Office 2010

Excel

Formulas

September 2014

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CONTENTS

INTRODUCTION

This introductory level course is aimed at those who want to learn spreadsheet basics using Microsoft Excel.

Knowledge assumed

experience of using a computer, for example keyboard and mouse familiarity

experience of using Windows, for example familiarity with icons, loading software, opening files and saving files

Areas covered

worksheet structure

formatting cells

printing from a spreadsheet

using formulae and functions

relative and absolute references

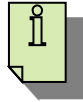manipulating worksheets

simple charts

Document signposts

Instructions for you to type

Bold text

Shortcuts

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Exercises

WHAT IS A FORMULA?

Formulas are what make a spreadsheet so useful. Using formulas lets you calculate results from the data stored in the worksheet.

When you create a formula, you use cell references to identify the data to be included in the calculation. By using cell references, rather than the values themselves, you ensure that any changes to the values in the cells referenced by the formulas automatically result in an updated answer.

A formula always commences with an equals sign (=) to indicate that what follows is an instruction, not a value.

EXAMPLES OF FORMULAS

In the example worksheet below, cells D2 and D3 both contain formulas to add the respective cells in columns B and C.

	A	B	C	D
1		JAN	FEB	TOTAL
2	PETROL	15.00	20.00	=15.00+20.00
3	OIL	5.00	14.50	=B3+C3

➢ Look at cell D2

The intention of this formula is to add together the values in cells B2 and C2 (15 plus 20). If the value in either cell changes, the formula will not take this into account and you will need to remember to alter the values in D2, otherwise the resulting figure will no longer be correct. This formula, therefore, is not very useful.

➢ Look at cell D3

The formula specifies the cell references (B3 and C3) rather than the current values of these cells. If you change the values in either or both cells, there is no need to worry about the formula in D3. Because the formula uses cell references, the resulting figure will be updated automatically.

ARITHMETIC OPERATORS

When creating formulas the following arithmetic operators are used:

Operator	Example
+ (plus sign)	Addition (3+3)
– (minus sign)	Subtraction (3–1)
	Negation (–1)
* (asterisk)	Multiplication (3*3)
/ (forward slash)	Division (3/3)
% (percent sign)	Percent (20%)
^ (caret)	Exponentiation (3^2)

You will now open the workbook **JumbleSales.xlsx** from the **ExcelFormulas** folder on drive **C**.
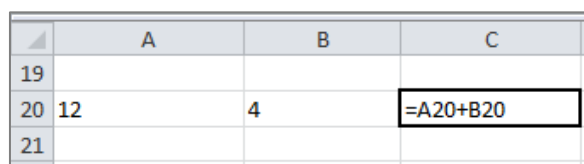
➢ Open the file **JumbleSales.xlsx**

ADDITION

➢ In A20 enter **12**

➢ In B20 enter **4**

To add these two values together and display the result in C20:

➢ In C20 type: **=A20+B20**

	A	B	C
19			
20	12	4	=A20+B20
21			

➢ Press **Enter**

This formula instructs Excel to add the contents of cell A20 to the contents of B20. C20 displays the value 16 (12+4=16).

After you have created a formula, any changes to the cells in the formula, automatically result in an updated answer.

➢ In B20 type **10**

➢ Press **Enter**

The value in C20 is automatically updated to 22 (12+10=22).

MULTIPLICATION

➢ In C21 type: **=A20*B20**

➢ Press **Enter**

C21 displays the value 120 (12x10=120).

Notice that in Excel an asterisk is used for multiplication.

You can, of course, multiply the contents of a cell by a value.

➢ In C22 type: **=A20*3**

➢ Press **Enter**

C22 displays the value 36 (12x3=36).

SUBTRACTION

➢ In C23 type: **=A20-B20**

➢ Press **Enter**

C23 displays the value 2 (12-10=2).

DIVISION

➢ In C24 type: **=A20/B20**

➢ Press **Enter**

C24 displays the value 1.2 (12÷10=1.2).

CALCULATING THE TOTAL PAY

In cell D3 you are going to enter the formula to calculate the Total for John Markshaw (Hourly Rate * Hours Worked).

➢ Click on cell **D3**

➢ Type **=**

The formula is **=B3*C3**, but instead of typing the cell references you will learn a quick way to insert cell references into a formula.

➢ Point to cell **B3** and click the mouse button

The cell is highlighted and its reference is added to the formula in D3.

	A	B	C	D
1	Name	Hourly Rate	Hours Worked	Total
2				
3	John Markshaw	7.5	30	=B3

➢ Type *****

➢ Point to cell **C3** and click

The cell is highlighted and its reference is added to the formula in D3.

	A	B	C	D
1	Name	Hourly Rate	Hours Worked	Total
2				
3	John Markshaw	7.5	30	=B3*C3

➢ Press **Enter**

The following result is displayed:

	A	B	C	D
1	Name	Hourly Rate	Hours Worked	Total
2				
3	John Markshaw	7.5	30	225

COPYING A FORMULA TO ADJACENT CELLS

If you are copying a formula (remember that you usually see the result of the formula rather than the formula itself), the cell references change automatically *relative* to the row and column of the cell it is being copied to.
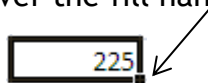
You now need to calculate the Total for the remaining employees.

Rather than create a formula for each one, you can copy the formula entered for John Markshaw into the remaining cells in the Total column.

➤ Click on cell **D3**

To copy the formula in D3 to the cells D4:D15:

➤ Move the mouse pointer over the fill handle (the cursor will change to a thin black $_+$)

225

➤ Click and hold down the left mouse button and drag the fill handle over the range D4 to D15

➤ Release the mouse button

Column D now looks like this:

D
Total
225
82.5
296
555
107.5
200
104.55
376.25
160
150
110.5
75
90

➤ Save the workbook.

HIERARCHY OF OPERATIONS

As you already know, a formula in Excel always begins with an equals sign (=). Following the equals sign are the elements to be calculated which are separated by operators (+, - , *, / etc). However, you should be aware that Excel does not always calculate the formula from left to right.

Say you entered the following formula into a worksheet:

=2+2*6

You might expect the answer to be 24.

After all, 2 plus 2 equals 4, and 4 multiplied by 6 equals 24.

Try this for yourself now

➢ In cell G3 type **=2+2*6**

➢ Press **Enter**

You might be surprised at the resulting answer of 14.

If you combine several operators in a single formula, Excel performs the operations in the following order:

first	* and / (Multiplication and division)
then	+ and – (Addition and subtraction)

This is sometimes referred to as **BODMAS** (Brackets over division, multiplication, addition, subtraction)

In the above formula Excel deals with the multiplication first (2 * 6 = 12) and then the addition (2 + 12) giving a total of 14.

PARENTHESES

To change the order of evaluation (to override the built-in order of precedence between *, /, + and -), you use parentheses.

You will enter the same formula again, but this time enclosing the first part in parentheses.

➢ In cell G4 type **=(2+2)*6**

➢ Press **Enter**

The answer is **24**.

Excel dealt with the calculation in the parentheses first and then multiplied the result.

You can appreciate, therefore, how important it is that you understand how Excel deals with the elements in a formula, before you create complex formulas.

➢ Delete the contents of G3 and G4

FUNCTIONS

Functions are predefined formulas that can be used to perform calculations.

The most frequently used functions are:

Name	Calculates…
SUM	The total value
MIN	The minimum value
MAX	The maximum value
AVERAGE	The average value
COUNT	The number of cells containing numbers
COUNTA	The number of non-empty cells
COUNTBLANK	The number of blank cells

All of these functions operate on a range of cells.

For example, a range of cells could begin at D2 and end at D16. In this case you would express the range as **D2:D16** – the colon in this situation can be interpreted as the word "to". So D2:D16 means D2 to D16.
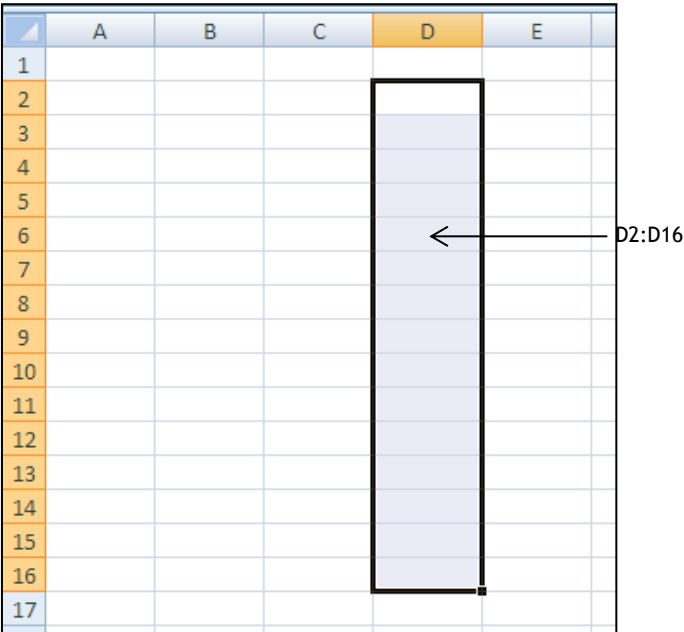
To total the range of cells above without using a function, your formula would look like this:

> **=D2+D3+D4+D5+D6+D7+D8+D9+D10+D11+D12+D13+D14+D15+D16**

However, by using the SUM function the formula is reduced to:

> **=SUM(D2:D16)**

You can enter functions into your worksheet in three different ways:

- ♦ using the AutoSum function button on the Ribbon
- ♦ using the Insert Function button
- ♦ typing the function (this is not recommended)

AUTOSUM BUTTON

You are required to add up all the figures in the Total column to calculate the company's monthly salary expenditure, and display the value in D17.

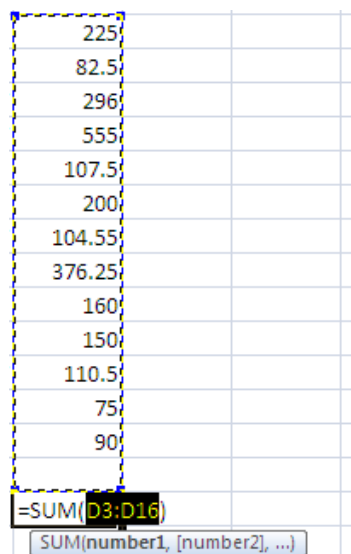➢ Select the cell in which the total is to appear – in this case **D17**

The AutoSum button creates a SUM formula.

The AutoSum button is in the Editing group on the Home tab, and also in the Function library group on the Formulas tab.
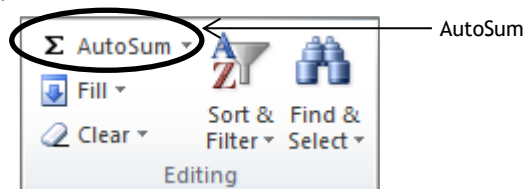
➢ Click the **AutoSum** button

Excel automatically selects a range for you (indicated by a dashed box around the cells).

You should always check to ensure that the range that is selected is correct – do not assume that Excel has got it right!

➢ If this range is correct (it should cover all of the figures in column D) press Enter

The result of the calculation is displayed in the selected cell, D17.

If the range is not correct then you can either:

➢ Click into the Formula Bar and type the correct range before pressing **Enter**

Or

➢ Highlight the required range using the mouse pointer and then press **Enter**

> If a cell in your worksheet displays #########, don't panic.
>
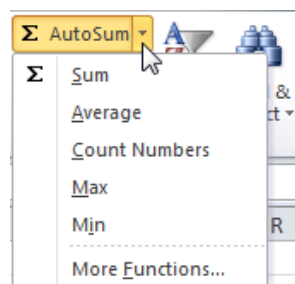> This indicates that the cell is not wide enough to display the result of your calculation.
>
> To solve the problem simply increase the cell width.

Many functions are used in a similar way.

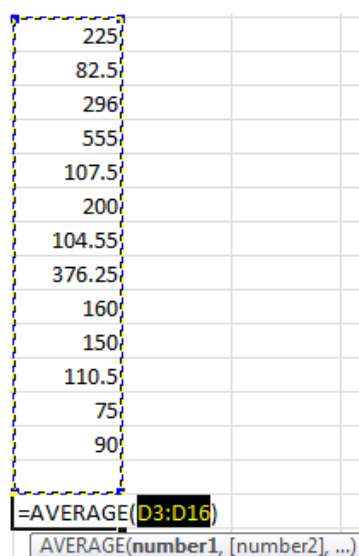➢ Delete the contents of **D17**

To calculate the average pay of all the employees:

➢ With D17 selected, click the down arrow next to the **AutoSum** button

This gives you quick access to some of the most common functions.

➢ Click **Average**

➢ Check to ensure that the range selected is correct (i.e. all the numbers in column D are selected)

➢ Press **Enter**

The average is calculated to be 194.79231

➢ Click the **Undo** button on the Quick Access Toolbar to undo the average function
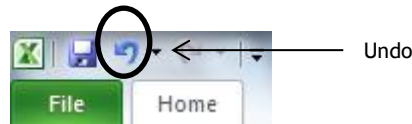
Other functions can be accessed via the AutoSum button.

➢ Click the down arrow next to the **AutoSum** button

➢ Select **More Functions**

The **Insert Function** dialog box is displayed.
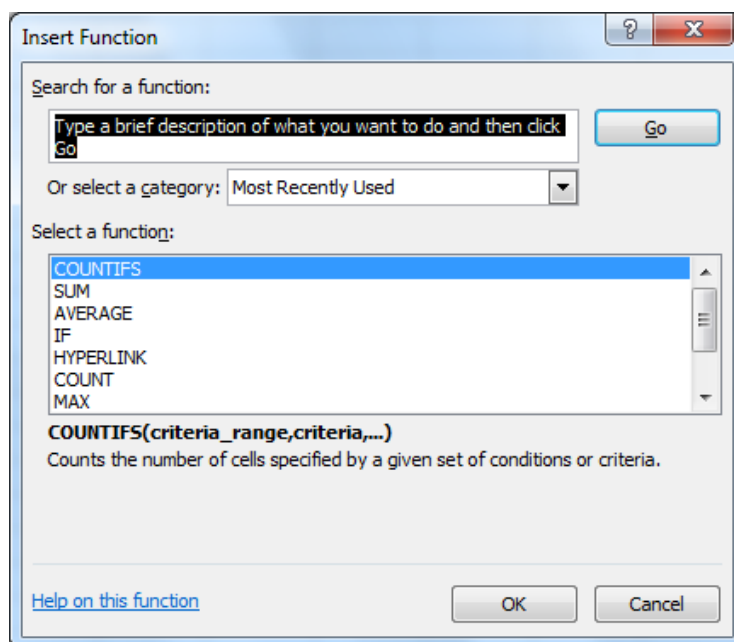
This dialog box can be accessed in various ways and is the general method used for inserting most of the functions that are available in Excel.

➢ Click **Cancel**

INSERT FUNCTION

Another way to access the Insert Function dialog box is to use the Insert [fx] Function button on the Formula Bar.

For this exercise you will use a function in A17 to display the number of employees listed on the spreadsheet. The function needed is called COUNTA.

- ➢ In cell **A17** type **no of staff:**

- ➢ Select **B17** (this is where the result is to be displayed)

- ➢ Click the [fx] button

The Insert Function dialog box is displayed.

- ➢ The default category is **Most Recently Used.** If the function you require is not listed then it is recommended to use the **All** category to find your function.

- ➢ Click the down arrow in the **Or select a category** box and select **All.** Scroll down the list to find the function you want.
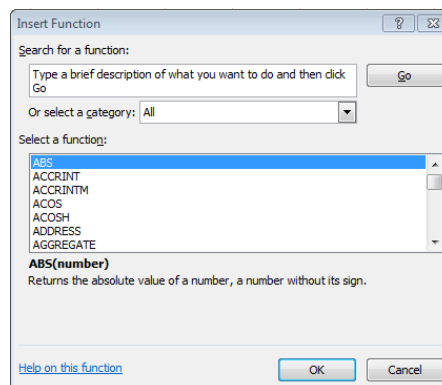
- ➢ Alternatively a quick way to find a function is to use the Search facility. Type **COUNTA** in the search box and select **Go.**
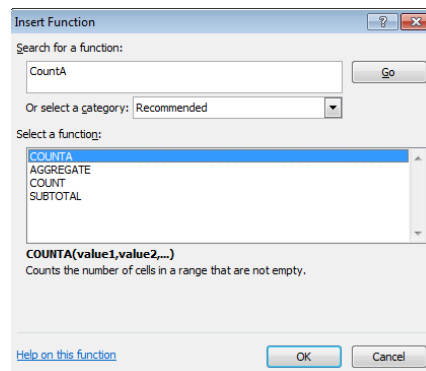
- ➢ Click once on the function you want and click **OK**

The Function Arguments dialog box is displayed.

➢ In the **Value 1** box type: **A3:A15** (this is the range of cells that we want the function to count). Alternatively you could have selected the cell range using your mouse.
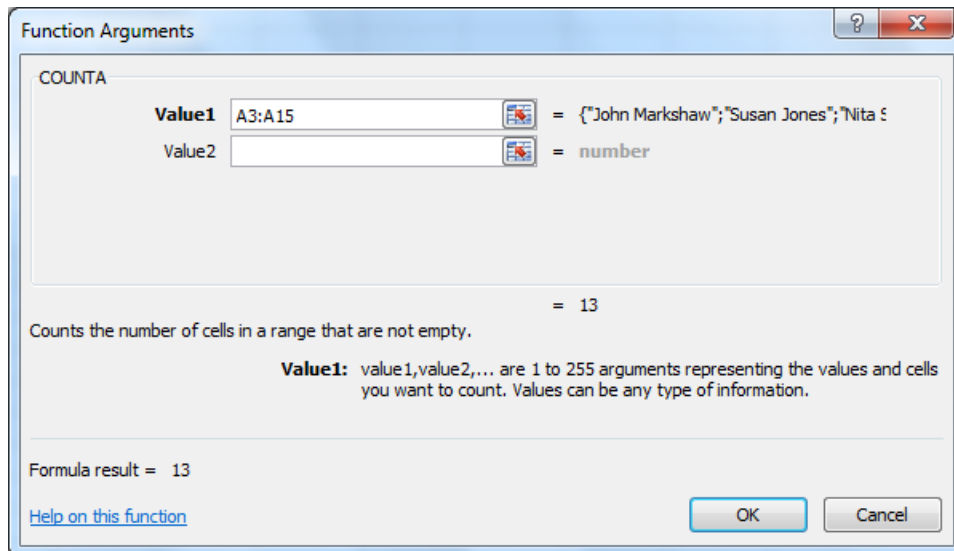
➢ Click **OK**

This function works by counting the number of non-empty cells in the range that you specify. It therefore counts the number of names in A3:A15 and returns the value 13.

EXERCISES

- ➤ In cell **A19**, type **TOTAL**

- ➤ In cell **C19** use the **SUM** function to calculate the total number of Hours Worked by all the employees (i.e. sum the range from C3 to C15)

- ➤ Copy this formula to cell **D19** to calculate the total pay for all the employees

- ➤ In **A20**, type **AVERAGE**

- ➤ In **C20**, use the **AVERAGE** function to calculate the average number of hours worked

- ➤ In **A22**, type **Maximum Salary**

- ➤ In **A23**, type **Minimum Salary**

- ➤ In **D22,** use the **MAX** function to calculate the Maximum salary from the Total column, ensuring that you specify the correct range

- ➤ In **D23** use the **MIN** function to calculate the Minimum salary from the Total column, again ensuring that the range is correct

	A	B	C	D
1	Name	Hourly Rate	Hours Worked	Total
2				
3	John Markshaw	7.5	30	225
4	Susan Jones	5.5	15	82.5
5	Nita Sonhil	8	37	296
6	Roy Barker	15	37	555
7	Tony Bare	10.75	10	107.5
8	Belinda Miles	8	25	200
9	Penelope East	6.15	17	104.55
10	Rupert Marks	10.75	35	376.25
11	James Colins	8	20	160
12	Sophie Doige	7.5	20	150
13	Mike Brown	6.5	17	110.5
14	Jasbir Bonsal	7.5	10	75
15	Marie Kaur	7.5	12	90
16				
17	No of Staff	13		
18				
19	Total		285	2532.3
20	Average		21.92307692	
21				
22	Maximum Salary		555	
23	Minimum Salary		75	

- ➤ Save the workbook

DISPLAYING FORMULAS

When you select a cell, you can see the formula (if there is one) displayed in the Formula Bar. It is also possible to view the formulas used in the entire worksheet.

➢ Select the **Formulas** tab

➢ Click the **Show Formulas** button in the **Formula Auditing** group
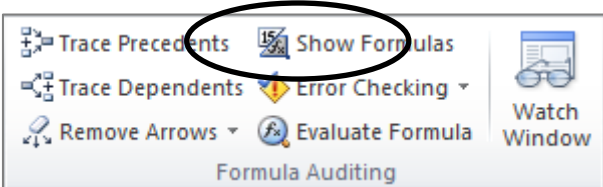
The formulas used in the worksheet are displayed.

	A	B	C	D
1	Name	Hourly Rate	Hours Worked	Total
2				
3	John Markshaw	7.5	30	=B3*C3
4	Susan Jones	5.5	15	=B4*C4
5	Nita Sonhil	8	37	=B5*C5
6	Roy Barker	15	37	=B6*C6
7	Tony Bare	10.75	10	=B7*C7
8	Belinda Miles	8	25	=B8*C8
9	Penelope East	6.15	17	=B9*C9
10	Rupert Marks	10.75	35	=B10*C10
11	James Colins	8	20	=B11*C11
12	Sophie Doige	7.5	20	=B12*C12
13	Mike Brown	6.5	17	=B13*C13
14	Jasbir Bonsal	7.5	10	=B14*C14
15	Marie Kaur	7.5	12	=B15*C15
16				
17	No of Staff	=COUNTA(A3:A15)		
18				
19	Total		=SUM(C3:C15)	=SUM(D3:D15)
20	Average		=AVERAGE(C3:C15)	
21				
22	Maximum Salary		=MAX(D3:D15)	
23	Minimum Salary		=MIN(D3:D15)	

DISPLAYING VALUES

To return the display to values rather than formulas:

➢ Click the **Show Formulas** button to deselect it
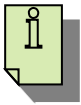
To display/hide formulas

Press and hold the [Ctrl] key and press the [`] key at the top left of the keyboard.

PERCENTAGES

There are several ways to use percentages in formulas and this section will look at some useful calculations that you may use in your spreadsheet.

CALCULATING THE PERCENTAGE DIFFERENCE BETWEEN TWO NUMBERS

It can be useful to know the difference between two numbers as a percentage.
For example, your earnings are £2,342 in November and £2,500 in December. What is the percentage change in your earnings between these two months? To do this task, use the subtraction (-) and division (/) operators.
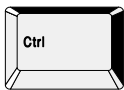
➢ Open the workbook **PayRoll** from the **ExcelFormulas** folder on drive **C.**

➢ Ensure you are on the **Previous Payroll** worksheet.

You are going to work out what percentage increase the staff have received in their salary within the last year.

➢ In cell **D3** type the following formula:

=(C3-B3)/C3

➢ Ensure the number in **D3** is formatted as a percentage to 2 decimal places and copy the formula down to the other staff.

This formula divides the difference between the second and first numbers, by the first number to get the percentage change.

INCREASE OR DECREASE A VALUE BY A PERCENTAGE

Another useful calculation is to increase or decrease a value by a specific percentage.
For example, all salaries need to be increased or decreased by 5%.

➢ Still using the workbook **PayRoll** select the **Payroll** worksheet.

You are going to work out the new salary when a 5% bonus is added to their current total pay.

➢ In cell **H3** type the following formula:
=D3*105%
Alternatively you could have typed
=D3+(D3*5%)
➢ Copy the formula down to the other staff

N.B To work out a decrease you would use the following formula: =D3*95% or D3-(D3*5%)

EXERCISES- PRACTICE SHEET 1

➢ Complete Practice Sheet 1 – **Percentage Calculation**

RELATIVE AND ABSOLUTE REFERENCES

RELATIVE REFERENCE

By default, formulas in Excel use relative cell references. This means that, as a formula is copied and pasted to other cells, the cell references in the formula change to reflect the formula's new location. The example below shows the effect of copying the formula in cell C1 to other cells in column C.

	A	B	C
1	6	3	18 (=A1*B1)
2	4	2	8 (=A2*B2)
3	10	4	40 (=A3*B3)

However, let's say that in column C you want to produce a formula that will multiply cell A1 by a series of cells in column B.

In other words, you want the following:

	A	B	C
1	6	3	18 (=A1*B1)
2		2	12 (=A1*B2)
3		4	24 (=A1*B3)

To achieve this, the reference to cell A1 needs to be changed from a *relative* reference to an *absolute* one before copying the formula down the column.

ABSOLUTE REFERENCE

An absolute cell reference in a formula does not change when the formula is copied and pasted into other cells.

In the formula above, to make the reference to cell A1 absolute, and therefore ensure that it remains unchanged when it is copied to other cells, you include $ signs ($A$1).

The diagram below illustrates what happens when the formula in C1 is changed to =$A$1*B1 and then copied down to other cells in column C.

The absolute reference ($A$1) has remained unchanged, and the relative reference (B1) has changed to, B2 and B3 respectively.

	A	B	C
1	6	3	18 (=$A$1*B1)
2		2	12 (=$A$1*B2)
3		4	24 (=$A$1*B3)

USING ABSOLUTE REFERENCES

➢ Select the **Payroll** worksheet

➢ Overtime pay is calculated using the formula:

Hourly rate * Overtime rate * Overtime hours

➢ In **F3**, calculate the overtime pay for John Markshaw

> To calculate the overtime pay for John Markshaw:
>
> ➢ Select **F3**
>
> ➢ Type **=B3*A19*E3**
>
> ➢ Press **Enter**

You now need to copy this formula down the column to calculate the overtime pay for the other employees.

➢ Select cell **F3**

Before copying the formula you must first decide if any of the references need to be absolute.

The Hourly rate figure changes for each employee and therefore this needs to be a relative reference.

The Overtime hours figure changes for each employee and therefore this also needs to be a relative reference.

However, the Overtime rate figure is the same for every employee and this is stored in A19. Therefore A19 must be made into an absolute reference.

➢ Position the insertion point in the Formula Bar and edit the formula so that the reference to cell A19 is made absolute by including $ signs

> A quick way to make a cell reference absolute is to use the **F4** key on your keyboard

=B3*$A$19*E3

Remember to press Enter when you have finished editing the formula.

➢ Copy the formula down the column to all employees

	A	B	C	D	E	F	G	H
1	Name	Hourly Rate	Hours Worked	Total Pay	Over time hours	Overtime pay	Total Pay	New Salary after 5% Bonus payment
2								
3	John Markshaw	£7.50	30.00	£225.00	5	£56.25	£225.00	£236.25
4	Susan Jones	£5.50	15.00	£82.50	6	£49.50	£82.50	£86.63
5	Nita Sonhil	£8.00	37.00	£296.00	1	£12.00	£296.00	£310.80
6	Roy Barker	£15.00	37.00	£555.00	0	£0.00	£555.00	£582.75
7	Tony Bare	£10.75	10.00	£107.50	8	£129.00	£107.50	£112.88
8	Belinda Miles	£8.00	25.00	£200.00	0	£0.00	£200.00	£210.00
9	Penelope East	£6.15	17.00	£104.55	0	£0.00	£104.55	£109.78
10	Rupert Marks	£10.75	35.00	£376.25	2	£32.25	£376.25	£395.06
11	James Colins	£8.00	20.00	£160.00	3	£36.00	£160.00	£168.00
12	Sophie Doige	£7.50	20.00	£150.00	4	£45.00	£150.00	£157.50
13	Mike Burns	£6.50	17.00	£110.50	0	£0.00	£110.50	£116.03
14	Jasbir Bonsal	£7.50	10.00	£75.00	0	£0.00	£75.00	£78.75
15	Marie Kaur	£7.50	12.00	£90.00	0	£0.00	£90.00	£94.50
16								
17			285.00	£2,532.30				
18	Overtime rate							
19		1.5						

➢ Click on the overtime pay for some of the other employees to see that while the hourly rate and overtime hours references have copied relatively, the overtime rate reference is absolute

➢ Save the workbook

As some staff have worked overtime, this figure must be **added** to their pay.

➢ Select cell **G3** ready to calculate the Total Pay for John Markshaw

➢ Edit the formula to include his Overtime pay

	A	B	C	D	E	F	G	H
1	Name	Hourly Rate	Hours Worked	Total Pay	Over time hours	Overtime pay	Total Pay	New Salary after 5% Bonus payment
2								
3	John Markshaw	£7.50	30.00	£225.00	5	£56.25	£281.25	

➢ Copy the amended formula down to the other staff – you do not need to make any part of this formula absolute

➢ To finish this exercise, use the **SUM** function in cell **G17** to total the column

14	Jasbir Bonsal	£7.50	10.00	£75.00	0	£0.00	£75.00	£78
15	Marie Kaur	£7.50	12.00	£90.00	0	£0.00	£90.00	£94
16								
17			285.00	£2,532.30			£2,892.30	
18	Overtime rate							
19		1.5						

EXERCISES- PRACTICE SHEET 2

➢ Complete Practice Sheet 2 – **Absolute Cell Referencing**

CONDITIONAL FORMULA

IF

The **IF** function is one of the most important functions in Excel as it can give your formulas decision-making capabilities.

The IF function includes a logical test, that compares a cell against a specified value. A logical test is a test that produces an answer of either True or False.

The IF function is structured as follows:

=IF(Logical Test, Value 1, Value 2)

Which produces these results:

If the **Logical Test** is TRUE, **Value 1** is inserted into the cell
If the **Logical Test** is FALSE, **Value 2** is inserted into the cell

If the Value is text rather than a number, it must be enclosed in quotation marks ("text").

For example, you might want to include the words "solvent" or "bankrupt" as the result of a calculation in the worksheet.

You can compare two values with the following operators. When two values are compared using these operators, the result is a logical value, either TRUE or FALSE.

>	**More than**
<	**Less than**
=	**Equal to**
>=	**More than or equal to**
<=	**Less than or equal to**

The management of Jumble Sales Corporation has decided that staff who earn £7.50 or less per hour will receive a bonus of £20 and all others will get £10.

Therefore, the bonus depends on each member of staff's hourly rate. So the logical test must check to see if the hourly rate is £7.50 or less.

➢ Still using the workbook **PayRoll** select the **Bonuses** worksheet
➢
To calculate the bonus payment for John Markshaw:

➢ Select cell **E3** (this is where his bonus pay will be entered)

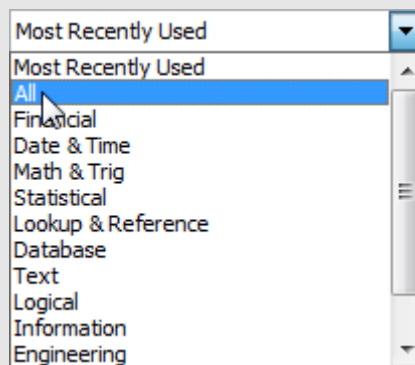➢ Click the **Insert Function** button

➢ Select the **IF** function

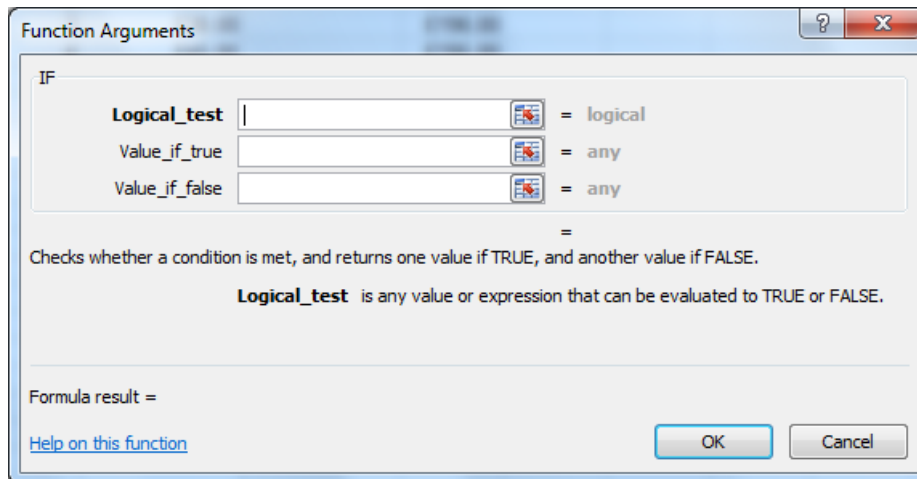If this function is not available in the Most Recently Used list

➢ Click the down arrow

➢ Select either **All** or **Logical**

You should now be able to choose the **IF** function.

➢ Click **OK**

The **Function Arguments** dialog box for the IF function is displayed.

There are three boxes to complete, and the first one is the logical test.

You must test to see if the hourly rate is £7.50 or less. The hourly rate value is in B3, so you are testing to see if B3 is £7.50 or less.

In the **Logical_test** box, type **B3<=7.5**

This will check to see if B3 is less than or equal to 7.5. The pound sign '£' is not included because this is just formatting.
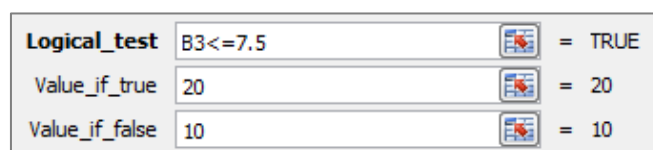
The logical test must include

- A cell reference

- An operator

- A value

➢ In the **Value_if_true** box, type **20**

This gives a bonus of £20 if the hourly rate is £7.50 or less.

➢ In the **Value_if_false** box, type **10**

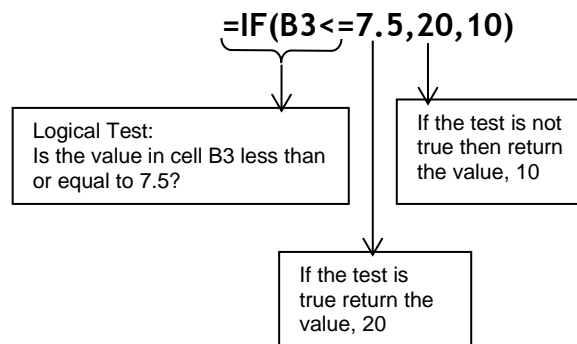This gives a bonus of £10 if the hourly rate is more than £7.50.

➢ Click **OK**

E3 displays John Markshaw's bonus as 20.

	A	B	C	D	E
					E3 fx =IF(B3<=7.5,20,10)
1	Name	Hourly Rate	Hours Worked	Total Pay	Bonus payment
2					
3	John Markshaw	£7.50	30.00	£225.00	£20.00

➢ Look at the formula in the Formula Bar

=IF(B3<=7.5,20,10)

Logical Test:
Is the value in cell B3 less than or equal to 7.5?

If the test is not true then return the value, 10

If the test is true return the value, 20

➢ Copy the formula down the column to the other members of staff

➢ Look down the Bonus payment column to check that the figures are correct

➢ Ensure that the range **E3:E15** is formatted as **Currency**

➢ Save the workbook

COUNTIF & COUNTIFS

The standard functions that are used to count cells in a range are COUNT, COUNTA and COUNTBLANK.

COUNT(range)	counts the cells in the range that contain numbers
COUNTA(range)	counts the non empty cells in the range
COUNTBLANK(range)	counts the empty cells in the range

The COUNTIF function enables you to count only the cells that satisfy a specific criteria.

The syntax is:

   =COUNTIF(criteria range, criteria)

Where:

criteria range	is a specified range
criteria	is the condition or value that cells in the specified range must satisfy in order to be counted

➢ Open the file **ClubMembership**.

The next example shows how to count the number of memberships depending on the type.

➢ In **C112** use the **Insert Function** button and locate the **COUNTIF** function:

➢ Ensure your cursor is in the **Range** box and highlight the range **H7** to **H108.**

➢ Place your cursor in the **Criteria** box and select the cell **B112**

This will set the criteria to **Gold** as that is the content of cell **B112**

➢ Click OK.

Ensure you have selected cell C112 and look at your formula bar. Your formula should look like this:

   =COUNTIF(H7:H108,B112)

The number of Gold memberships is **29.**

This formula can now be copied for the other membership types. **However, for it to work some cells will need to be made absolute.**

Can you work it out?

You should have made the range H7:H108 absolute in order for your formula to work when copied.

COUNTIFS works in the same way but can take multiple pairs of criteria range and criteria.

You need to find the number of staff in the Brokerage department with Gold memberships:

➢ In **G112** use the **Insert Function** button to locate the **COUNTIFS** function.

➢ In the **Criteria_range1** box highlight the cell range **H7:H108**

➢ In the **Criteria1** box insert the text **"gold"** (notice that another box has now appeared so you can add a second criteria)

➢ In the **Criteria_range2** box highlight the cell range **G7:G108**

➢ In the **Criteria2** box insert the text **"brokerage"**

You could keep adding criteria but we have finished for this example

➢ Select **OK**

The answer is **6**.

The above formula counts the number of rows where gold is present in column H **AND** brokerage is present in column G.

SUMIF & SUMIFS

The SUMIF function is used to sum data in a selected range when specified conditions are met.

The standard SUM function can be used to calculate the total Annual Fee, but if you need to calculate the total Annual Fee for the Maintenance department, or the total Annual Fee for the Maintenance staff who joined after 1995, then either SUMIF or SUMIFS will need to be used.

The syntax for the SUMIF function is:

=SUMIF(criteria range, criteria, sum range)

Where:

criteria range is the range where you want to look for a specific condition
criteria is the value or condition to look for in the criteria range
sum range is the range you want to sum once the above criteria has been met

Sum range and criteria range must have equal length and shape.

SUMIFS allows you to have multiple criteria range and criteria pairs which enables you to sum data that satisfies many different criteria.

For the first example you will calculate the total Annual Fee for the Sales department.

➢ Still using the **ClubMembership** workbook

➢ In **G115**, use the **Insert Function** button to locate the **SUMIF** function

➢ In the **Range** box select cells **G7:G108**

➢ In the **Criteria** box type **"brokerage"**

➢ In the **Sum_range** box select cells **i7:i108**

The answer is **£9,918.00.** Your formula should look like this:

=SUMIF(G7:G108,"brokerage",I7:I108)

Explanation:

g7:g108 is the criteria range (the range in which to look for the criteria)
"brokerage" is the criterion to look for in g7:g108 (text must be enclosed within double quotes)
i7:i108 is the sum range (the range of cells to be summed. This can be left blank if it is the same range as the criteria)

Next you will calculate the total Annual Fee for members of the Brokerage department who joined after 1995.

➢ In **G118**, use the **Insert Function** button to locate the **SUMIFS** function:

➢ In the **Sum_range** box select cells **i7:i108**

➢ In the **Criteria_range1** box select cells **G7:G108**

➢ In the **Criteria1** box type **"brokerage"**

➢ In the **Criteria_range2** box select cells **D7:D108**

➢ In the **Criteria2** box type **>31/12/1995**

The answer is **£4181.50.** Your formula should look like this:

=SUMIFS(i7:i108,g7:g108,"brokerage",d7:d108,">31/12/1995")

Explanation:

i7:i108   the sum range
g7:g108,"brokerage"   first pair of criteria range and criteria
d7:d108,">31/12/1995"   second pair of criteria range and criteria

The function sums the cells in the sum range for the rows that satisfy both conditions.

➢ Save and close the workbook

EXERCISES- PRACTICE SHEET 3

➢ Complete Practice Sheet 3 – **Conditional Formula**