

ENGG1811 How-To Guide: Understanding Conditional Formatting

Key Learning Outcomes

1. Understand how conditional formatting dynamically applies styles to cell ranges based on contents of the sheet
2. Be able to apply conditional formatting to cells using simple comparisons
3. Understand how cell references in formulas are interpreted when conditional formatting is applied
4. Be able to apply conditional formatting to cells using formulas
5. Be able to apply conditional formatting to ranges using formulas relating to other cells

Part 1. How Conditional Formatting Works

Conditional formatting applies a single style to a single cell or group of cells, based on conditions that are evaluated whenever the sheet changes. The style overrides any existing formatting the cell may have.

Conditions can be

- a comparison between a cell value and a constant
- a comparison between a cell value and a value determined by a formula
- completely determined by a formula

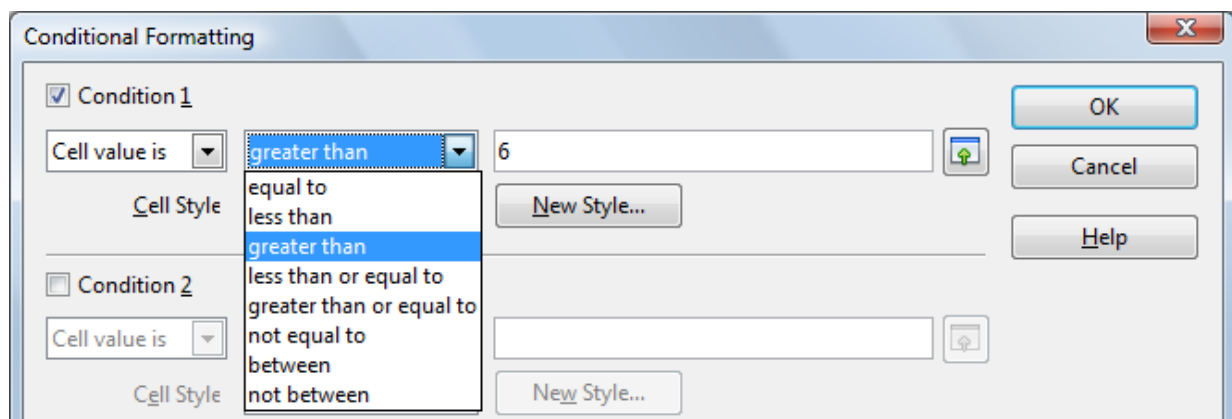
In all cases any cell addresses used in a formula are evaluated with respect to a *reference cell*, the last cell selected. If they aren't absolute addresses they will be adjusted the same way formulas are when copied. Identifying the reference cell is crucial to getting the formulas exactly right.

Part 2. Using Conditional Formatting

On a new sheet enter the first 9 odd numbers and the first 6 even numbers in a 3-column by 5-row range starting at (say) C2:

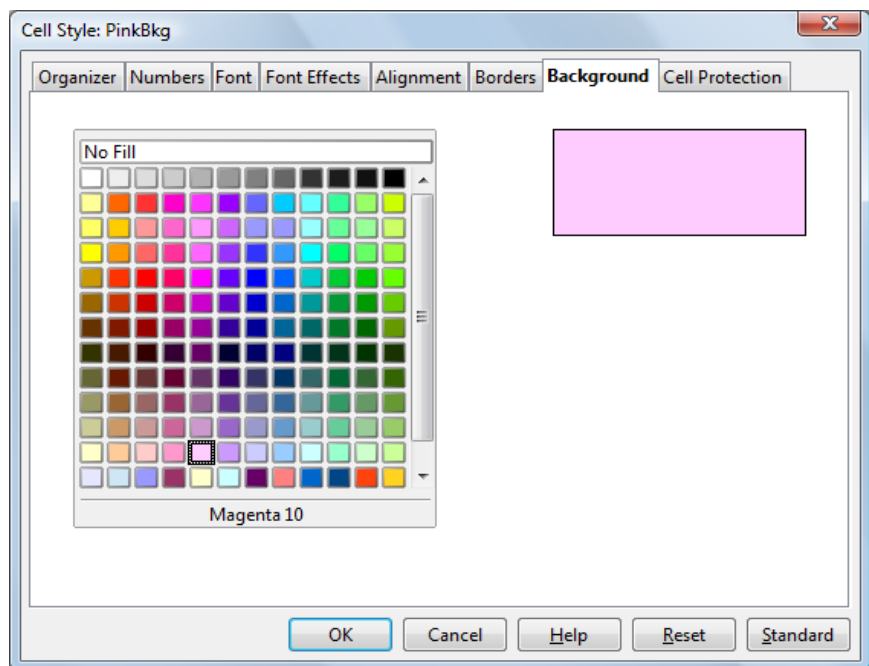
	A	B	C	D	E
1					
2			1	3	5
3			7	9	11
4			13	15	17
5			2	4	6
6			8	10	12

Now highlight the middle column, select Conditional Formatting from the Format menu. keep the default condition type (**Cell value is**) and against the first condition select **greater than** and enter 6 in the box:



To be sure you can notice the applied style it's best to make a new one. Press **New Style...**, enter **PinkBkg** in the Name box and select a light pink colour (probably Magenta10) from the **Background** tab. Press **OK**, and then **OK** on the Conditional Formatting dialogue box.

Not surprisingly, the cells in the selected range that have values greater than 6 now have a pink background. To show it's dynamic, temporarily change one of the smaller values in that column to be larger, and a large one to be 6 or less. Restore the original numbers.



Select the range again from top to bottom and re-select Conditional Formatting. The condition should still be there, replace the constant 6 by the absolute cell reference **\$E\$5**. Click OK, there's no change as expected. Repeat the task, but this time remove the **\$** so it's just **E5**. The cells should look like this:

	A	B	C	D	E
1					
2			1	3	5
3			7	9	11
4			13	15	17
5			2	4	6
6			8	10	12

That's funny, 3 isn't normally greater than 6! To see what happened, click on the middle cell, the one containing 15. Its condition, as shown in the Conditional Formatting box, is "greater than **E3**", not the E5 we typed. E3 is *one row up and one column right* of the central cell. That's because E5 is a row up and a column right of the highlighted cell, which was the **active cell** when we entered the formula. Cell D2 is highlighted because 3 is greater than the empty cell E1.

	A	B	C	D	E
1					
2			1	3	5
3			7	9	11
4			13	15	17
5			2	4	6
6			8	10	12

In this case the relative column reference makes no difference, because there's only one column. If we applied this condition to column C as well, then the formulas applied to that column would point to column D, one to the right. If we used **\$E** in the formula, they would point there.

Important conclusion

When using a formula to define conditional formatting, assume you are entering it for the *active cell* (the last cell selected), and it will be copied to all cells in the selected range. Use the appropriate addressing type (absolute, relative or mixed) according to how you want the formula interpreted.

Part 3. Using the *Formula is Condition* type

Once you've got the idea of how formulas are interpreted, you can apply this to tasks like highlighting rows of data based on some characteristic of a cell in each row or on adjacent rows. In this case you use the **Formula is** type rather than **Cell value is**, because that allows you to make a decision based on values in any cells, not just the one whose highlighting is being considered.

Once again, the formula will be evaluated against the reference cell, the one that ended the drag range.

For a fairly simple example, copy the following data, including headers, into a blank area of the spreadsheet, starting with F10.

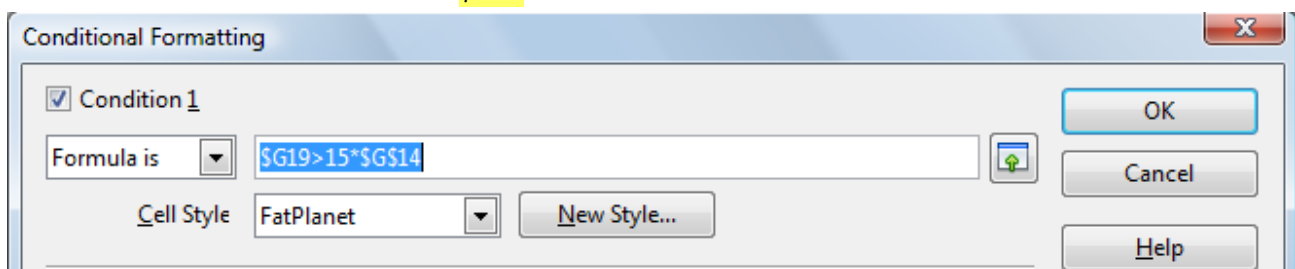
Solar System Body	Mass, x 10 ²¹ kg	Natural Satellites
Sun	1989100000	8
Mercury	330.2	0
Venus	4868.5	0
Earth	5973.6	1
Mars	641.85	2
Jupiter	1898600	63
Saturn	568460	62
Uranus	86832	27
Neptune	102430	13

We're interested in solar system bodies that are more than 15 times the mass of Earth. We could highlight just the mass column with a **Cell value is** condition referring to G14 (the cell containing Earth's mass). Which of the following would achieve this? (Answer overleaf).

- A: Cell value is greater than 15*G14
- B: Cell value is greater than 15*G\$14
- C: Cell value is greater than 15*\$G14
- D: Cell value is greater than 15*\$G\$14

To highlight the entire row of the table (columns F, G and H) we can't use such a formula without saying which cell compares to the Earth's mass. Call that cell X. It's obvious that X always has to refer to the G column (absolute reference), and X must be on the same row as the cell we want to highlight, so it's a relative reference. Putting that together, we have

1. The formula must be of the form **X > 15*\$G\$14** (when we work out what X is), because the cell to be highlighted can be anywhere in the table, so the G14 reference must be absolute, **\$G\$14**.
2. If we drag the range from top to bottom and left to right, the active cell ends up at H19. We therefore enter the formula as if we were highlighting row 19, but let the row reference be relative. Thus X is the mixed reference **\$G19**.



Assuming we create a new style **FatPlanet** with greenish background and a bold font, the desired effect is achieved:

Solar System Body	Mass, x 10^{21} kg	Natural Satellites
Sun	1989100000	8
Mercury	330.2	0
Venus	4868.5	0
Earth	5973.6	1
Mars	641.85	2
Jupiter	1898600	63
Saturn	568460	62
Uranus	86832	27
Neptune	102430	13

Not covered

Multiple conditions. These are tested in order. As soon as one condition is true, that style is applied. If none of the conditions is true, no style is applied.

Geoff Whale
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Answer B or D. D is safest, but B also works because only one column is involved so G doesn't have to be absolute.