Excel Business Modelling

Sample manual - first two chapters



Manual 1202 - 158 pages -

TABLE OF CONTENTS (1 of 5)

1 SEVEN MODELLING GUIDELINES Page

1.1	Guideline 1 – Use a Cover Sheet	7
1.2	Guideline 2 – Separate Inputs and Calculations	8
	Checking for Rogue Formulae	8
1.3	Guideline 3 – Use Styles	9
1.4	Guideline 4 – Use Range Names	10
1.5	Guideline 5 – Keep Formulae Simple	10
1.6	Guideline 6 – Copy Formulae Across	11
1.7	Guideline 7 – Use Consistent Period Headings	11

2	RANGE NAMES	Page
2.1	What are Range Names?	12
	Going to a Range Name	12
2.2	Creating Range Names	13
	Method 1 – Using the Name Box Method 2 – Defining Names	13 13
	Method 3 - Creating Range Names from Selected Cells	14
2.3	Range Names in Formulae	15
	Referencing Range Names in Formulae	15
	Dealing with Spill Errors	16
	The Possible Spill Errors	16
	Implicit Intersection using @	17
	Two-Dimensional Range Formulae	17
	Getting Aggregation Functions to Work using +	18
2.4	Working with Range Names	19
	Editing and Deleting Range Names	19
	Viewing Range Names	19
2.5	The Scope of Range Names	20
	Choosing the Scope of a Range Name	20
	Copying Worksheets Copies their Range Names with Local Scope	20
2.6	3-Dimensional Ranges	21

STYLES	Page
Overview of Styles	22
Benefits of Styles (1) – Consistent Formatting	22
Benefits of Styles (2) – Protection	22
Applying Styles	23
Adding Styles to the Quick Access Toolbar	23
Creating Styles	24
Creating Partial Styles	24
Changing Styles	25
Merging Styles	26
	STYLES Overview of Styles Benefits of Styles (1) – Consistent Formatting Benefits of Styles (2) – Protection Applying Styles Adding Styles to the Quick Access Toolbar Creating Styles Creating Partial Styles Changing Styles Merging Styles

4	NUMBER AND DATE FORMATS	Page
4.1	What are Number Formats?	27
	Examples of Number Formats Examples of Date Formats	27 27
4.2	Formatting Dates	28
	How Dates and Times are Stored Quick Ways to Enter Dates and Times Quick Formatting Dates and Times Selecting Different Date/Time Formats Custom Date Formats Custom Date Formatting Codes Custom Time Formatting Codes Displaying Elapsed Times without Overflow	28 28 29 30 30 31 31
4.3	Standard Number Formats	32
	Standard Number Formats using the Ribbon Standard Number Formats using Format Cells	32 33
4.4	Custom Number Formats	34
	Creating Custom Number Formats General Rules for Custom Number Formats Example of a Typical Custom Number	34 34 35
	Format	05
	Re-using Custom Number Formats	35
4.5	Tricks with Number Formats Tricks with Text	36 36
	Hiding Parts of a Number Format	36
	Colouring Parts of a Number Format	36
	Getting Positive and Negative Numbers to Line Up	37
	Getting Decimal Points to Line Up	37
	Fractions	37
	Scaling Large Numbers	38
	Filling Spaces	38



TABLE OF CONTENTS (2 of 5)

Page

CONDITIONAL FORMATTING

5.1	Overview	39
5.2	Creating Conditional Formats	40
	Applying a Pre-set Conditional Format Creating your own Conditional Format – a Case Study	40 41
5.3	Editing and Deleting Conditional Formats	42
	Changing the Order in which Rules Apply	42
5.4	More Sophisticated Rules	43
	Picking out Statistical Trends	43
	Using Formulae in Rules	44
	Using Formulae in Rules to Highlight a Whole Row	45
5.5	Viewing Conditionally Formatted Cells/Rules	46
	Viewing All Conditionally Formatted Cells	46
	Viewing all Conditional Formatting Rules	46

6	NOTES	Page
6.1	Overview of Notes	47
6.2	Working with Notes	48
	Creating Notes	48
	Changing the Default User Name	48
	Editing and Deleting Notes	49
	Formatting Notes	49
	Printing Notes	50
6.3	Ways to Show Notes	51
	Hiding Red Triangles	51
	Showing/Hiding All Notes	51
	Selecting Cells Containing Notes	51

7	DATA VALIDATION	Page
7.1	What is Data Validation?	52
7.2	Creating Validation Rules	53
	Step 1 – Saying what is Allowed Step 2 – Defining your Punishment for Mistakes	53 54
7.3	Referencing Formulae in Validation	55
7.4	Dropdown Lists	56
	Step 1 - Creating a Range Name Step 2 – Setting the List	56 56
7.5	Input Messages	57
7.6	Copying and Clearing Validation Settings	58
	Copying Validation Clearing Validation Settings	58 58
7.7	Highlighting Validated Cells	59
	Highlighting Cells which have Validation Applied	59
	Circling Invalid Data	59

8	PROTECTION	Page
8.1	Types of Protection	60
8.2	Protecting Worksheets	61
	Unlocking Cells A Note on Unprotecting Cells using Styles Protecting and Unprotecting Worksheets	61 62 62
8.3	Protecting a Workbook's Structure	63
8.4	Password-Protecting Workbooks	64
8.5	Preventing Accidental Changes to a Workbook	65
8.6	Hiding Worksheets	66
	Very Hidden Worksheets	66
8.7	Hiding Cells and Formulae	67
	Hiding Cells Hiding Formulae	67 67



TABLE OF CONTENTS (3 of 5)

9	GROUPING (OUTLINING)	Page
9.1	Using Grouping	68
9.2	Creating Grouping/Outlining	69
	Creating Automatic Outlines	69
	Manually Grouping Rows/Columns	69
9.3	Problems with Grouping/Outlining	70
	Changing Outlining Position	70
	Using Grouping/Outlining with Protection	70
9.4	Removing Outlining/Grouping	71
	Removing Outlining/Grouping from Selected Rows/Columns	71
	Removing All Outlining	71

10	IF FUNCTIONS	Page
10.1	Overview of IF Functions	72
	Relational Operators	72
10.2	Creating IF Functions	73
	Typing IF Functions	73
	Using the Function Wizard	74
10.3	Nesting IF Conditions	75
	Step 1 – Define the Conditions	75
	Step 2 – Create the Nested IF Function	75
	An Alternative: the IFS function	76
10.4	The SWITCH Function	77

11	INFORMATION FUNCTIONS	Page
11.1	The CELL and INFO Functions	78
	The INFO Function The CELL Function	78 78
11.2	Sheet Number / Numbers	79
	The SHEET Function The SHEETS Function	79 79

12	TEXT FUNCTIONS	Page
12.1	List of Text Functions	80
	Searching and Replacing Text	80
	Extracting one String from Another	80
	Converting Strings	81
	Other Text Functions	81
	Joining Multiple Items	81
	Converting Numbers and Dates to Text	82
12.2	Text Functions – a Case Study	83

13	DATE AND TIME FUNCTIONS	Page
13.1	Returning Date Information	84
	Returning Parts of a Date	84
	Returning today's Date/Time	84
	Returning Parts of a Time	85
	Converting Numbers/Text into Dates/Times	85
13.2	Manipulating Dates	86
	Returning Different Dates	86
	Returning the Difference between Dates	86

14	THE VLOOKUP FUNCTION	Page
14.1	Types of Lookup Table	87
	Exact Matches or Not? Horizontal or Vertical?	87 87
14.2	Inexact Matches (Continuous Value Lookups)	88
	Creating the Lookup Table	88
	Giving the Lookup Table a Range Name	88
	Creating the VLOOKUP Formula	89
14.3	Exact Match Lookup Tables	90
	Syntax of the Exact VLOOKUP Function	90
	Creating a Range Name for your Lookup Table	91
	Creating the Lookup Formula	91
14.4	Trapping Errors	92
	Method 1 - Preventing Errors Happening with Data Validation	92
	Method 2 - Adding Outliers to your Input Table	93
	Method 3 – Converting Invalid Values using IF	93
	Method 4 – Trap Errors when they Occur	93

15	INSPECTION AND ERROR FUNCTIONS	Page
15.1	Inspection Functions	94
	Non-Error Inspection Functions Error Inspection Functions	94 94
15.2	Handling Errors	95
	General Error Trapping using IFERROR Avoiding the Error in the First Place	95 95



TABLE OF CONTENTS (4 of 5)

16 THE XLOOKUP FUNCTION Page 16.1 Introduction to XLOOKUP 96 Our Example for this Chapter 96 The XLOOKUP Function Arguments 96 16.2 Using XLOOKUP 96 Basic Lookups 97 Reversing the Sort Order 97 Using Wildcards 98 Setting a Not Found Value 99 Returning Arrays 99

17	CONDITIONAL STATISTICS	Page
17.1	Overview of Conditional Statistical Functions	100
	Using IF instead of Conditional Statistical Functions	100
	The Special Functions Available	100
17.2	SUMIFS, COUNTIFS, etc	101
	Syntax of the Functions	101
	Worked Example	101
	Example with Multiple Criteria and Wildcards	102
	AVERAGEIF, COUNTIF and SUMIF	103
	Using with a Summation Range	103
	Combining the Criteria and Summation Range	103

18	LOGICAL FUNCTIONS / MASKING	Page
18.1	Masking	104
18.2	Logical Functions	105

19	OTHER LOOKUP FUNCTIONS	Page
19.1	Combining MATCH and INDEX	106
	Reasons to Prefer MATCH/INDEX to VLOOKUP	106
	The Range Names for our Example	107
	The Syntax of MATCH	107
	Using MATCH to Find Row/Column Numbers for our Example	108
	Syntax of the INDEX Function	108
	Creating the INDEX Function for our Example	109
	Combining MATCH and INDEX in a Single Function	109
19.2	The XMATCH Function	110
	The XMATCH Function Arguments	110
19.3	The CHOOSE Function	111
19.4	The OFFSET Function	112
	Basic Offsetting	112
	Setting the Number of Rows/Columns Returned	113
19.5	The INDIRECT Function	114
	Example: Picking Out Figures from a Chosen Worksheet	114

20	THE SUMPRODUCT FUNCTION	Page
20.1	Our Example	115
20.2	Solutions without SUMPRODUCT	116
	Summing the Results of IF Functions Using SUMIFS	116 116
20.3	The SUMPRODUCT Function	117
	What Summing Products Means Vectors of TRUE / FALSE values Forcing SUMPRODUCT to Calculate True/False Correctly	117 117 118
	Weighted Averages using SUMPRODUCT	118

21	DYNAMIC RANGE NAMES	Page
21.1	Examples of Dynamic Range Names	119
21.2	Making a Range Name Dynamic	120
	The Principle: the OFFSET Function Creating the Range Name Using Dynamic Range Names	120 120 121
21.3	Dynamic Range Names and Charts	122
	Creating the Range Names Making the Chart Refer to these Ranges	122 122



TABLE OF CONTENTS (5 of 5)

22	CASHFLOW	Page
22.1	Template for a Cashflow Calculation	123
22.2	Calculating Interest	124
	Step 1 – Splitting the Cash Stream into Positive and Negative Amounts	124
	Step 2 – Calculating the Deposit/Loan Rate	125
	Step 3 – Calculating the Deposit/Loan Amount	125

23	INVESTMENT APPRAISAL	Page
23.1	Discount Rates	126
23.2	Discounted Cashflow	127
23.3	NPV and IRR Functions	128
	NPV Function	128
	IRR Function	129
	Using IRR or NPV to Assess an Investment	129
	Non-Periodic Cashflows using XNPV and XIRR	130
	Modified Internal Rate of Return Function	130

24	MULTIPLE WORKSHEETS	Page
24.1	Moving between Worksheets	131
24.2	Common Tasks	132
	Selecting and De-selecting Worksheets Renaming Worksheets Changing Worksheet Tab Colours Hiding and Unhiding Worksheets	132 132 133 133
24.3	Inserting and Deleting Worksheets	134
	Inserting Single Worksheets Inserting Multiple Worksheets Deleting Worksheets	134 134 134
24.4	Moving and Copying Worksheets	135
	Moving Worksheets within a Workbook Copying Worksheets within a Workbook Moving and Copying to a Different or New Workbook	135 135 136
24.5	Group Mode	137
24.6	Summing across Sheets	138

25	SCENARIOS	Page
25.1	Overview of Scenarios	139
25.2	Creating a Scenario	140
	Base case scenarios Starting the Scenario Manager Creating a Scenario	140 140 141
25.3	Showing Different Scenarios	142
	Showing Different Scenarios using the Ribbon Switching Scenarios using the Quick Access Toolbar	142 142
25.4	Editing, Deleting and Merging Scenarios	143
	Editing or Deleting Scenarios	143 142
25 5	Summarising Scenarios	143
20.0		1.1.1

26	GOAL-SEEKING	Page
26.1	Goal-Seeking Example	145
26.2	Using Goal-Seeking	146

27	DATA TABLES	Page
27.1	Overview of Data Tables	147
	One-Way and Two-Way Data Tables Example of a Data Table	147 147
27.2	One-Way Data Tables	148
	Step 1 – Create your Formulae Step 2 – Create your Inputs Step 3 – Create the Data Table Itself	148 148 149
27.3	Two-Way Data Tables	150
	Step 1 – Create your Formula Step 2 – Create your Inputs Step 3 – Create the Data Table	150 150 151

28	MODELLING SHORT-CUTS	Page
28.1	Creating a Row of Data	152
28.2	Other Keyboard Shortcuts	154
	Shortcuts for Moving and Selecting Shortcuts for Formatting Shortcuts for Range Names Shortcuts for Formulae and Data	154 154 155 155



CHAPTER 1 - SEVEN MODELLING GUIDELINES

This chapter lists the seven habits of highly effective modellers (with apologies to Stephen R. Covey).



1.1 Guideline 1 – Use a Cover Sheet

Our first guideline is to include a cover sheet as the first worksheet in any model:

A В D C You can hide all of the columns and rows not 1 being used to create a tidier effect. 2 Title of model ==> The Chocolate Emporium 3 4 Start date for model ==> 01 Sep 2020 5 6 1.0 Version number ==> 7 8 Status ==> (Very) untested 9

Things this might contain include:

Cover sheet field	Notes
Who wrote the model	Your name and contact details
Revision dates and version number	When the model was created, when it was last revised and any version number
Confidentiality	Whether the model contains confidential data



If your company or organisation has a standard model template which you can use, so much the better!



1.2 Guideline 2 – Separate Inputs and Calculations

As a fundamental principle, you should put all of your input assumptions on one (or more) separate worksheet(s):



Checking for Rogue Formulae

You can highlight any rogue formulae in an input worksheet as follows:





Another good way to check this is to press Ctrl + ` (this strange symbol, called a backtick, is usually at the top left of your keyboard, above the Tab key) to display formulae. For an inputs worksheet, this shouldn't change any of the displayed values.



1.3 Guideline 3 – Use Styles

Imagine how much easier modelling in your company or organisation would be if everyone used consistent formatting!

		-	-	_	-		-	
1	The Cho		Pei	riod ==>	1	2		
2			Start date ==>			01/09/2020	01/10/2020	
3	Section	Input row title	Units	ind d	ate ==>	30/09/2020	31/10/2020	
4							,	7
5	Costs							
6		Raw materials	£			-500	-🔊0	
7		Labour	£			-400	-390	
8		Overheads	£			-300	-350	
9							\sim	
10	Revenue							
11		Base sales	£		1000	RevBase		1\
12		Sales multiplier	%			0	0.1	
10								7

This input cell is formatted with the **InputCell** style, which makes it appear with a yellow background and borders ...

... which is also why all of these other input cells have the same formatting.

Here is a suggestion for a set of styles that you could create:

Worksheet type	Suggested name	Used for			
	InputPercent	Input cells which contain percentages			
Innuto	InputCurrency	Input cells which contain currency amounts			
inputs	InputDate	Input cells which contain dates			
	InputOther	Input cells containing text and numbers			
	CalcPercent	Calculation cells which contain percentages			
Coloulations	CalcCurrency	Calculation cells which contain currency amounts			
Calculations	CalcDate	Calculation cells which contain dates			
	CalcOther	Calculation cells containing text and numbers			
	RepPercent	Report cells which contain percentages			
Bonorto	RepCurrency	Report cells which contain currency amounts			
Reports	RepDate	Report cells which contain dates			
	RepOther	Report cells containing text and numbers			
	GenRangeName	How range names appear to the right of each row			
Conorol	GenUnits	How units appear			
General	GenTitle	Titles for blocks of data			
	Genltem	Individual item lines in a report			



It doesn't matter whether your input cells are blue, pink or red with yellow spots, just as long as they are consistent.



1.4 Guideline 4 – Use Range Names

A *range name* is a name given to a cell (or to a block of cells), which you can then use in your formulae. Range names make formulae easier to read, write, maintain and test!

f _x	=Co	ostLa	abou	ır+CostMateria	als+CostOverhea	ds	Range names like		fx	Input	s!F7+	Inputs!F6+Inp	uts!F8
С		D	E	F	G	-	this are so much easier to read		4	D	E	F	G
£				1000	1100			_	£			1000	1100
£				-1200	-1240		than cell	\bigvee	£			-1200	-1240
£				-200	-140		references like this.		£			-200	-140



You should aim to avoid using any references at all in your models (although there will be a few times when you have to relax this slightly).

1.5 Guideline 5 – Keep Formulae Simple

Here is a sequence of formulae which display a message saying how many spaces there are in a worksheet name (this is a daft thing to do, but that's not the point!).

A series of formula to display a message		=CELL("filename")	FileName
like this in the final cell:		=FIND("]",FileName)+1	SheetStarts
	\geq	RIGHT(FileName,LEN(FileName)-SheetStarts+1)	SheetName
List of calcs has 2 space(s) Message		=SUBSTITUTE(SheetName," ","")	WithoutSpaces
		=LEN(SheetName)-LEN(WithoutSpaces)	NumberSpaces
		=SheetName & " has " & NumberSpaces & " space(s)"	Message

Here's the same thing done in a single formula – probably!

=RIGHT(CELL("filename"),LEN(CELL("filename"))-FIND("]",FileName)+1) & " has " & (LEN(RIGHT(CELL("filename"),LEN(CELL("filename"))-FIND("]",FileName)+1+1))-LEN(SUBSTITUTE(RIGHT(CELL("filename"),LEN(CELL("filename"))-FIND("]",CELL("filename"))+1+1)," ",""))) & " space(s)"

Our guideline will be to keep formulae short and simple (if necessary breaking them up into several steps).





1.6 Guideline 6 – Copy Formulae Across

Imagine a software application which colours Excel cells using these rules (such programs do exist – for example, *Spreadsheet Detective* and *Operis Analysis Kit*, or *OAK*):

Contents of cell	What Excel would do
Unique formula	Colour the cell pink and put an F in the cell
Copied from its neighbour	Colour the cell green and put a > in the cell

Such a program would produce a map like this for our model:



In a well-written model, you'd see a map with \mathbf{F} s in the first column and chevrons in subsequent columns showing where the formulae had been copied over.

Our guideline will be to ensure that unique formulae only appear in the first column of any row, making the resulting spreadsheet easier to maintain and test.

1.7 Guideline 7 – Use Consistent Period Headings

It is good practice to ensure that each of the worksheets of your model uses the same time period headings beginning in the same columns:

		Inp	puts sheet													
	,	4		L.	-0	L	-					,	K	L	141	
1	The	e Choc	olate Emporium		Pe	riod ==>		1	2		4		6		8	
2	-				Start d	date ==>	01/09/2	020 01/10/	2020 01/11	/2020 01/1	12/2020	01/01/2021	01/02/2021	01/03/2021	01/04/2021	01/
3	Sectio	on	Input row title	Units	ind a	date ==>	30/09/2	020 31/10/	2020 30/11	/2020 31/1	12/2020	31/01/2021	28/02/2021	31/03/2021	30/04/2021	31/
	А		В		C	D	E	F	G	Н		J	K	L	М	
1	A Tł	ne Cho	B ocolate Emporium		c	D Pe	E eriod ==>	F	G 2	H	3	4 J	5	6 L	M 7	8
1 2	A Tł	ne Cho	B Decolate Emporium		с	D Pe Start (E eriod ==> date ==>	F 1 01/09/2020	G 2 01/10/2020	H 01/11/2020	3 0 01/12/2	J 4 2020 01/01/	5 2021 01/02/2	6 2021 01/03/20	7 21 01/04/20	8 21 C
1 2 3	A Th Section	ne Cho Ing	B Docolate Emporium put row title	Uni	C ts	D Pe Start (End (E eriod ==> date ==> date ==>	F 1 01/09/2020 30/09/2020	G 2 01/10/2020 31/10/2020	H 01/11/2020 30/11/2020	3 0 01/12/2 0 31/12/2	4 2020 01/01/ 2020 31/01/	5 2021 01/02/2 2021 28/02/2	6 2021 01/03/20 2021 31/03/20	M 7 21 01/04/20 21 30/04/20	8 21 0 21 3
1 2 3	A Th Section	ne Cho Ing	B pocolate Emporium put row title	Uni	C its	D Pe Start o End o	E eriod ==> date ==> date ==>	F 1 01/09/2020 30/09/2020	G 2 01/10/2020 31/10/2020	H 01/11/2020 30/11/2020	3 0 01/12/2 0 31/12/2	4 2020 01/01/ 2020 31/01/	5 5 2021 01/02/: 2021 28/02/:	6 2021 01/03/20 2021 31/03/20	7 7 21 01/04/20 21 30/04/20	8 21 C 21 3

To do this, break your columns down into the smallest required level of granularity (for the example above this is by month).



CHAPTER 2 - RANGE NAMES

2.1 What are Range Names?

You can assign *names* to individual cells, or to blocks of cells:

4										
5	Costs									
6		Raw materials	£			-500	-500	-500	-50	0 -500
7		Labour	£			-400	-390	-380	-30	0 -290
8		Overheads	£			-300	-350	-400	-80	0 -850
9										
10	Revenue									
11		Base sales	£	▼	1000	RevBase				
12		Sales multiplier	%			0	0.1	0.2		1 1.1
10										
								[
Fo	or example	, you could call thi	s					and th	is block of o	cells a name
si	ngle cell a	name like RevBas	ie					like Cost	Materials.	



Going to a Range Name

One of the many benefits of range names is that they allow you to find a cell (or block of cells) quickly:

ଘ ୬· ୯ · ■	You can click on this arrow to the right of	Go To ?	×
File Home Inse	the Name Box, and choose which range you want to go to (it doesn't have to be on the same worksheet): CostMaterials CashCosts CashNet CashRey CostLabour	Go to: \$F\$6:\$Q\$6 '[Modelling - cashflow.xlsx]Calculations'!\$F\$6:\$Q\$6 \$F\$7 CashCosts CashNet CashRev CostLabours CostMaterials CostOverheads CoverStartDate Reference: CostBay	~
Alternatively, press the F5 f range, then double-click on i and choose OK).	unction key to go to a t in the list (or select it	Special OK Canc	el



2.2 Creating Range Names

There are (at least) three ways to create a range name in Excel – the best one is probably the last!

Method 1 – Using the Name Box

To create a range name for a cell or block of cells using the **Name Box**:

E11 💌 🔹 🔀 🏑 fx 1000		/	a)	Select the cell or cells to which you want to attach a name.				
	A	В	С	D	E	/		
7		Labour	£				b)	Click in the name box, and type in the name you want to
8		Overheads	£					use (you can use underscores, but can't use spaces):
9								· · · · · · · · · · · · · · · · · · ·
10	Reven	ue			▶			RevBase
11		Base sales	£		1 (‡) 0			Nevbase -
12		Sales multiplier	%	\searrow				
13								You must then press $[a]$ to confirm the range name.
11	Carles							

Method 2 – Defining Names

Another (harder) way to create a range name is using the ribbon:





Method 3 - Creating Range Names from Selected Cells

This is the best way to create range names, partly because it lets you assign names to lots of blocks of cells at the same time.



Another advantage of this method is that you can see which names refer to which blocks of cells, but be aware that this is not dynamic (if you change the range name typed in next to a block of cells, this won't have any affect on the existing range name applied to them).

Here's how to use this method:

a) Select a block of cells which includes the names that you want to use and the cells that you want to name.

							/			
	Α	В	C	D	E	F	G	P	Q	R
1	The Ch	ocolate Emporiur	n	Pe	riod ==>	1	2	11	12	PeriodIn
2				Start a	late ==>	01/09/2020	01/10/2020	01/07/2021	01/08/2021	StartDateIn
3	Sectio	Input row title	Units	End a	late ==>	30/09/2020	31/10/2020	31/07/2021	31/08/2021	EndDateIn
4										
5	Costs									
6		Raw materials	£			-500	-500	-500	-500	CostMaterials
7		Labour	£			-400	-390	-300	-290	CostLabour
8		Overheads	£			-300	-350	-800	-850	CostOverhead's
9										
10	Reven	ue								
11		Base sales	£		1000					
12		Sales multiplier	%			0	0.1	1	1.1	RevMultiplier
13										2







ОΚ



Cancel

2.3 Range Names in Formulae

Referencing Range Names in Formulae

For the following example, suppose we want the total cost to be the sum of the three ranges called **CostMaterials**, **CostLabour** and **CostOverheads**. Here's how to create this formula:



corres	sponding	ω	une	wiu
of the	referenc	۵d	ran	ape





Total revenue

£

16

Once you've clicked in the list of range names, you can type the first letter of a range name repeatedly to cycle to it (so for the above example you could press *C* six times to go to the 6^{th} range name beginning with a **C**).



Dealing with Spill Errors

The formula we've created only exists in the left-hand cell, but it uses a new Excel feature called *dynamic arrays* to fill multiple cells:

G1	5	• I 🔉	< 🗸	f_x	=CostN	laterials+Cost	Labour+Cost(Overheads ┥			The formula shows up in light	
	А	В	С	D	E	F	G	н	I.		grey in the formula bar if you	
7		Labour	£			-400	-390	-380	CostLabour		CIICK ON	
8		Overheads	£			-300	-350	-400	CostOverheads			
9												
10	Reven	iue										
11		Base sales	£		1000	RevBase						
12		Sales multiplier	%			0%	10%	20%	RevMultiplier			
13											any call apart from the left	
14	Monie	es in/out									any cen apart from the left-	
15		Total cost	£			-1200	-1240	-1280			hand one in your row.	
10		T ()	-							1		

If there's something in the way Excel can't create the formula and shows a spill error:

1 T	PILL! 42	 a)	Here someone has typed 42 into the second cell, preventing the formula from spanning its full width.



The Possible Spill Errors

You can get a **#SPILL!** error in Excel when one of the following happens:

Error	How to solve
The spill range isn't blank	Remove the obstructing cell contents (as above)
Indeterminate size	Don't use functions like =RAND or =RANDBETWEEN with dynamic arrays
Extends beyond worksheet edge	Use a smaller range/array
Table formula	Spilled array formulae are not supported in tables
Out of memory	Try referencing a smaller array or range
Spill into merged cells	Un-merge the cells
Unrecognized / Fallback	Check your formula for errors!



Implicit Intersection using @

You can prefix range names with the *(a)* character to tell Excel not to use dynamic arrays:

-500	-500	-500	CostMaterials					
-400	-390	-380	CostLabour					
-300	-350	-400	CostOverheads					
=CostMaterials+CostLabour+CostOverheads								

This example uses dynamic arrays: the formula entered fills all 3 cells.

	-500	-500	-500	CostMaterials					
	-400	-390	-380	CostLabour					
	-300	-350	-400	CostOverhead	ls				
	=@CostMaterials+@CostLabour+@CostOverheads								
-		/							

This example doesn't use dynamic arrays: the formula entered only fills the left-hand cell, and you would have to copy it across to the other two cells:

-500	-500	-500	CostMaterials
-400	-390	-380	CostLabour
-300	-350	-400	CostOverheads
-1200			
		÷.	



When you open a workbook created in an older version of Excel, Microsoft will add @ prefixes before range names in formulae to show that you are not using dynamic ranges (you couldn't have been; they didn't exist in earlier versions).

Two-Dimensional Range Formulae

You can create a matrix of results by creating formulae combining ranges of different shapes:

SLN		• I X	🗸 j	fx =Sam	npleRow*Sa	ampleColu	mn 💌
	А	В	С	D	E	F	G
2							
3							
4			1	2	3	4	SampleRow
5		=SampleRc	w*Sample	Column	15	20	
6		6	6	12	18	24	
7		7	7	14	21	28	
8		SampleColumn					
0							

Here the formula multiplies the value in the green range (**SampleRow**) for the column in question by the value in the blue range (**SampleColumn**) for the row in question.



Getting Aggregation Functions to Work using +

Some common statistical functions (think **SUM**, **MAX**, **MIN**, **AVERAGE**, **COUNT**) work on a whole range, whereas we want them to work sometimes on a cell-by-cell basis:

	Α	В	С	D	E	F	G			
1										
2			Q	uarterly Fo	orecast Sale	es				
3										
4				Quarters						
5			1	2	3	4				
O										
7		Cash balance (£m)	(100.0)	50.0	(25.0)	125.0	CashBalance			
8										
9		Postive balance	=max(Cash	Balance <mark>,0)</mark>			PostiveBalance			
10		Negative balance					NegativeBalance			

Without any modification this formula will give us 125 in each cell, since this is the highest value out of -100, 50, - 25, 125 and 0!

Cash balance (£m)	(100.0)	50.0	(25.0)	125.0
Postive balance	125.0	125.0	125.0	125.0

To get this formula to give the positive balance for each quarter, precede the range name by a +:

	Quarters			
	1	2	3	4
Cash balance (£m)	(100.0)	50.0	(25.0)	125.0
Postive balance	=MAX(+Ca	shBalance,	0) 🔺	
Negative balance				

t's amazing how much difference a single plus sign an make in a formula. This would give:					
Cash balance (£m)	(100.0)	50.0	(25.0)	125.0	
Postive balance	0.0	50.0	0.0	125.0	



2.4 Working with Range Names

Editing and Deleting Range Names

Range names are harder to edit/delete than they are to create!



Viewing Range Names

A bizarre feature of Excel is that if you zoom in to a tiny view (generally anything less than 40% will do) you can see range names superimposed:





2.5 The Scope of Range Names

The *scope* of a range name controls where you can use it. Range names can be scoped to an entire workbook, or to a specific worksheet within it.

Choosing the Scope of a Range Name

You can only choose the scope of a range name when you create it, and then only if you use the **Define Name** method (range names created by other methods always have workbook scope).



Copying Worksheets Copies their Range Names with Local Scope

When you copy a worksheet, you create copies of all of its range names:





This can be very confusing! The best strategy may be to carefully rename unwanted local copies of range names immediately after you copy any worksheets.



2.6 3-Dimensional Ranges

To impress friends you can create 3-dimensional range names:



To do this, follow these steps:































What we do!

		Basic training	Advanced training	Systems / consultancy
e	Microsoft Excel VBA macros	2 4	₹	2
Offi	Office Scripts Microsoft Access			
BI, etc	Power BI and DAX	<u>.</u>		
Power]	Power Apps Power Automate (both)	<u>.</u>		
	SQL	2	2	
erver	Reporting Services	<u>.</u>	<u>.</u>	201 201
QL Se	Report Builder			*
Ň	Integration Services	<u>.</u>	<u></u>	<u></u>
	Analysis Services			
	Visual C#	1	2	
Ď	VB programming	<u>N</u>	<u>yar</u>	
Codin	MySQL			÷.
	Python			



