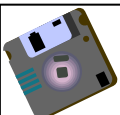


KEY SKILLS MODELLING: TASK 4

Estimated number of people		
Item	Cost per person	Amount
1. Transport	£2.00	£200.00
2. Lunch	£1.50	£150.00
3. Dinner	£1.50	£150.00
4. Hotel/Accommodation	£1.00	£100.00
5. Bus	£1.50	£150.00
6. Games	£1.00	£100.00
7. Coffee	£1.00	£100.00
8. Laundry	£1.00	£100.00
TOTALS		£1907.00 Total EXPENDITURE
REVENUE		£900.00 Total REVENUE
		£907.00 Profit Loss

MODELLING : TASK 4 - CONTENTS

- Nested IF formulae
- IF(Or.....) formulae
- IF(And...) formulae



Wherever you see this symbol, make sure you remember to save your work!

MODELLING : 4

Last week you looked at simple IF...Then statement where there is a TRUE or FALSE condition. These are the ones that you are more likely to come across so it is important that you know how to write these.

You may be asked to write a Nested IF statement. They may look long and complicated, but they are really quite simple once you understand the concept.

A nested if statement will look something like this:

`=IF("if this condition stated here is true", then enter "this value, else if("if this condition stated here is true", then enter "this value, else enter"this value")`

Let's break this down into simple stages.

You may have a spreadsheet that you use to keep track of the rate of commission that your sales team earns. You may not want to pay a flat rate of commission, perhaps it is fairer to pay more commission to those sales people who have worked harder and sold more items.

You decide to pay commission as follows:

Sales from £1 to £10 earns 10% commission

Sales between £11 to £100 earns 15% commission

If they sell over £100 they earn 20% commission

TASK 1

Set up a spreadsheet with the data on the right

We need to write our nested IF so that we can find out the correct commission they should earn.

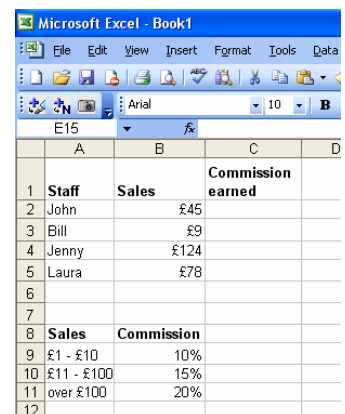
This is what the nested IF function would look like:

`=IF(B2<=10,B9,IF(B2<=100,B10,B11))`

Let's break this down:

`=IF(B2<=10,`

This first part looks at the data in cell B2, which is Johns' sale. It then says, 'If Johns sales are less than or equal to 10



The screenshot shows a Microsoft Excel spreadsheet with the following data:

	A	B	C	D
1	Staff	Sales	Commission earned	
2	John	£45		
3	Bill	£9		
4	Jenny	£124		
5	Laura	£78		
6				
7				
8	Sales	Commission		
9	£1 - £10	10%		
10	£11 - £100	15%		
11	over £100	20%		
12				

You then need to tell the formula what to do IF Johns' sales are less than or equal to 10, in this case it would be to display the value in cell B9 - which is the commission paid for sales of £10 or below.

```
=IF(B2<=10,$B$9,
```

Notice that an absolute cell reference has been used for B9 - otherwise when you drag it down, you would get the wrong values.

Let's look at the next bit:

```
=IF(B2<=10,$B$9,IF(B2<=100,
```

This part says, IF Johns' sales in B2 are less than or equal to 100

```
=IF(B2<=10,$B$9,IF(B2<=100,$B$10,
```

If they are less than or equal to 100, then you tell the formula what you want displayed, in this case, it is the corresponding commission for sales over £11 up to £100 - Cell B10 (remember to use an absolute cell reference again).

```
=IF(B2<=10,$B$9,IF(B2<=100,$B$10,$B$11))
```

The final part of the formula says what should happen if neither of the first two conditions are met, i.e. sales are not £1-£10, nor are they £11-£100.

Notice how the brackets are used in this formula

```
=IF(B2<=10,$B$9,IF(B2<=100,$B$10,$B$11))
```

You have one set of brackets for the first IF condition: =IF(B2<=10,\$B\$9,

You then open another set of brackets for the second IF condition:

```
=IF(B2<=10,$B$9,IF(B2<=100,$B$10
```

Because you have two sets of opening brackets, just the same as in maths, you must have two sets of closing brackets:

```
=IF(B2<=10,$B$9,IF(B2<=100,$B$10,$B$11))
```

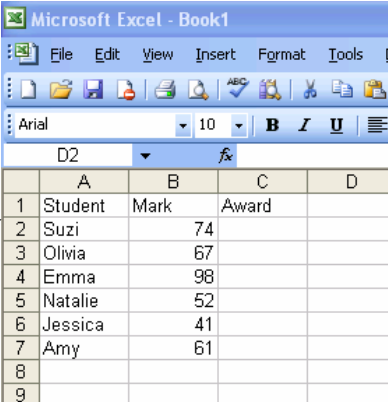
Now have a go at writing this nested IF statement in cell C2 - remember the use of absolute cell references!

Once you have written your first statement, drag the formula down through cells C3:C5. Check that the correct rates of commission have been displayed.

TASK 2

Open a blank worksheet.

Enter the data shown on the right



	A	B	C	D
1	Student	Mark	Award	
2	Suzi	74		
3	Olivia	67		
4	Emma	98		
5	Natalie	52		
6	Jessica	41		
7	Amy	61		
8				
9				

We want to enter an award based on a range of grades:

- 49 or below = Fail
- 50 to 74 = Pass
- 75 or above = Distinction

We need to start the nested IF formula in cell C1.

Let's do the first part of the statement:

```
=IF(B2>=75,"Distinction",
```

So, if the mark in B2 is >= to 75, display 'Distinction'

Then let's do the next part:

```
IF(B2>=50,"Pass",
```

So, if the mark in B2 is >=to 50 (but below 75), display 'Pass'

Let's do the last part:

```
"Fail"))
```

So, if the mark isn't above 50 or above 75, display 'Fail'.

Remember to put a double set of closing brackets.

Your formula should look like this:

```
=IF(B2>=75,"Distinction",IF(B2>=50,"Pass","Fail"))
```

Have a go yourself.

Not working?

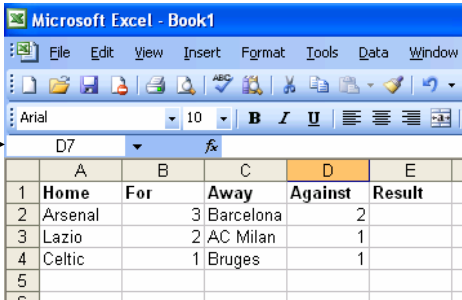
If something goes wrong, it is usually because you have missed a comma, speech marks or a bracket.

Notice, we did not need to use any absolute cell references in this formula as we were typing in the conditions ourselves and not referencing another cell on the spreadsheet.

TASK 3 - Your turn

Open a new worksheet

Type in the data as shown on the right



The screenshot shows a Microsoft Excel spreadsheet with the following data:

	A	B	C	D	E
1	Home	For	Away	Against	Result
2	Arsenal		3 Barcelona		2
3	Lazio		2 AC Milan		1
4	Celtic		1 Bruges		1
5					

Information:

- If the home result is greater than the away result, we want to display 'Home'
- If the home result is the same as the away result, we want to display 'Draw'
- If the away result is higher than the home result we want to display 'Away'.

Remember - any words e.g. home, away or draw must be enclosed in speech marks for Excel to accept them.

In cell E1, have a go at writing your nested IF statement - here is a little hint to start you off:

```
=IF(B2>D2,"Home",
```

When you have written your formula, drag it down to cells E3 and E4.

Check that you got the right results.

TASK 4

Open a new worksheet

Type in the data as shown on the right

Remember to format C4, C5, D4:D9, B12:14 as currency to 2dp

Draw a border around cells A11:D14 as shown

Fill A11:D14 with a background colour

Draw a border around cells C1:D1 as shown

Fill C1:D1 with a background colour

	A	B	C	D	E
1	Mobile Phone Account		Tarriff Chosen	C	
2		Minutes	Price per minute	Cost	
3					
4	Call charges (peak)	147			
5	Call charges (off peak)	94			
6	Line rental				
7	Total				
8	VAT				
9	Total with VAT				
10					
11	Tariff	Peak rate	Off-peak rate	Line rental	
12	A	£0.30	£0.05	£15.00	
13	B	£0.10	£0.02	£20.00	
14	C	£0.90	£0.00	£30.00	
15					

We need to be able to pick up the correct price per minute for 'peak call charges' from the Tariff table depending on which tariff has been chosen in cell D1 (in this case tariff C).

The formula needs to take the following into account:

- If D1 = A then display the value shown in cell B12
- If D1 = B then display the value shown in cell B13
- If D1 doesn't equal A or B then display the value shown in cell B14

Remember, that A, B or C will need speech marks around them in your formula. Also remember that you need two sets of opening and two sets of closing brackets.

In cell C4, have a go at writing your nested IF formula, taking into account the information above.

To start you off here is the first part: =IF(D1="a",

Now that you have worked out your formula for peak call charges, you need to write another nested IF formula to work out off-peak call charges.

Using the same information shown above, in cell C5, write a nested IF that finds the correct off-peak rate from the Tariff table.

In D4 write a formula to calculate the peak call charges (minutes * price per minute)

In D5 write a formula to calculate the off peak call charges (minutes * price per minute)

In cell D6 you need to write another nested IF formula to pick up the correct line rental from the Tariff table.

In cell D7 write a formula to calculate the total costs of call charges and line rental.

In cell D8 calculate the VAT payable by multiplying the total costs (D7) by 0.175 or 17.5%

In cell D9 write a formula to calculate the total costs and the VAT payable.

These are the results that you should have obtained

If your results are different, please recheck your formulae and correct them.

Add your name in the footer.

Choose to display gridlines and column and row headers

Print out a copy of your work.

Display the formulae.

Resize the columns so that the formulae show correctly.

Set your print area and ensure that your work is set to print on one page.

Print out a copy of your formulae.

Hand in both printouts.

	A	B	C	D	E
1	Mobile Phone Account		Tariff Chosen	C	
2					
3		Minutes	Price per minute	Cost	
4	Call charges (peak)	147	£0.90	£132.30	
5	Call charges (off peak)	94	£0.00	£0.00	
6	Line rental			£30.00	
7	Total			£162.30	
8	VAT			£28.40	
9	Total with VAT			£190.70	
10					
11	Tariff	Peak rate	Off-peak rate	Line rental	
12	A	£0.30	£0.05	£15.00	
13	B	£0.10	£0.02	£20.00	
14	C	£0.90	£0.00	£30.00	
15					
16					
17					

IF(OR....) FORMULAE

Logical functions can also be included in IF statements. It is also important that you understand how these functions work.

You may be asked to write an IF(OR...) statement, or an IF(AND...) statement.

An IF(OR...) statement will look something like this:

=IF(OR("if this condition stated here is true", or "if this condition stated here is true"), then enter "this value", else enter "this value")

Lets break this down into simple stages.

You may have a spreadsheet that you want to use to work out whether or not a pupil should be entered for a higher Maths paper in their exams.

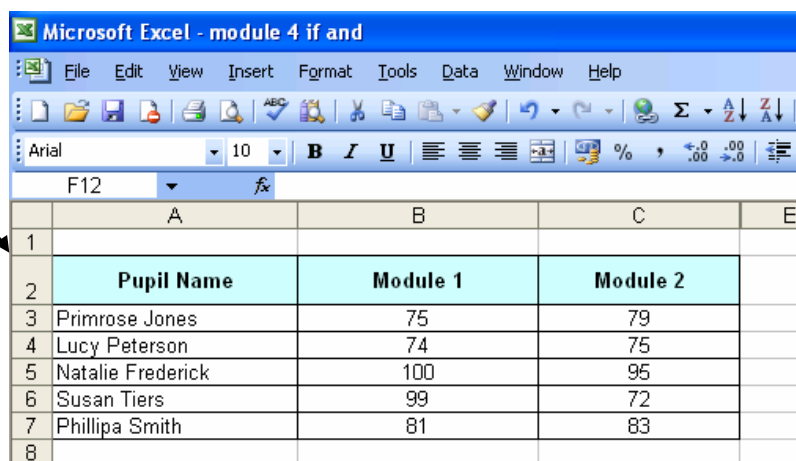
In this example, pupils have sat two Maths papers. In order to be entered for the higher paper, they must have achieved at least 75 marks in each of the two modules.

TASK 5

Open a blank worksheet and enter the data shown on the right.

We need to write our nested IF(OR) function so that we can determine whether or not they should be entered for the higher paper.

This is what the IF(OR) function would look like:



The screenshot shows a Microsoft Excel spreadsheet titled "module 4 if and". The spreadsheet has columns A, B, and C, and rows 1 through 8. Row 2 is the header row with "Pupil Name" in column A, "Module 1" in column B, and "Module 2" in column C. Rows 3 through 7 contain data for five pupils: Primrose Jones (75, 79), Lucy Peterson (74, 75), Natalie Frederick (100, 95), Susan Tiers (99, 72), and Phillipa Smith (81, 83). Row 8 is empty.

	A	B	C	E
1				
2	Pupil Name	Module 1	Module 2	
3	Primrose Jones	75	79	
4	Lucy Peterson	74	75	
5	Natalie Frederick	100	95	
6	Susan Tiers	99	72	
7	Phillipa Smith	81	83	
8				

=IF(OR(B3<75, C3<75), "Foundation", "Higher")

Lets break this down:

=IF(OR(

This first part says that we want to check whether either of the conditions that follow are satisfied.

You then need to tell the formula what conditions to check.

=IF(OR(B3<75,

This checks whether or not the value in cell B3 is less than 75. (The minimum mark to sit the higher paper in module 1 is 75 - so any value less than 75 will not be accepted). If the condition is met i.e. the value in cell B3 is less than 75 then TRUE is stored.

=IF(OR(B3<75, C3<75),

This part checks whether or not the value in cell C3 is less than 75. (The minimum mark to sit the higher paper in module 2 is also 75 - so any value less than 75 will not be accepted). If the value in cell C3 is less than 75 then TRUE is stored.

Lets look at the next bit:

=IF(OR(B3<75, C3<75), "Foundation",

If either of the conditions, B3<75 or C3<75, is TRUE, then the word foundation will be displayed. It is important that any text you want to display is enclosed in speech marks.

=IF(OR(B3<75, C3<75), "Foundation", "Higher")

The final part of the formula displays higher if either of the conditions has not been met i.e. neither of the marks for the modules were less than 75. The word Higher will then be displayed.

Notice how the brackets are used in this formula

=IF(OR(B3<75, C3<75), "Foundation", "Higher")

You have one set of brackets for the IF condition: =IF(

You then open another set of brackets for the OR condition: =IF(OR(

Another bracket, ends the OR condition, with another ending the IF condition:

=IF(OR(B3<75, C3<75), "Foundation", "Higher")

Now have a go at writing this IF(OR) statement in cell D3.

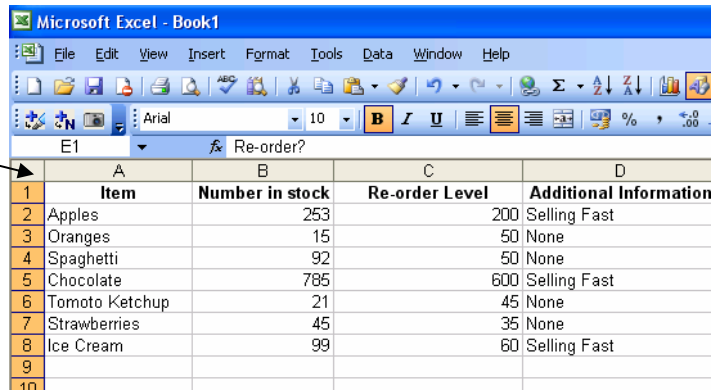
Once you have written your first statement, drag the formula down through cells D3:D7. Check that the correct papers have been assigned to the pupils.

TASK 6

Open a blank worksheet and enter the data on the right.

This example shows:

- a list of items
- how many of each are in stock
- what the level needs to be to order more
- Whether the item is selling particularly fast



	A	B	C	D
1	Item	Number in stock	Re-order Level	Additional Information
2	Apples	253	200	Selling Fast
3	Oranges	15	50	None
4	Spaghetti	92	50	None
5	Chocolate	785	600	Selling Fast
6	Tomato Ketchup	21	45	None
7	Strawberries	45	35	None
8	Ice Cream	99	60	Selling Fast
9				
10				

You need to add title in E1, with the words "Re-order?".

We are now going to write an IF(OR) statement to determine whether or not each item needs to be re-ordered.

Items need reordering if:

- The quantity in stock is less than the re-order level
- Or, someone has entered "selling fast" in additional information

Start the statement in cell E2.

Write the following:

=IF(OR(

We now need to write a condition, to work out whether the quantity in stock is less than the re-order level: =IF(OR(B2<C2,

We now need to determine whether the item is selling fast, add this to the statement:

=IF(OR(B2<C2, D2="Selling Fast"),

If either condition is true, then the item needs re-ordering. Enter the word "Yes" if it does, "No" if not:

=IF(OR(B2<C2, D2="Selling Fast"), "Yes", "No")

Fill this statement down the column.

IF(AND.....) FORMULAE

The IF(AND) function is very similar to the IF(OR) function. However, rather than either of the conditions being satisfied, both conditions must be satisfied.

An IF(AND...) statement will look something like this:

=IF(AND("if this condition stated here is true", and "if this condition stated here is true"), then enter "this value", else enter "this value")

TASK 7

The example in task 5 can be re-written using this function to determine the answer.

Open the worksheet you used for task 5.

Delete the formulae in column D.

This is what the IF(AND) function would look like:

=IF(AND(B3=>75, C3=>75), "Higher", "Foundation")

Lets break this down:

=IF(AND(

This first part says that we want to check the whether both the conditions that follow are satisfied.

You then need to tell the formula what conditions to check.

=IF(AND(B3=>75,

Here we want to check whether the value in cell B3 is equal to or greater than 75 i.e. they have got enough marks for this module to be entered for the higher paper.

=IF(AND(B3=>75, C3=>75),

This part checks whether the value in cellC3 is equal to or greater than 75 i.e. they have got enough marks for this module to be entered for the higher paper.

Lets look at the next bit:

=IF(AND(B3=>75, C3=>75), "Higher",

If both of the conditions, B3=>75 C3=>75, are TRUE, then the word higher will be displayed. Remember the importance of the speech marks.

=IF(AND(B3=>75, C3=>75), "Higher", "Foundation")

If one of the conditions, B3=>75 C3=>75 is not satisfied, then the word higher will be written.

Remember how brackets are used in this formula:

=IF(AND(B3=>75, C3=>75), "Higher", "Foundation")

Write this statement into cell E3, and fill down - check it gives you the same answer as in column D.

TASK 8

Open a new worksheet.

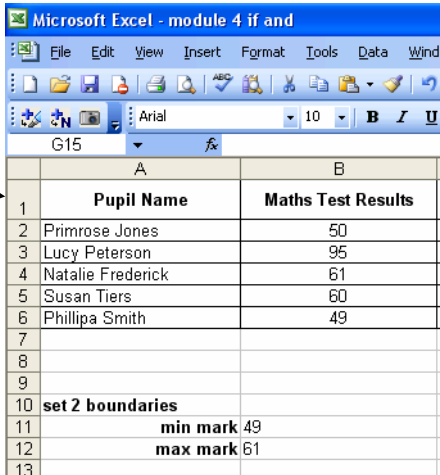
Type in the data as shown on the right

Draw a border around cells A1:B6 as shown

Fill A1:B1 with a background colour

Fill A2: B6 with another background colour

Draw a border around cells A1:B6 as shown



	A	B
1	Pupil Name	Maths Test Results
2	Primrose Jones	50
3	Lucy Peterson	95
4	Natalie Frederick	61
5	Susan Tiers	60
6	Phillipa Smith	49
7		
8		
9		
10	set 2 boundaries	
11	min mark	49
12	max mark	61
13		

Make sure that you have entered the data in cells A10:B12

You now need to work out whether or not each pupil can be put into set 2 for their Maths lessons. Put a title in cell C1 saying 'Maths Set'.

Now have a go at entering an IF(AND) statement into cell C2 to decide. (NB. Be careful with absolute referencing).

If the pupil qualifies to be in set 2, write "set 2", if not write "another set".

To start you of here is the first part: =IF(AND(B2>\$B\$11,

Now that you have worked out what set each pupil should be in, add another column to work out whether any of the pupils deserve a commendation. If they achieve higher than 90 marks, "commendation" should be entered. If their mark does not deserve a commendation, then leave the cell empty. To do this just type "", for what to display.

TASK 9

Enter the data on the right into a blank worksheet.

Make it look more attractive, using borders, background colours and changing the font.

In column D, write the heading Overall.

In this example, if there is a letter 'G' entered, the homework was handed in on time. If there is a letter 'L' then it was late.

You need to write an IF(OR) statement. If the pupil has handed in either week's homework late, the word 'late' should be displayed in the Overall column. If both pieces of homework were handed in on time then the word 'excellent' should be displayed.

Note: The words to be displayed should not be entered, the cells that contain the words should be used.

Now, insert another column titled Action.

This column is to display whether any action needs to be taken for this pupil.

Write an if(AND) statement in this column. If both pieces of work from week 1 and week 2 were late, the word 'detention' should be written (get this from the cell, do not type it in). If there is no action to be taken, leave the cell empty i.e. as before type "".

	A	B	C
1	Subject	Week 1	Week 2
2	ICT	L	G
3	Geography	G	G
4	History	L	L
5	Mathematics	G	L
6	French	G	G
7			
8	Overall		
9	Excellent		
10	Late		
11			
12	Action		
13	Detention		
14			