data** also makes it possible to audit the consolidation process as you can view the formulas created by consolidation.

	A	B	C	D	E	F
1						
2						
3			Week 1 Hours	Week 2 Hours	Week 3 Hours	Total Ho
4		Class_Cor	40	32	40	
5		Class_Cor	21	57		
6		Class_Cor	55	27	11	
7		Site 1	116	116	51	2
8		Site 2	141	207	103	4

Figure 1-3: Outlining Symbols Next To The Row Numbers

Let's quickly make a duplicate copy of the **Feb** tab.

14. Left click and hold the left mouse button down on the **Feb** tab. Hold down the **Ctrl** key
15. Drag the mouse to the very right hand side of the existing **Mar** tab (while still holding the **Ctrl** key). Release the mouse button, release the **Ctrl** key

You have now made duplicate copy of the **Feb** tab.

16. Rename the **Feb(2)** sheet to: Apr
17. **Save** the workbook and leave the workbook open for the following exercise

1.2 Go To Special

You can use the **Go To** command to quickly locate and select all cells that contain specific types of data (such as formulas), visible cells, blank cells or only cells that meet specific criteria (such as the last cell on the worksheet contains data or formatting). Before performing a **Go To** action, do one of the following:

- To search the entire worksheet, click any cell.
- To search within a range, select the range, rows, or columns that you want. The cells in a range can be adjacent or nonadjacent.
- To search across many sheets, select the sheets first (by holding **Ctrl** or **Shift**).

In this workbook, you now have a new **Apr** tab which contains all of the old values from the original **Feb** sheet (which we duplicated at the end of the last exercise). We would now like to quickly select all cells that contain all manually entered values... or constants (the old values from the **Feb** sheet) on the new **Apr** tab in order to delete them. This is easily accomplished by using **Home > Find & Select > Go To Special**.

In the following exercise, we will use **Home > Find & Select**, in order to easily select all numerical constant values on a sheet. We will also select all cells that contain formulas...



Exercise 1.b. GO TO SPECIAL

1. Within workbook: **Chapter_1A.xlsx**; or alternatively if you did not complete the previous exercise(s), open the file **Chapter_1B.xlsx** located in the **Desktop \ Excel \ Expert** folder
2. Navigate to the **Apr** tab and click any cell on the worksheet
3. Click **Home > Find & Select > Go To Special**

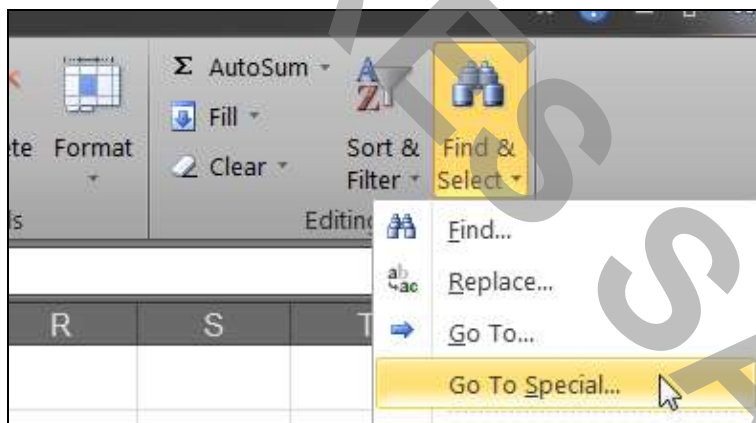


Figure 1-4: Go To Special

You could also press **(Ctrl) + (G)**, you can also press **(F5)** which displays the **Go To** dialog box, you would then click **Special**).

4. Click **Constants** and remove the check boxes on **Text**, **Logicals** and **Errors** and Click **OK**

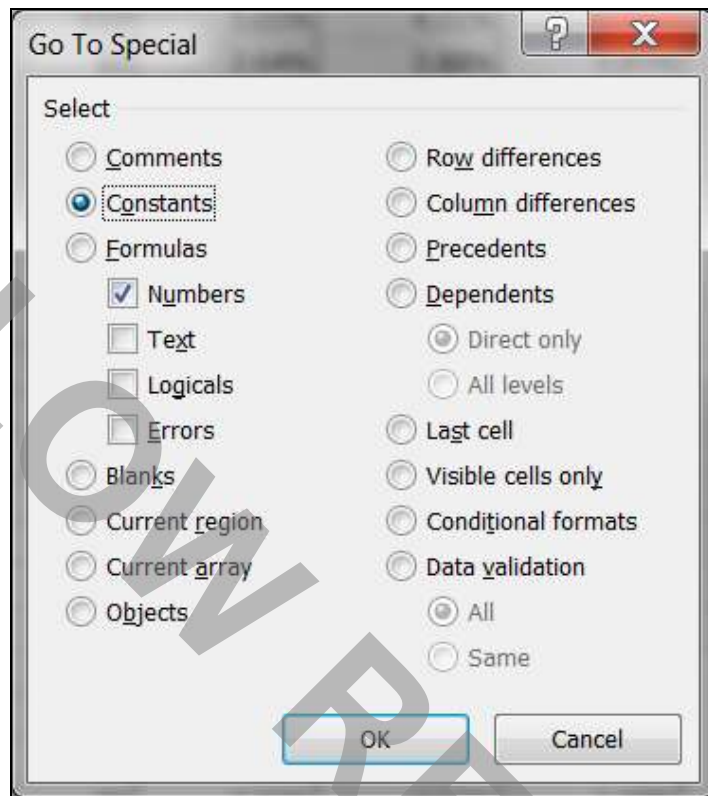


Figure 1-5: Go To Special Dialog Box

Excel has selected all cells that contain manually entered (constant) numbers.

5. Press **Del**



i You can press **Tab** or **Enter** to cycle through all of the selected cells.

6. Navigate to the **Mar** sheet and click any cell within the sheet.
 7. Click **Home > Find & Select > Go To Special**
 8. Click **Formulas** and this time leaving all check boxes ticked and then Click **OK**

By leaving all of these textboxes selected you will be selecting all cells that contain formulas. Excel has selected all cells that contain formulas.

9. On the **Home** tab, click the **Bold** button and then **Save** and **Close** the workbook

Table 1-1: Go To Special options

Option	Explanation
Comments	Highlights all cells that contains a comment
Constants	Highlights all cells that contains a constant; mainly non-formula cells. A constant can be text or numerical. It would not include a formula where a constant was included instead

Option	Explanation
	of a cell reference
Formula	Highlights all cells containing a formula if all boxes (Numbers, Text, Logicals, and Errors) are checked. You can narrow your search by excluding choices that are not applicable to your needs
Blanks	Highlights all cells that do not contain information (all empty cells)
Current Region	Highlights the range of cells surrounding the active cell bounded by blank rows and columns (equivalent to pressing Ctrl + A)
Current Array	Highlights the cells of an array when the active cell is contained in an array
Object	Selects all objects on the worksheet such as charts, text boxes or pictures
Row Differences	Highlights all cells in the selected row that differ from the contents of the active cell. For multiple rows, the highlighted cells will be based on the cell in the same column as the active cell but within each selected row. For example, if the active cell is C3 and row 4 was also selected, the comparison for row 4 will be based on cell C4
Column Differences	Highlights all cells in the selected column that differ from the contents of the active cell. For multiple columns, the highlighted cells will be based on the cell in the same row as the active cell but within each selected column. For example, if the active cell is C3 and column D was also selected, the comparison for column D will be based on cell D3
Precedents	Highlights the cells referenced in the formula contained in the active cell. Additional options for this feature can be selected from the Dependents choice. Select the " Direct Only " option to find only those cells that are directly referenced in the formula. The " All Levels " option will locate all cells that are directly or indirectly referenced. Thus if any of the directly referenced cells contain formulas the cells within that formula will also be located. Precedents and Dependents are covered in a later section of this workbook
Dependents	Highlights all cells containing a formula that references the active cell. The " Direct Only " option finds only those cells containing a direct reference to the active cell. The " All Levels " option includes cells containing indirect references to the active cell. Thus, if the cell has a direct reference to another cell with a formula referencing the active cell, it will be selected. Precedents and Dependents are covered in a later section of this workbook
Last Cell	Highlights the last cell in the lower right that contains either data or formatting
Visible Cells Only	Highlights only those cells that are visible in a range when the range crosses hidden rows or columns
Conditional Formats	Highlights cells that contain conditional formats. Additional options for this feature can be selected from the Data Validation choice. Select " All " to include any cell that has conditional formatting applied. Select " Same " to limit the selections to only those cells that have the same conditional formatting as the active cell. Conditional Formatting and Data Validation are covered in a later section of this workbook
Data Validation	Highlights cells that have Data Validation applied. Select " All " to include any cell that has Data Validation applied. Select " Same " to limit the selections to only those cells that have the same Data Validation rule as the active cell. Conditional Formatting and Data Validation are covered in a later section of this workbook

1.3 Creating and Applying Templates



MICROSOFT OFFICE CERTIFICATION

This concept addresses the **Apply workbook settings, properties, and data options** competency of the Microsoft Office Expert Certification (**Exam 77-888**).

PLEASE NOTE: This training resource does not necessarily cover all of the requirements of this exam objective as this objective may include but is not limited to: setting advanced properties, saving a workbook as a template, and importing and exporting XML data.

Visit <http://www.microsoft.com/learning/en/us/mos-certification.aspx> for the latest Microsoft Office Certification requirements.

You can create a template from scratch or base it on an existing workbook. If you're using an existing workbook, first make sure that all the formulas work and that numbers and text are formatted appropriately. Remove the text and numbers that will be manually entered in the future (within the workbook that the template is based on). Don't remove formulas – although the results of the formulas change, the formulas themselves remain the same.

If you're creating a template from scratch, you still need to enter (and then remove) values to test the template's formulas before saving the template. A template differs from a regular workbook in three specific ways:

- The file is saved as a template (.xltx file extension) rather than a regular workbook (.xlsx); as a result, Excel opens a fresh copy when you use the template.
- The template is saved in the Templates folder or a shared folder for others to use.
- The workbook contains only the text, formulas and formatting that remain the same in each workbook.

Every workbook and worksheet is based on a template. A template can include values, formulas, formatting, macros and custom toolbars or form features. Workbooks created based on a template include the template's contents, so templates are the best way to make sure workbooks have a uniform look and feel. Template files use the file extension .xltx



Important Note



Templates that will contain macros should be saved as an Excel Macro-Enabled Template (*.xlsm).



Excel 2003 and earlier users cannot access Excel 2007 / 2010 / 2013 templates, therefore if there are users in your organisation using earlier versions of Excel, who will be using your template, you must save the template as an Excel 97-2003 Template (*.xlt)

1.3.1 Creating a Template

Any workbook can be turned into a template, and your frequently created workbooks should be. In the following exercise you will create a new template.

Exercise Time

Exercise 1.c. CREATING A TEMPLATE

1. Open **Chapter_1C.xlsx**, located in the **Desktop \ Excel \ Expert** folder
2. Click **File (the Office Button in Excel 2007) > Save As** (or press **F12**)
3. In the **Save As** dialog box, choose **Excel Template** as the file type

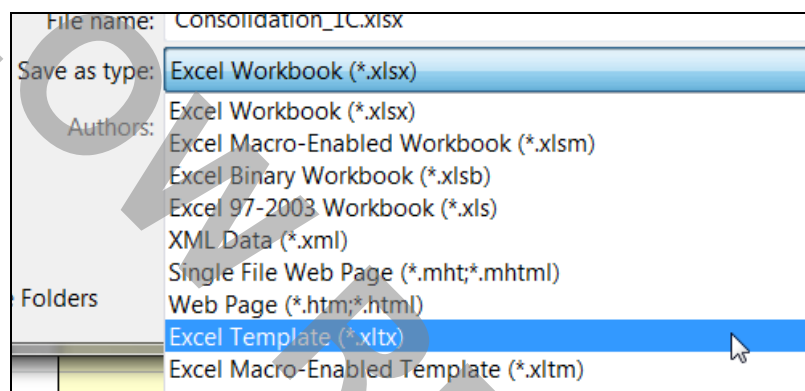


Figure 1-6: Save As Type

4. Change the **File name** to: **Shift Hours Template** and navigate to the **Desktop \ Excel \ Expert** folder. Click **Save**
5. **Close** the template

Important Note

- Any user who double clicks the template (from within **Windows**), will be creating a new document based on the template.
- If you open the template from the list of Recent Documents you're opening the template, not a new workbook based on the template.

1.3.2 Editing the Template

If you're going to use a template frequently, it's tedious to enter the standard information e.g. your company name and address or have to do certain formatting over and over again, every time you use the template. In the following exercise you will edit the template created in the previous exercise and save it again as a template, which you can use as the basis for future workbooks. **You must complete the previous exercise (Exercise 1.c before proceeding with this exercise).**

Exercise Time

Exercise 1.d. EDITING A TEMPLATE

1. Open the template: **Shift Hours Template.xltx** from **File (the Office Button in Excel 2007) > Open** (or **Ctrl + O**)

Important Note



Take care not to open the template by double click the template from within **Windows Explorer** (or **Computer**) as this would only generate a new document based on the template. It would not open the template.

2. Highlight cells **B3:H3** and change the formatting of these cells (to whatever you deem appropriate)
3. Click cell **B4**, click **File** (the **Office Button** in Excel 2007) > **Save As** (or press **F12**)
4. In the **Save As Type** box, once again choose **Excel Template** as the file type

Note that Excel changes the **Save In** location to the **Templates** folder; this is where Excel templates are stored by default.

5. Change the **File name** to: `Shift Template` and click **Save, Close** the template
6. Click **File** (the **Office Button** in Excel 2007) > **New**, click **My Templates**
7. From the list of **Personal Templates**, double click **Shift Template.xltx**

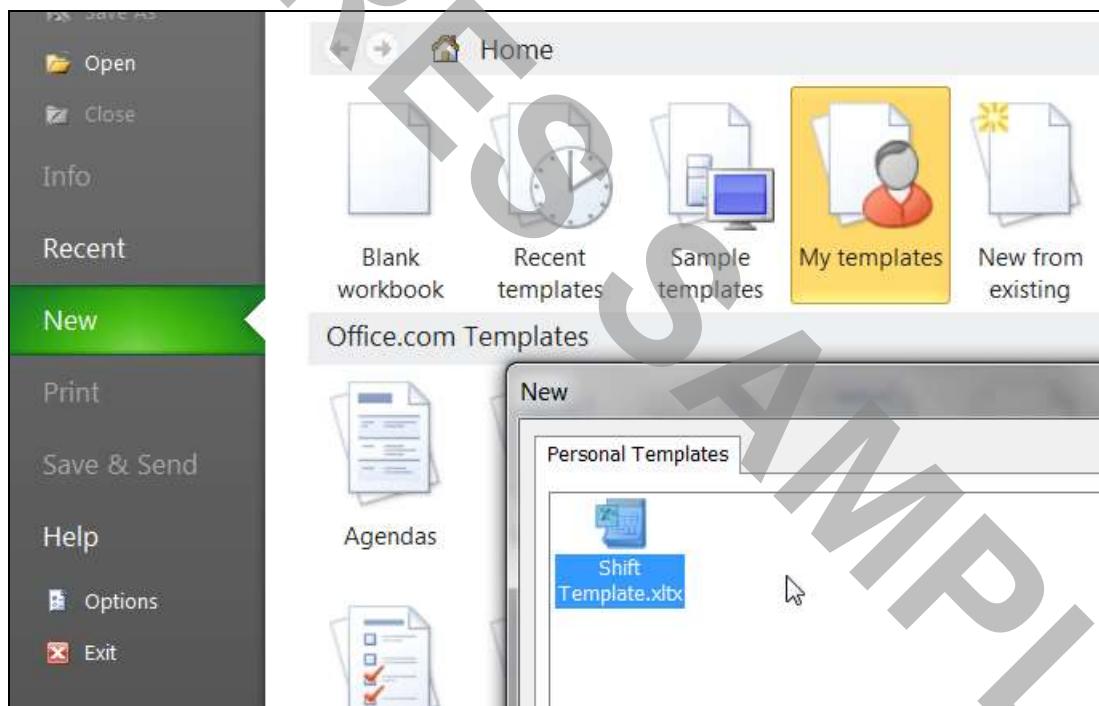


Figure 1-7: Creating A New Workbook Based On An Existing Template (Excel 2010)

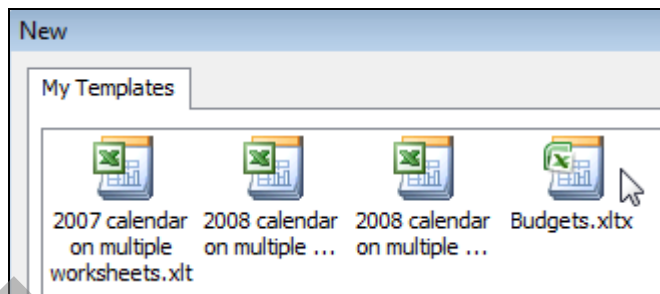


Figure 1-8: Creating A New Workbook Based On An Existing Template (Excel 2007)

You now have a blank new file entitled **Shift Template.xltx1**. Changes to this file will not affect the original template.

8. **Close** the workbook without saving changes

1.4 Formula Auditing



MICROSOFT OFFICE CERTIFICATION

This concept addresses the **Audit Formulas** competency of the Microsoft Office Expert Certification (**Exam 77-888**).

PLEASE NOTE: This training resource does not necessarily cover all of the requirements of this exam objective as this objective may include but is not limited to: tracing formula precedents, dependents, and errors, locating invalid data or formulas, and correcting errors in formulas.

Visit <http://www.microsoft.com/learning/en/us/mos-certification.aspx> for the latest Microsoft Office Certification requirements.



MICROSOFT OFFICE CERTIFICATION

This concept addresses the **Apply functions in formulas** competency of the Microsoft Office Expert Certification (**Exam 77-888**).

PLEASE NOTE: This training resource does not necessarily cover all of the requirements of this exam objective as this objective may include but is not limited to: applying arrays to functions, and using Statistical, Date and Time, Financial, Text, and Cube functions.

Visit <http://www.microsoft.com/learning/en/us/mos-certification.aspx> for the latest Microsoft Office Certification requirements.

Reviewing your data is important. But as with proofreading, it's difficult to catch all errors: it's easy to overlook errors because you "see" what you think should be there, rather than the actual contents. Excel includes tools that help you check formulas to ensure your formulas (or other users formulas) are accurate.

1.4.1 Precedents and Dependants

Formula auditing mode displays the worksheet formulas rather than the results of the formulas. In the following exercise you will switch to and work with formula auditing mode as well as learn about precedents and dependants.



Exercise 1.e. TRACING PRECEDENTS AND DEPENDANTS

1. Open the file: **Chapter_1E.xlsx**, located in the **Desktop \ Excel \ Expert** folder
2. Choose **Formulas > Show Formulas** or press **Ctrl** + **~** (~ tilde) to switch to **Formula Auditing Mode**

The formulas in the worksheet are displayed.

3. Press **Ctrl** + **~** (~ tilde) to turn off **Formula Auditing Mode**. Press **Ctrl** + **~** (~ tilde) to return to **Formula Auditing Mode** once again

Precedents are cells referred to in a formula. For example, if the active cell, E5, contains the formula **=C5*D5**, then cells C5 and D5 are precedents of E5.

4. Select cell E4 on the **Jan** sheet. Excel colour codes cells **B4**, **C4** and **D4** (the precedent cells)
5. Click cell **F4**. Excel colour codes cells **B4** and **B25** (the precedent cells)
6. Click cell **F25**. Excel colour codes cells **F4:F23** with a box (the precedent cells)
7. Click the **Trace Precedents** button in the **Formula Auditing** group of the **Formulas** tab

An arrow is drawn down column F, further highlighting the cells that precede the formula in cell **F25**.

8. Click the **Trace Precedents** button again

Arrows are drawn from the various cells in column B, through to all of the dependant cells in column F.

QUICK NOTES

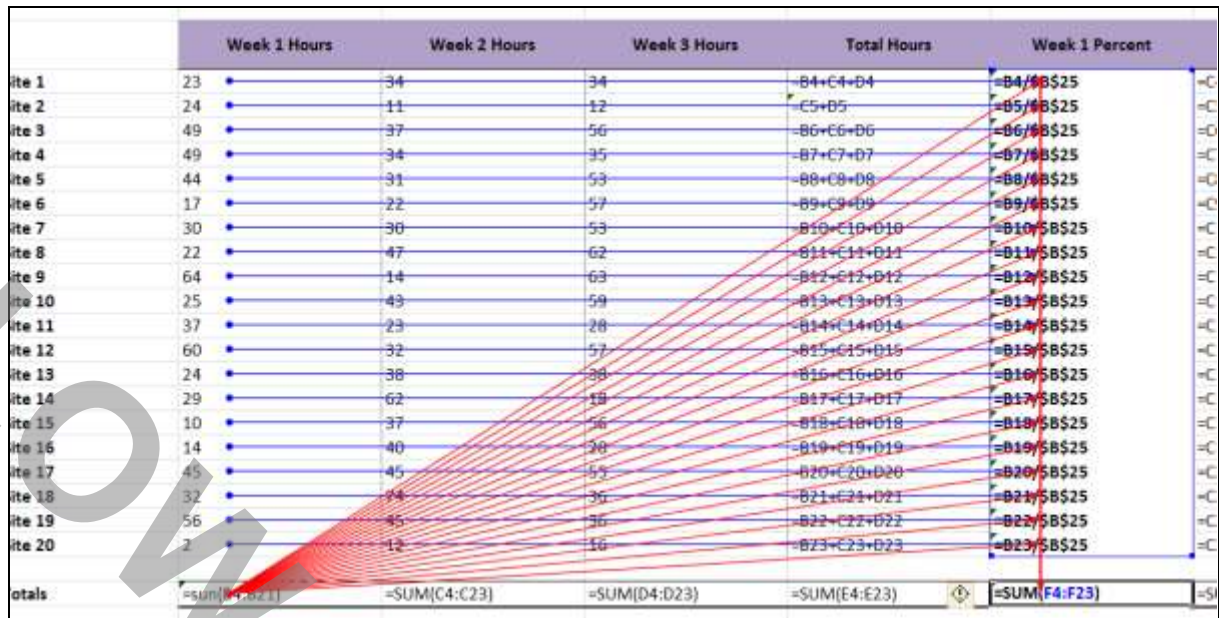


Figure 1-9: Tracing Precedents

9. Click the **Trace Precedents** button again

An arrow is drawn down column B, through to the sum function in cell **B25**. You have traced the precedence even further.

10. Click the **Remove Arrows** button

Dependents are cells that contain formulas that rely on another cell(s).

11. Click cell **B4** on the **Jan** sheet. Click the **Trace Dependents** button to determine which cells are dependants of the value in **B4**

Arrows are drawn to cells **B25**, **B27**, **E4** and **n**.

12. Click the **Trace Dependents** button again to add the next level of dependents

Arrows are drawn from cell **B25** to most of the cells in column F.

13. Again, click **Trace Dependents** again to add the next level of dependents

Arrows are drawn down column F as well as a dotted line to a table.

	Week 1 Hours	Week 2 Hours	Week 3 Hours	Total Hours	Week 1 Per
23	34	34	=B4+C4+D4	=B4/\$B\$25	
24	11	12	=C5+D5	=B5/\$B\$25	
49	37	56	=B6+C6+D6	=B6/\$B\$25	
49	34	35	=B7+C7+D7	=B7/\$B\$25	
44	31	53	=B8+C8+D8	=B8/\$B\$25	
17	22	57	=B9+C9+D9	=B9/\$B\$25	
30	30	53	=B10+C10+D10	=B10/\$B\$25	
22	47	62	=B11+C11+D11	=B11/\$B\$25	
64	14	63	=B12+C12+D12	=B12/\$B\$25	
25	43	59	=B13+C13+D13	=B13/\$B\$25	
37	23	28	=B14+C14+D14	=B14/\$B\$25	
60	32	57	=B15+C15+D15	=B15/\$B\$25	
24	38	38	=B16+C16+D16	=B16/\$B\$25	
29	62	18	=B17+C17+D17	=B17/\$B\$25	
10	37	56	=B18+C18+D18	=B18/\$B\$25	
14	40	28	=B19+C19+D19	=B19/\$B\$25	
45	45	55	=B20+C20+D20	=B20/\$B\$25	
32	74	36	=B21+C21+D21	=B21/\$B\$25	
56	45	36	=B22+C22+D22	=B22/\$B\$25	
2	12	16	=B23+C23+D23	=B23/\$B\$25	
=sum(B4:B23)		=SUM(C4:C23)	=SUM(D4:D23)	=SUM(E4:E23)	=SUM(F4:F23)
=AVERAGE(B4:B23)		=AVERAGE(C4:C23)	=AVERAGE(D4:D23)	=AVERAGE(E4:E23)	=AVERAGE(F4:F23)

Figure 1-10: Tracing Dependents

A series of dotted lines ending in “mini-tables” indicates that further dependants are located on other sheets, or in another workbook.

- Position your mouse on the serrated line (coming from cell E25), double click the line to display the **Go To** dialog box

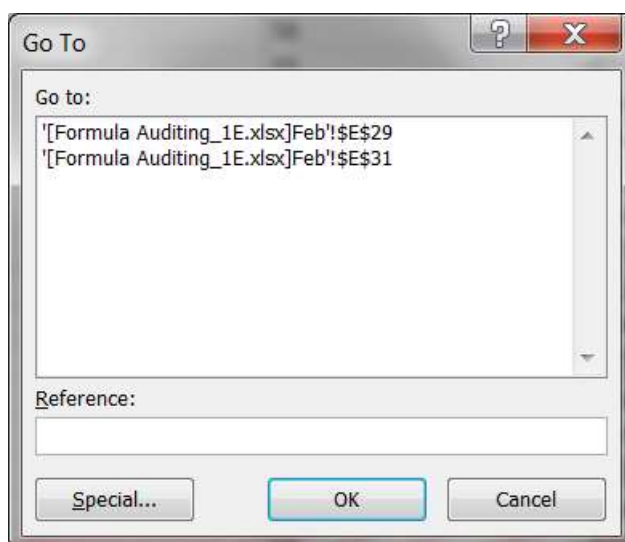



Figure 1-11: Go To Dialog Box

- Double click the '[Formula Auditing_1E.xlsx]Feb!\$E\$31' reference to go to cell **E31** on the **Feb** sheet

Cell **E31** on the **Feb** tab is dependent on the value in cell **E25** on the **Jan** sheet.

16. On the **Feb** sheet, press **Ctrl** +  (~ tilde) to switch to **Formula Auditing Mode**
17. On cell **E31**, click the **Trace Precedence** button
18. Double click the dotted line (indicating the precedent value is on another sheet or workbook)
19. Within the **Go To** dialog box, double click the reference to **'[Formula Auditing_1E.xls]Jan'!\$E\$25**
20. Click the **Remove Arrows** button
21. **Save** the workbook, leave the workbook open for the following exercise

1.4.2 Locating and Resolving Errors

Many errors are obvious in an Excel worksheet. Some errors appear with an error code. For example, when a numeric entry is wider than the column width, the number does not appear. Instead, Excel displays an error value, filling the cell with the # symbol to indicate that the number cannot be displayed in the current format and column width.

Excel errors do not necessarily only show on the specific cell that contains the error. If a precedent cell contains an error, the error will propagate through to all dependant cells, which is why it is very handy to be able trace errors.

The table that follows describes the Excel error values and conditions that cause the error value, as well as what you can do to fix the error. Error values with multiple causes are listed more than once in the table that follows.

Table 1-2: Excel Error Values, Causes and Corrective Actions

Error Value	Common Causes	Corrective Action
#####	The column isn't wide enough. Note this error value is anomalous when you select cells with errors, cells with this error are not selected.	Increase column width or switch to a more compact format (for example, omitting dollar signs)
#####	The cell contains a negative date or time (a negative value that is formatted as a Date or Time).	If the content is a value, delete the minus symbol. If the content is a formula, check to ensure the result is greater than or equal to zero
#VALUE!	One of the formula arguments is the incorrect type, for example, multiplying a number by a text value, or entering a range for a function that requires a single value.	If the formula is correct, use the Trace Precedents feature to locate the cells referenced in the formula. Check each precedent to make sure the data in the precedent cell is the required type for the argument

Error Value	Common Causes	Corrective Action
#DIV/0!	A formula is trying to divide by zero, an empty cell, or a nonnumeric entry for example, =20/0 or =20/Jones. This error is often found in worksheets where formulas are entered prior to entering data.	Use the Trace Precedents feature to find the precedent divisor (the number being "divided by"). If the formula points to the correct cell, and 0 (or blank) may be a legitimate entry in the cell, modify the formula by adding an IF function so that the division operation is completed only if the divisor is a nonzero value
#NAME?	The formula includes unidentifiable text, often a misspelled function name, for example, =ABERAGE (B5:B10), an unknown named range, or a range without the colon, such as B5B10 rather than B5:B10.	Select the formula. If it is a function, click the Insert Function button on the Formula Bar to see if the function name is spelled correctly or is identified as Undefined in the Function Arguments dialog box. Check each item in the formula to ensure that the text entries are enclosed in quotation marks. If the formula includes a range name, choose Insert > Name > Define to double-check the name
#NAME?	The workbook was created on another computer, and the cell includes a formula using a function that is not installed on your computer – usually a function from the Analysis Tool pack	Choose Tools > Add-Ins and install the Analysis Tool pack or install the appropriate Add-In.
#NAME?	The formula relies on column or row labels, and support for labels in formulas is not turned on. This feature was turned on by default in Excel 2000 and is off by default in Excel 2002 and 2003	Examine the formula. If it uses column or row labels, either change the formulas or choose Tools > Options to open the Options dialog box. On the Calculation tab, enable the Accept Labels In Formulas check box.
#N/A	A value used by a lookup formula is blank, or there was no match found for the lookup_value in question (for more information on lookup formulas see XXXX).	If the cell contains a lookup function, use the Trace Precedents command to identify the cell's precedents. Make sure that the cell referred to in the first argument is not blank.
#N/A	Too few arguments are supplied for a function	Click the Insert Function button on the Formula Bar to open the Function Arguments dialog box. Make sure you have entered all required (bold) arguments
#N/A	A precedent cell has the error value #N/A	Use the Trace Precedent command to examine all precedents
#REF!	There is an invalid cell reference, often caused by deleting cells or pasting a selection over cells referred to in an existing formula	If this just happened, click Undo. If it's too late to undo the change you'll need to re-create the formula.
#NUM!	Text is used as an argument when a number is required.	Click the Insert Function button to open the Function Arguments dialog box. Examine the output at the right end of the text box for each argument to find the error
#NUM!	A formula returns a number that is incredibly large or incredibly small that cannot be represented by Excel	Change the formula

Error Value	Common Causes	Corrective Action
#NULL!	A formula includes the intersection of two ranges that have no common cells, for example, =(B9:B10, C9:C10). This error is most often created when you insert a second range when editing an existing formula, rather than replacing the original range	Use the range finder to identify the ranges in the formula. Modify the formula.



i You can find and select all the error values in a worksheet using **Home > Find and Replace > Go To Special**.

1.4.3 Using the Formula / Error Checker to Find Errors

Excel has an error checker for formulas. Just like Word's grammar checker, the error checker works by applying rules to the formulas in the worksheet. By default, the error checker runs in the background as you enter formulas in the worksheet.

If a formula violates one or more rules, a green triangle indicator appears in the upper-left corner of the cell. If you select the cell, an Error Options smart tag appears. By clicking the drop-down arrow on the Error Options tag, a menu will open; you can then deal with the error by selecting one of the menu options, including ignoring the error. If you ignore the error, the Error Options tag is removed.

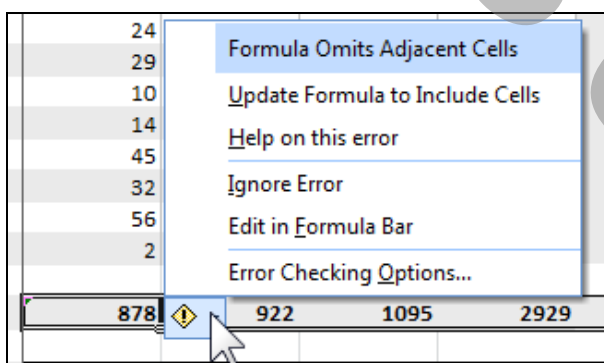


Figure 1-12: Error Checker

The following exercise demonstrates how to use the Error Checker to resolve errors.



Exercise 1.f. USING THE ERROR CHECKER

1. If it is still open, continue on with the file entitled **Chapter _1E.xlsx**, located in the **Desktop \ Excel \ Expert** folder
2. If you are in **Formula Auditing Mode** press **Ctrl** + **~** to exit **Formula Auditing Mode**

3. Select cell **F4** (on the **Jan** sheet) which contains a **#NAME?** error and look at the formula within the **Formula Bar**

Note that there is technically nothing wrong with the formula. Therefore the **#NAME?** error on this sheet must be as a result of a problem in some of other area of the spread sheet.

4. Click on cell **F25**. Turn on **Formula Auditing Mode** by pressing **Ctrl** + **~**
5. Click the drop down arrow on the **Error Checking** button on the **Formulas** tab
6. Click the **Trace Error** option

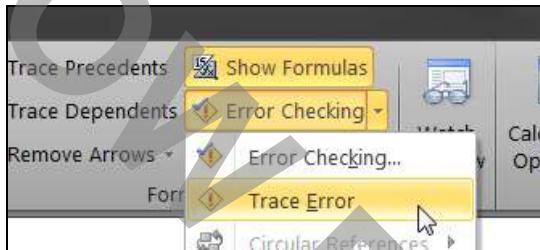


Figure 1-13: Trace Error

Note how **Trace Error** draws a series of red arrows directly to cell **B25**, which suggests that the reason for the **#NAME?** error emanates from cell **B25**.

7. Click the **fx** **Insert Function** button on the **Formula Bar** to open the **Function Arguments** dialog box

Notice that the function description reads **"Undefined."** This means that either the function name is misspelled or that the function is not available to Excel. The function in cell **B25** currently reads **sun**, whereas it should actually read **SUM**.

8. Click **Cancel** to close the **Function Arguments** dialog box
9. Correct the formula by changing "sun" to: **sum** and pressing **Enter**

The dependent arrows automatically turn blue.

10. Turn off **Formula Auditing Mode** by pressing **Ctrl** + **~**
11. Select cell **E5**

This cell does not contain an error value, but the formula checker indicator shows that the formula may be incorrect. Note the same for cell **B25**.

12. Return to **Formula Auditing Mode** by pressing **Ctrl** + **~** (or click the **Show Formulas** button on the **Formulas** tab)
13. Click the **Error Options** button

The menu that appears is titled **Inconsistent Formula**. The formulas above and below this formula are the same, but this formula is different.

14. Choose **Copy Formula from Above** to correct the formula

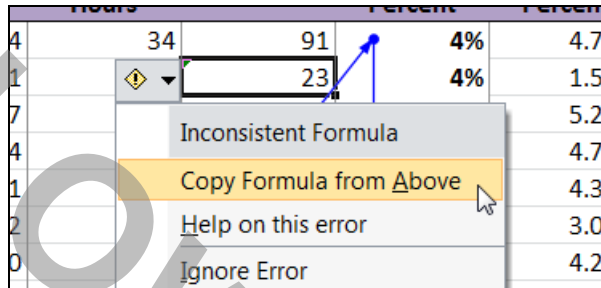


Figure 1-14: Copying a Formula From Above Using Error Options

15. Click cell **B25**

This cell no longer contains a **#NAME?** error, but the formula checker indicator shows that the formula may be incorrect.

16. Click the  **Error Options** button

The menu is titled **Formula Omits Adjacent Cells**. The formula incorrectly only sums cells **B4:B21**, whereas it should be summing **B4:B23**.

17. Choose **Update Formula to Include Cells** to correct the formula

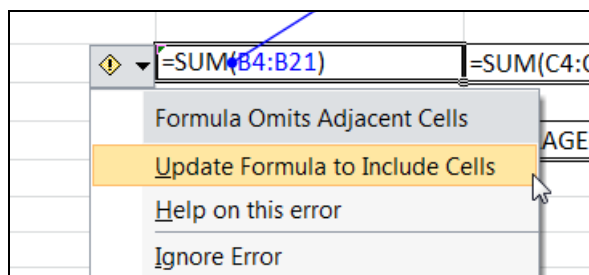



Figure 1-15: More Error Checking

18. Close **Formula Auditing Mode** by pressing **Ctrl** + 
19. **Save** the workbook, leave the workbook open for the following exercise

QUICK NOTES

1.4.4 The Watch Window

The **Watch Window** is a separate window that lets you view formulas and their results directly within cells. With the **Watch Window**, you can see the results of several cells without scrolling to the cells. In the following exercise we will use the **Watch Window** to watch several cells.



Exercise 1.g. USING THE WATCH WINDOW

1. If it is still open, continue on with the file **Chapter_1E.xlsx**, located in the **Desktop \ Excel \ Expert** folder
2. Click the **Feb** sheet, click cell **E31**, click the **Add Watch** button on the **Formulas** tab
3. Within the **Watch Window**, choose **Add Watch**, click the **Add** button

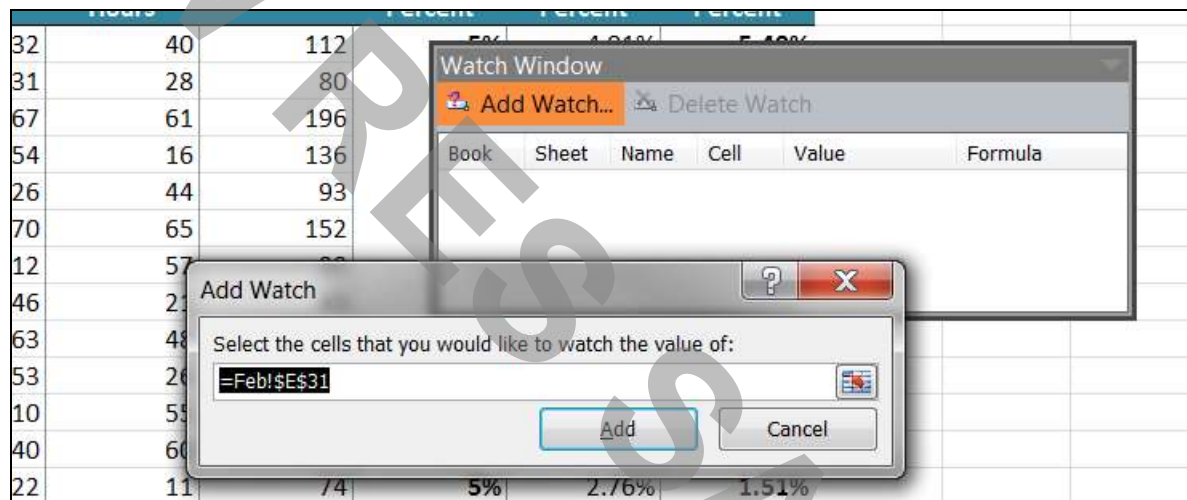


Figure 1-16: The Watch Window

4. If your **Watch Window** is not maximised, then double click the title bar of the **Watch Window** which (most likely) maximises and positions the **Watch Window** at the top of the screen
5. Click the **Jan** sheet, click cell **F4**, click the **Add Watch** button (within the **Watch Window**) and again click **Add**

Note the two existing values.

6. Select the **Jan** sheet, click cell **B4**, change the value to: **50** and press **Enter**

Note how the values listed in the **Watch Window** change automatically. Using the **Watch Window** you are now able to monitor data without having to scroll to the data.



i You can use the **Watch Window** to monitor data in other workbooks, but those workbooks have to be open in order to do so.

i You can double click a watch in the **Watch Window** to navigate to that watched cell.

7. Close the **Watch Window** (by clicking the **Watch Window** button). **Save** and **Close** the workbook

1.5 Forecasting (What-If) and Other Business Analysis Tools



MICROSOFT OFFICE CERTIFICATION

This concept addresses the **Apply data analysis** competency of the Microsoft Office Expert Certification (**Exam 77-888**).

PLEASE NOTE: This training resource does not necessarily cover all of the requirements of this exam objective as this objective may include but is not limited to: using automated analysis tools and performing What-If analysis.

Visit <http://www.microsoft.com/learning/en/us/mos-certification.aspx> for the latest Microsoft Office Certification requirements.

Excel's functions and formulas are considered business analysis tools, as powerful as these functions and formulas are; they have their limitations. For more advanced work, Microsoft Excel includes specialized forecasting tools. These tools are often referred to as "what-if tools".

There are three tools used in what-if analysis: **Data Tables**, **Goal Seek** and **Solver**. Of the three what-if tools, data tables are said to be the least complex, **Solver** being the most complex.

1.5.1 Single Variable Data Table

To create a one-variable data table to perform what-if analysis in Excel, you enter a series of input values either across columns of a single row or down the rows of a single column. The formulas in a one-variable data table refer to only one input cell: a row input cell for input values entered across a row or a column input cell for input values entered down a column.

In the following exercise, you will calculate potential production outputs based on a projected production growth percentage. The projected production amount in cell **C5** is calculated by adding last year's production total in cell **C2** to a percentage increase that are expected to grow in the following year (**C3**).

	A	B	C	D
1	Projected Production (Tonnes)			
2	2009 Production Level		200,000	
3	Production Increase		1.25%	
4				
5	2010 Projected level		202,500	
6				
7	% Increase			
8	1.50%			
9	1.75%			
10	2.00%			
11	2.25%			
12	2.50%			
13	2.75%			
14	3.00%			
15	3.25%			

Figure 1-17: Using a Single Variable Data Table

The data table feature uses an input cell to temporarily store each value from the data series as it calculates results. Rather than creating fifteen formulas that refer to cells A8 through A27, you can create one formula that refers to the input cell. Excel changes the values of the input cell as it creates the table, so the ideally the input cell should be an empty cell. In the following exercise you will create this data table that uses a single variable.



Exercise Time

Exercise 1.h. CREATING A SINGLE-VARIABLE DATA TABLE

1. Open: **Chapter_1G.xlsx**; located in the **Desktop \ Excel \ Expert** folder
2. On the **DataTables** worksheet, select the cell directly above the first cell that will return results, in this case, select cell **D9**
3. Press = and then click cell **R5** press **Enter**



Important Note



You could just as easily have recreated the formula, **=R3+R3*R2** (as within cell **R5**) to calculate the production increase.

You will now need to select the data table range: including the formula, data series, and results cells.

4. Select the range **C9:D29**

Important Note

It is important that you do not include the input cell, do not hold **Ctrl**, selecting multiple ranges and do not include additional cells.

- With the cells selected, choose **Data > What-if Analysis > Data Table**

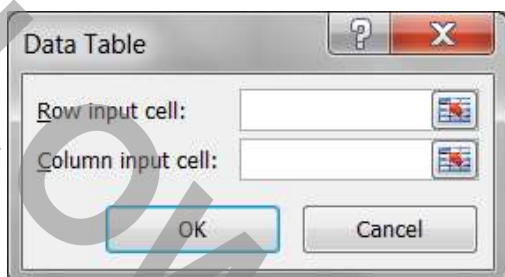


Figure 1-18: The Data Table Dialog Box

- Click within the **Column Input Cell** text box and then click cell **R2** (the percentage to be substituted)
- Click **OK** to create the data table
- Save** the workbook and leave the workbook open for the following exercise

1.5.2 Creating a Two Variable Data Table

Data tables are used to show the results of changing either one or two variables used as arguments in a formula. The data table feature uses an input cell to temporarily store each value from the data series as it calculates results. Rather than creating fifteen formulas that refer to cells A6 through A20, you can create one formula that refers to the input cell. Excel changes the values of the input cell as it creates the table. There are two types of **Data Tables**:

- Single variable
- Two variable

In a two-variable table, the layout is critical. The formula cell must be directly above the column of data and directly to the left of the row of data. The column and row cannot share common cells.

Exercise Time

Exercise 1.i. CREATING A TWO-VARIABLE DATA TABLE

- Continue on with the file left open from the previous exercise, or alternatively open **Chapter_1G.xlsx**, located in the **Desktop \ Excel \ Expert** folder
- On the **DataTables** worksheet, select cell **H9**
- Press **=** and then click cell **R5** press **Enter**