

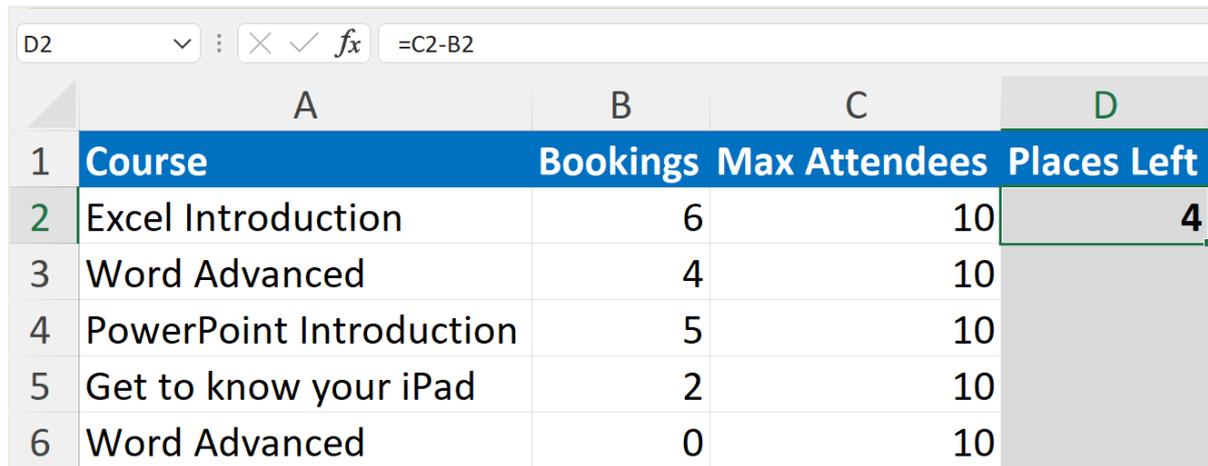
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Copying a Formula

For absolute cell references to make sense, you need to understand how Excel interprets formulas and what happens when a formula is copied. Excel doesn't think of formulas the same way we do.



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D
1	Course	Bookings	Max Attendees	Places Left
2	Excel Introduction	6	10	4
3	Word Advanced	4	10	
4	PowerPoint Introduction	5	10	
5	Get to know your iPad	2	10	
6	Word Advanced	0	10	

The formula bar for cell D2 shows the formula `=C2-B2`.

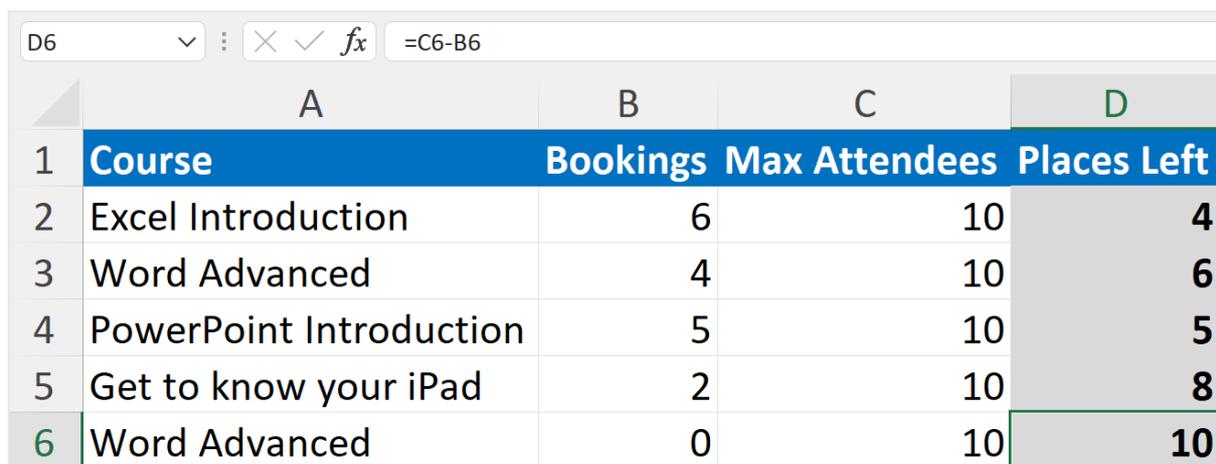
In the example above, D2 contains the following formula: `=C2-B2`

Excel interprets the formula as "take the number in the cell one to the left of the formula and subtract from it the number in the cell two to the left of the formula"

When the formula is copied to D3:D6, Excel doesn't copy the result. Nor does it copy `C2-B2`.

What is copied is "take the number in the cell one to the left of the formula and subtract from it the number in the cell two to the left of the formula"

Therefore the formula in D3 is `=C3-B3`. The formula in D4 is `=C4-B4` and so on



The screenshot shows the same Excel spreadsheet as above, but with the formula copied to cells D3 through D6. The formula bar for cell D6 shows the formula `=C6-B6`.

	A	B	C	D
1	Course	Bookings	Max Attendees	Places Left
2	Excel Introduction	6	10	4
3	Word Advanced	4	10	6
4	PowerPoint Introduction	5	10	5
5	Get to know your iPad	2	10	8
6	Word Advanced	0	10	10

In most cases this is what you'd want (think about some of your own spreadsheets), however, in some situations, you might need one or more cell references to remain "locked" (or fixed) when the formula is copied.

The screenshot below shows an alternative way of setting up the same worksheet. Instead of storing the maximum number of places once per row, in a separate column, the value is stored in F1.

	A	B	C	D	E	F
1	Course	Bookings	Places Left		Maximum Attendees	10
2	Excel Introduction	6	4			
3	Word Advanced	4				
4	PowerPoint Introduction	5				
5	Get to know your iPad	2				
6	Word Advanced	0				

The formula in C2 is: **=F1-B2**. Copying the formula results in the following:

	A	B	C	D	E	F
1	Course	Bookings	Places Left		Maximum Attendees	10
2	Excel Introduction	6	4			
3	Word Advanced	4	-4			
4	PowerPoint Introduction	5	-5			
5	Get to know your iPad	2	-2			
6	Word Advanced	0	0			

The values in C3:C6 are obviously incorrect. But why?

Think about how Excel interprets the original formula in C2... “take the number in the cell three to the right and one up and subtract from it the number in the cell one to the left”

When the formula is copied to C3:C6, Excel doesn’t copy the result. Nor does it copy **F1-B2**.

What is copied is “take the number in the cell three to the right and one up and subtract from it the number in the cell one to the left”

Therefore the formula in C3 is **=F2-B3**. The formula in C4 is **=F3-B4** and so on.

Absolute Cell References

To resolve this problem, the formula in C2 needs to be edited and copied again to C3:C6

What is the edit that needs making?

Cell F1 needs to be “locked” so that when the formula is copied, B2 changes to B3, B4, B5 and B6 but F1 doesn’t change. In this context, the Excel terminology for locked/fixed is **Absolute**.

An absolute cell reference is a cell reference within a formula that doesn’t adjust when the formula is copied.

To make a cell reference absolute, place a dollar sign before the letter and number..... **\$F\$1**

	A	B	C	D	E	F
1	Course	Bookings	Places Left		Maximum Attendees	10
2	Excel Introduction	6	4			
3	Word Advanced	4				
4	PowerPoint Introduction	5				
5	Get to know your iPad	2				
6	Word Advanced	0				

Now when the formula is copied, F1 remains fixed...

	A	B	C	D	E	F
1	Course	Bookings	Places Left		Maximum Attendees	10
2	Excel Introduction	6	4			
3	Word Advanced	4	6			
4	PowerPoint Introduction	5	5			
5	Get to know your iPad	2	8			
6	Word Advanced	0	10			

TIP: Instead of manually typing the dollar signs, place the cursor within the cell reference in the formula bar and press function key F4

NOTE: This feature works in Google Sheets and Apple Numbers. In Numbers, click the drop down next to the cell reference in the formula and tick the Preserve Row and Preserve Column boxes.

Part Absolute

Part absolute means only the row or only the column is made absolute. This is indicated by placing a dollar sign before the row number or the column letter (as appropriate).

\$F1 means that column F is absolute but not row 1

F\$1 means that row 1 is absolute but not column F

In the previous example, although both row and column were made absolute (\$F\$1), strictly speaking, because the formula is being copied down a column but not across a row, it is only necessary to make row 1 absolute (F\$1)

Below is an example of where making just a column absolute and just a row absolute is the only option...

This is a list of products with the price in US dollars. The requirement is to show the price of each product in Euros (EUR) and Great Britain Pounds (GBP). The USD-EUR exchange rate is displayed in G2 and the USD-GBP exchange rate is in H2

	A	B	C	D	E	F	G	H
1	Product	Price (\$)	Price (EUR)	Price (GBP)			USD - EUR	USD - GBP
2	Product 1	7.00	5.95				0.85	0.77
3	Product 2	6.00						
4	Product 3	10.00						
5	Product 4	12.00						
6	Product 5	7.00						

One way to do this is to type a formula in C2 (=B2*G2) and copy it down to C3:C6. Then enter another formula in D2 (=B2*H2) and copy it down to D3:D6

A quicker way would be to type one formula, in C2, copy it down to C3:C6, select C2:C6 and copy that range across to D2:D6. This method means only one formula is typed manually instead of two.

However, in order to copy the formula down and keep the reference to row 2 and copy the formula across and keep the reference to column B, it is necessary to use part absolute.

The correct formula, typed into C2, is **= $\$$ B2* $\$$ G2**

TIP: Pressing F4 multiple times cycles through the different “states of absolute”, i.e. full absolute, row absolute, column absolute, no absolute.

NOTE: To set part absolute in Numbers, click the drop down next to the cell reference in the formula and tick the Preserve Row or Preserve Column boxes as appropriate

About Mike Thomas

Mike Thomas is a subject matter expert in a range of technologies, although his primary focus and passion is Excel and Power BI.

In a career spanning 30+ years, he has delivered thousands of training courses on a wide variety of technology-related topics.

In 2012 Mike founded theexceltrainer.co.uk where he has produced nearly 200 written and video-based Excel tutorials. He also runs 2 YouTube Channels and has recorded several video-based training courses for pluralsight.com.

Mike is a Fellow of The Learning and Performance Institute and has worked with and for many global and UK-based companies and organizations across a diverse range of sectors.

In addition to training, he also designs and develops Microsoft Office-based solutions that automate key business tasks and processes.

Away from the Microsoft world, Mike is co-host of the [MacBites](#) podcast and a co-presenter of [MacBites After Hours](#), a live technology show hosted on YouTube.

Connect with Mike via the links below

- [YouTube Channel 1](#)
- [YouTube Channel 2](#)
- [The Excel Trainer Website](#)
- [LinkedIn](#)