# Video: Absolute, Relative and Mixed Cell Referencing

> **Recommended Reading:** See the section on "Cell Referencing Best Practices" in Chapter 5, Page 119 of
> Using Excel for Business Analysis

Formula consistency is critical for fundamental best practice both in financial modelling and (any other sort of analysis using Excel, for that matter!) In order to have consistent formulas across and down the block of data, you need to understand how cell referencing works. Whilst this is a very basic feature of Excel that is taught in introductory Excel courses, it is surprising how many modellers don't understand its importance.

The $ sign in a cell referencing tells Excel how to treat your references when you copy the cell. If there is a dollar sign in front of a row number or column letter, the row or column does not change when you copy it. Otherwise, it does change. So an absolute reference will not change its cell reference when you copy it, whereas a relative reference will.

**Background:** Let's create a simple calculation which looks at various units at a single price.

**Exercise:**

1.  Open the file called "Absolute & Relative Cell Referencing" as shown in the video
1.  Go to cell **B3** and calculate the price for 5 units at $450 each by adding the formula **=A3*B2**. You can do this by hitting the equal sign, and then clicking on each cell with the mouse, or alternatively, use the up and down arrows (↑↓).
2.  Copy this down (using the double-click in the bottom right-hand corner) and you'll notice that formulas do not give the correct result. These cell references will change as you copy the formula down, because they are *relative cell references.*
3.  Go back to cell **B3** and use the F2 shortcut to edit the formula. [Control+U for Mac users]
4.  Use the F4 shortcut to add in the dollar signs. [Command+T for Mac users]
5.  Your formula in cell **B3** should now be **=A3*$B$2**. This means that the B2 part of the formula is now anchored, and will not change no matter where the formula is copied to. This is called an *absolute reference.*
6.  Copy the formula back down the range again

Knowing the difference between an absolute reference and a relative reference is an important point for financial modelling for accuracy and it's also going to save you a huge amount of time as you build your model.

# Video: Calculating Project Costs

Now that we are comfortable with linking, and know how to use our relative and our absolute cell referencing, let's apply that to a very simple financial model.

**Background:** We have been given the annual salaries for staff members who will work on a particular project.  Assuming each person works 260 days in the year, (net of leave, sick days etc.) and assuming each person must work 60 days on this project, calculate the total staff cost of this project.

**Exercise:**

1. Open the file called "Calculating Project Costs" as shown in the video
2. Go to cell **C6** and enter the formula =**B6/B3**
3. Copy the formula down the range **C6:C9**
4. This causes an error, so go back to cell **C6**, hit F2 and then F4 to apply the absolute referencing [Control+U and then Command+T for Mac Users]
5. Copy it down the range again

Now we need to calculate what those project costs are based on the daily rate.

6. Go to cell **D6** and enter the formula =**$D$3*C6**
7. Copy it down the range
8. Go to cell **D10** create a SUM formula =**SUM(D6:D9)** and the result should be $146,769 which is the total project cost
9. You can now perform some sensitivity analysis by changing the number of project days in cell **D3** from 60 to 65, or change the cost for the Business Analyst in cell **B7** from $120,000 to $150,000 and see the effect it has on the project costs