

# Contents

<b>Introduction</b>	<b>17</b>
Feedback.....	17
Downloading the sample files.....	17
Problem resolution.....	17
The Excel version that were used to write this book.....	17
Typographical Conventions Used in This Book .....	18
<b>How to use this course</b>	<b>20</b>
Three important rules.....	20
How to work through the lessons.....	21
How to best use the incremental sample files .....	21
<b>Session One: Tables, and Ranges</b>	<b>23</b>
Session Objectives .....	23
Lesson 1-1: Check that your Excel version is up to date .....	24
Lesson 1-2: Change the Office Theme .....	26
Lesson 1-3: Apply a simple filter to a range.....	28
Lesson 1-4: Apply a top 10 and custom filter to a range .....	30
Lesson 1-5: Apply an advanced filter with multiple OR criteria .....	32
Lesson 1-6: Apply an advanced filter with complex criteria .....	34
Lesson 1-7: Apply an advanced filter with function-driven criteria.....	36
Lesson 1-8: Extract unique records using an advanced filter .....	38
Lesson 1-9: Add totals using Quick Analysis .....	40
Lesson 1-10: Add percentage and running totals using Quick Analysis .....	42
Lesson 1-11: Convert a range into a table and add a total row.....	44
Lesson 1-12: Format a table using table styles and convert a table into a range .....	46
Lesson 1-13: Create a custom table style.....	48
Lesson 1-14: Sort a range or table by rows .....	50
Lesson 1-15: Sort a range by columns .....	52
Lesson 1-16: Sort a range or table by custom list.....	54
Lesson 1-17: Name a table and create an automatic structured table reference.....	56
Lesson 1-18: Create a manual structured table reference .....	58
Lesson 1-19: Use special items in structured table references .....	60
Lesson 1-20: Understand unqualified structured table references.....	62
Session 1: Exercise .....	65
Session 1: Exercise Answers .....	67
<b>Session Two: Data Integrity, Subtotals and Validations</b>	<b>69</b>
Session Objectives .....	69

Lesson 2-1: Split fixed width data using Text to Columns .....	70
Lesson 2-2: Split delimited data using Text to Columns .....	72
Fixed width data .....	72
Delimited data .....	72
Lesson 2-3: Automatically subtotal a range .....	74
Lesson 2-4: Create nested subtotals.....	76
Lesson 2-5: Consolidate data from multiple data ranges .....	78
Lesson 2-6: Use data consolidation to generate quick subtotals from tables .....	80
Lesson 2-7: Validate numerical data .....	82
Lesson 2-8: Create user-friendly messages for validation errors .....	84
Lesson 2-9: Create data validation input messages .....	86
Lesson 2-10: Add a formula-driven date validation and a text length validation.....	88
Lesson 2-11: Add a table-based dynamic list validation .....	90
Lesson 2-12: Use a formula-driven custom validation to enforce complex business rules .....	92
Lesson 2-13: Remove duplicate values from a table .....	94
Lesson 2-14: Use a custom validation to add a unique constraint to a column .....	96
Session 2: Exercise.....	99
Session 2: Exercise Answers .....	101

## **Session Three: Advanced Functions 103**

Session Objectives .....	103
Lesson 3-1: Understand precedence rules and use the Evaluate feature .....	104
Lesson 3-2: Use common functions with Formula AutoComplete .....	106
Lesson 3-3: Use the Insert Function dialog and the PMT function.....	108
Lesson 3-4: Use the PV and FV functions to value investments .....	110
Present Value.....	110
Future Value .....	110
Lesson 3-5: Use the IF logic function .....	112
Lesson 3-6: Use the SUMIF and COUNTIF functions to create conditional totals .....	114
Lesson 3-7: Understand date serial numbers.....	116
Lesson 3-8: Understand common date functions .....	118
Lesson 3-9: Use the DATEDIF function.....	120
Lesson 3-10: Use date offsets to manage projects using the scheduling equation.....	122
Lesson 3-11: Use the DATE function to offset days, months and years.....	124
Lesson 3-12: Enter time values and perform basic time calculations .....	126
Lesson 3-13: Perform time calculations that span midnight.....	128
Lesson 3-14: Understand common time functions and convert date serial numbers to decimal values....	130
Lesson 3-15: Use the TIME function to offset hours, minutes and seconds .....	132
Lesson 3-16: Use the AND and OR functions to construct complex Boolean criteria .....	134
Lesson 3-17: Understand calculation options (manual and automatic).....	136

Lesson 3-18: Concatenate strings using the concatenation operator (&).....	138
About strings .....	138
The concatenation operator (&).....	138
Lesson 3-19: Use the TEXT function to format numerical values as strings.....	140
Custom format strings recap .....	140
Lesson 3-20: Extract text from fixed width strings using the LEFT, RIGHT and MID functions .....	142
Lesson 3-21: Extract text from delimited strings using the FIND and LEN functions.....	144
Lesson 3-22: Use a VLOOKUP function for an exact lookup.....	146
Lesson 3-23: Use the SWITCH function.....	148
Lesson 3-24: Use an IFERROR function to suppress error messages .....	150
Lesson 3-25: Use a VLOOKUP function for an inexact lookup .....	152
Lesson 3-26: Use a MATCH function for an exact lookup .....	154
Lesson 3-27: Use the INDEX function.....	156
Lesson 3-28: Use the IFS function .....	158
Session 3: Exercise .....	161
Session 3: Exercise Answers .....	163

## **Session Four: Using Names and the Formula Auditing Tools 165**

Session Objectives .....	165
Lesson 4-1: Automatically create single-cell range names.....	166
Lesson 4-2: Manually create single cell range names and named constants .....	168
Lesson 4-3: Use range names to make formulas more readable.....	170
Lesson 4-4: Automatically create range names in two dimensions .....	172
Lesson 4-5: Use intersection range names and the INDIRECT function.....	174
Lesson 4-6: Create dynamic formula-based range names using the OFFSET function .....	176
Lesson 4-7: Create table-based dynamic range names .....	178
Lesson 4-8: Create two linked drop-down lists using range names .....	180
Lesson 4-9: Understand the #NUM!, #DIV/0! and #NAME? error values .....	182
Lesson 4-10: Understand the #VALUE!, #REF! and #NULL! error values.....	184
Lesson 4-11: Understand background error checking and error checking rules .....	186
Lesson 4-12: Manually check a worksheet for errors.....	188
Lesson 4-13: Audit a formula by tracing precedents .....	190
Lesson 4-14: Audit a formula by tracing dependents.....	192
Lesson 4-15: Use the Watch Window to monitor cell values .....	194
Lesson 4-16: Use Speak Cells to eliminate data entry errors .....	196
Session 4: Exercise .....	199
Session 4: Exercise Answers .....	201

## **Session Five: What If Analysis and Security 203**

Session Objectives .....	203
Lesson 5-1: Create a single-input data table.....	204

Lesson 5-2: Create a two-input data table .....	206
Lesson 5-3: Define scenarios .....	208
Lesson 5-4: Create a scenario summary report.....	210
Lesson 5-5: Use Goal Seek .....	212
Lesson 5-6: Use Solver.....	214
What is Solver? .....	214
Lesson 5-7: Hide and unhide worksheets, columns and rows .....	216
Lesson 5-8: Create custom views.....	218
Lesson 5-9: Prevent unauthorized users from opening or modifying workbooks .....	220
Lesson 5-10: Control the changes users can make to workbooks .....	222
Lesson 5-11: Restrict the cells users are allowed to change .....	224
Lesson 5-12: Allow different levels of access to a worksheet with multiple passwords .....	226
Lesson 5-13: Create a digital certificate .....	228
Why digital certificates are needed. ....	228
Self-certification and third-party certification.....	228
Lesson 5-14: Add an invisible digital signature to a workbook .....	230
Lesson 5-15: Add a visible digital signature to a workbook.....	232
Session 5: Exercise.....	235
Session 5: Exercise Answers .....	237

## **Session Six: Working with Hyperlinks, Other Applications and Workgroups 239**

Session Objectives .....	239
Lesson 6-1: Hyperlink to worksheets and ranges .....	240
Lesson 6-2: Hyperlink to other workbooks and the Internet.....	242
Lesson 6-3: Hyperlink to an e-mail address and enhance the browsing experience.....	244
Lesson 6-4: Embed an Excel worksheet object into a Word document .....	246
Lesson 6-5: Embed an Excel chart object into a Word document .....	248
Lesson 6-6: Link an Excel worksheet to a Word document .....	250
Introduction to legacy sharing lessons .....	253
Lesson 6-7: Understand the three different ways to share a workbook.....	254
The lock method.....	254
The merge method.....	254
Sharing workbooks on a network.....	255
Lesson 6-8: Share a workbook using the lock method .....	256
Lesson 6-9: Share a workbook using the merge method.....	258
Lesson 6-10: Share a workbook on a network .....	260
Lesson 6-11: Accept and reject changes to shared workbooks .....	262
Session 6: Exercise.....	265
Session 6: Exercise Answers .....	267

## **Session Seven: Forms and Macros 269**

Session Objectives .....	269
Lesson 7-1: Add group box and option button controls to a worksheet form .....	270
Lesson 7-2: Add a combo box control to a worksheet form.....	272
Lesson 7-3: Set form control cell links.....	274
Lesson 7-4: Connect result cells to a form .....	276
Lesson 7-5: Add a check box control to a worksheet form.....	278
Lesson 7-6: Use check box data in result cells.....	280
Lesson 7-7: Add a temperature gauge chart to a form .....	282
Lesson 7-8: Add a single input data table to a form.....	284
Lesson 7-9: Improve form appearance and usability.....	286
Lesson 7-10: Understand macros and VBA.....	288
Macros record keystrokes and mouse-clicks.....	288
Lesson 7-11: Record a macro with absolute references.....	290
Lesson 7-12: Understand macro security.....	292
Why is security needed? .....	292
The Excel Workbook and Excel Macro Enabled Workbook formats.....	292
Four ways to trust a macro enabled workbook.....	292
Lesson 7-13: Implement macro security .....	294
Lesson 7-14: Understand trusted documents.....	296
Lesson 7-15: Record a macro with relative references.....	298
Lesson 7-16: Use shapes to run macros.....	300
Lesson 7-17: Run a macro from a button control.....	302
Lesson 7-18: Show and hide ribbon tabs.....	304
Lesson 7-19: Add custom groups to standard ribbon tabs.....	306
Lesson 7-20: Create a custom ribbon tab .....	308
Session 7: Exercise.....	311
Session 7: Exercise Answers .....	313

<b>Session Eight: Pivot Tables</b>	<b>315</b>
------------------------------------	------------

Session Objectives .....	315
Lesson 8-1: Create a one dimensional pivot table report from a table .....	316
Lesson 8-2: Create a grouped pivot table report .....	318
Lesson 8-3: Understand pivot table rows and columns .....	320
Lesson 8-4: Understand the pivot table data cache.....	322
Lesson 8-5: Apply a simple filter and sort to a pivot table.....	324
Lesson 8-6: Use report filter fields.....	326
Lesson 8-7: Filter a pivot table visually using slicers.....	328
Lesson 8-8: Add a timeline control to a pivot table.....	330
Lesson 8-9: Use slicers to create a custom timeline .....	332
Lesson 8-10: Use report filter fields to automatically create multiple pages .....	334

Lesson 8-11: Format a pivot table using PivotTable styles .....	336
Lesson 8-12: Create a custom pivot table style .....	338
Lesson 8-13: Understand pivot table report layouts.....	340
Lesson 8-14: Add/remove subtotals and apply cell styles to pivot table fields .....	342
Lesson 8-15: Display multiple summations within a single pivot table .....	344
Lesson 8-16: Add a calculated field to a pivot table .....	346
Lesson 8-17: Add a calculated item to a pivot table.....	348
Lesson 8-18: Group by text.....	350
Lesson 8-19: Group by date.....	352
Lesson 8-20: Group by numeric value ranges .....	354
Lesson 8-21: Show row data by percentage of total rather than value.....	356
Lesson 8-22: Use pivot table values in simple formulas.....	358
Lesson 8-23: Use the GETPIVOTDATA function.....	360
Lesson 8-24: Create a pivot chart from a pivot table .....	362
Lesson 8-25: Embed multiple pivot tables onto a worksheet .....	364
Lesson 8-26: Use slicers to filter multiple pivot tables.....	366
Session 8: Exercise.....	369
Session 8: Exercise Answers .....	371

<b>Introduction to OLAP sessions</b>	<b>373</b>
--------------------------------------	------------

<b>Session Nine: Data Modeling, OLAP and Business Intelligence</b>	<b>375</b>
--	------------

Session Objectives .....	375
Lesson 9-1: Import tables from an external relational database (Excel 2016) .....	376
Lesson 9-2: Import tables from an external relational database (Excel 365) .....	378
Lesson 9-3: Understand primary and foreign keys.....	380
Lesson 9-4: Link primary and foreign keys using VLOOKUP .....	382
Lesson 9-5: Efficiently import data using a view (Excel 2016) .....	384
Lesson 9-6: Efficiently import data using a view (Excel 365) .....	386
Lesson 9-7: Understand linked tables .....	388
Lesson 9-8: Work with big data (Excel 2016) .....	390
Lesson 9-9: Work with big data (Excel 365) .....	392
Lesson 9-10: Create a simple data model .....	394
Lesson 9-11: Understand OLAP pivot tables.....	396
Lesson 9-12: Understand OLAP cubes and Business Intelligence .....	398
Lesson 9-13: Create an OLAP pivot table directly from a relational database (Excel 2016) .....	400
Lesson 9-14: Create an OLAP pivot table directly from a relational database (Excel 365).....	402
Lesson 9-15: Understand many-to-many relationships.....	404
Lesson 9-16: Create an OLAP pivot table using a many-to-many relationship.....	406
Lesson 9-17: Understand MDX queries and OLAP pivot table limitations.....	408
Lesson 9-18: Use the CUBEVALUE function to query an OLAP cube.....	410

Lesson 9-19: Convert CUBEVALUE functions to include MDX expressions .....	412
Lesson 9-20: Create an asymmetric OLAP pivot table using Named Sets.....	414
Session 9: Exercise .....	417
Session 9: Exercise Answers .....	419

## **Session Ten: 3D Maps** **421**

Session Objectives .....	421
Lesson 10-1: Create a simple 3D Map .....	422
Lesson 10-2: Confirm the accuracy of geocoding .....	424
Lesson 10-3: Map using different location fields .....	426
Lesson 10-4: Apply filters to a 3D Map.....	428
Lesson 10-5: Set layer options and customize data cards.....	430
Lesson 10-6: Add a height field to a layer .....	432
Lesson 10-7: Apply different visualization types .....	434
Lesson 10-8: Visualize multiple categories.....	436
Lesson 10-9: Create a visualization with multiple layers .....	438
Lesson 10-10: Add annotations .....	440
Lesson 10-11: Create a video from temporal data .....	442
Lesson 10-12: Set scene options.....	444
Lesson 10-13: Create a tour with multiple scenes.....	446
Session 10: Exercise .....	449
Session 10: Exercise Answers .....	451

## **Session Eleven: Create Get & Transform queries** **453**

Session Objectives .....	453
Lesson 11-1: Understand Get & Transform and ETL.....	454
Lesson 11-2: Create a simple extract and load web query .....	456
Lesson 11-3: Understand queries and connections .....	458
Lesson 11-4: Move, remove, rename, filter and sort columns .....	460
Lesson 11-5: Split delimited data .....	462
Lesson 11-6: Specify data types.....	464
Lesson 11-7: Understand steps and PQFL.....	466
Lesson 11-8: Remove empty, error and top and bottom rows.....	468
Lesson 11-9: Understand and work with null values .....	470
Lesson 11-10: Transform date and time columns .....	472
Lesson 11-11: Transform number columns .....	474
Lesson 11-12: Add a custom calculated column.....	476
Lesson 11-13: Create an aggregated data query .....	478
Lesson 11-14: Unpivot aggregated data.....	480
Lesson 11-15: Work with multiple queries.....	482
Lesson 11-16: Create an append query .....	484

Lesson 11-17: Understand normal and de-normalized data.....	486
Lesson 11-18: Create a simple two-table merged query.....	488
Lesson 11-19: Create a five-table merged query.....	490
Session 11: Exercise.....	493
Session 11: Exercise Answers.....	495
Appendix A: Skills Covered in the Essential Skills Course.....	497
Essential skills course outline.....	498