

ADVANCED EXCEL

EXCEL CLASS THREE

- ▶ **PMT Function**
- ▶ **Subtotals**
- ▶ **VLOOKUP function**
- ▶ **Conditional Formatting**
- ▶ **Hyperlinks**
- ▶ **Data Verification**
- ▶ **Linking Worksheets**
- ▶ **Absolute Cell Reference**

PMT FUNCTION

The PMT function can be used to calculate the amount of your monthly payment of a loan when the Interest Rate, Number of Payments, and Loan Amount is known. If you create a small table with all these values, as shown in the example in the LOAN PAYMENT sheet tab, then you can easily change the interest rate or loan amount to see how it changes the payment.

The formula is as follows: =PMT(RATE,NPER,PV)

RATE The interest rate on your loan. When you build the formula you should enter the rate divided by 12 to get the monthly interest rate.

NPER The number of monthly payments in the loan. For example, if the loan is a 30 year mortgage, you would enter either 360 or 30*12 for the number of periods.

PV The present value which is the total amount of the loan. Enter the loan amount as a negative in order to obtain a positive payment.

In our example we entered the Interest Rate (RATE) in cell C3, the number of payments (NPER) in cell C4 and the amount of our loan (PV) in cell C5. Based on this, our formula to calculate a monthly payment was:

=PMT(C3/12,C4,-C5)

Notice we divided the Annual percentage rate by 12 in the formula in order to obtain a true monthly interest rate. We also used the negative of cell C5 for the loan amount. This allows our payment amount to display as a positive amount.

We now can change any of the values for the Interest Rate, Number of Payments or Amount of Loan to see what the monthly payments for our loan would amount to.

[Use the LOAN PAYMENT worksheet to practice.](#)

PMT FUNCTION USED TO CALCULATE LOAN PAYMENT	
ANNUAL INTEREST RATE	7.00%
NUMBER OF MONTHLY PAYMENTS	360
AMOUNT OF LOAN	\$150,000
MONTHLY PAYMENT	\$997.95

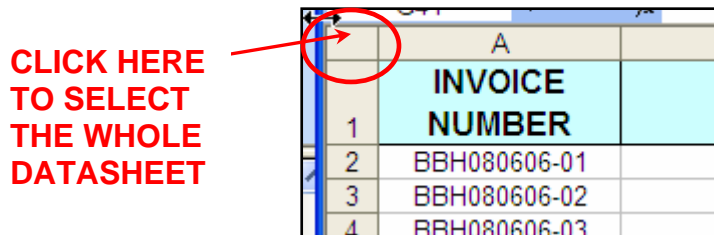
SUBTOTALS

We also looked at the Subtotal feature in Excel. We saw that the Subtotal feature was an easy way to obtain subtotals for certain categories in your data list.

Use the **SUBTOTAL TAB** in this workbook to practice this.

Remember, when using the subtotal feature, we first need to sort the list by the category we wish to obtain a subtotal for. In our example, we wanted to get a subtotal for each company in our list. Therefore, we need to sort by company before using the subtotal feature.

We sort by highlighting or selecting all of our data (select the whole sheet by clicking the small square in the upper left of the spreadsheet, located above row 1 and to the left of column A - this selects our spreadsheet).

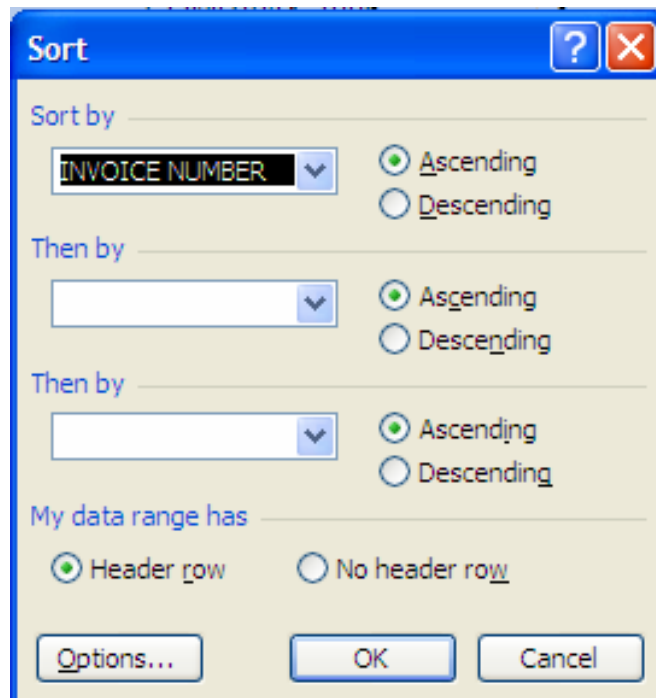


Once we have selected the data, we click on **DATA** in the menu bar and select **SORT** from the menu.

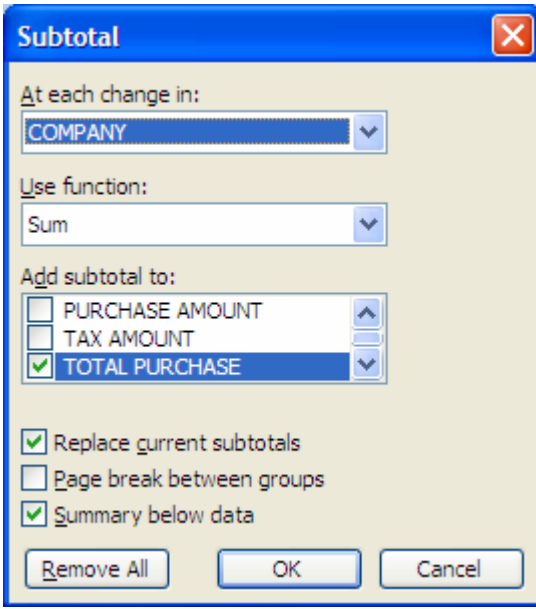
In the sort dialogue box, make sure **Header Row** is selected under 'My data range has' section at the bottom of the dialogue box. This puts the header row cell values into the sort by list boxes as well as keeps the header row from being sorted with the other values.

Now in the first "sort by" box, select **COMPANY** from the drop down list and click 'OK'. This will sort our spreadsheet by Company.

Once our datalist is sorted by **COMPANY**, we can now easily use the Subtotal feature to obtain subtotals for each individual company.



To apply the Subtotal feature once our list is sorted, click **DATA** in the menu bar and select **SUBTOTAL**. The Subtotal dialogue window will appear.



We need to select the options we wish to use for our Subtotal feature.

Select COMPANY in the 'At each change in:' drop down list. This is why we needed to sort the list first. Excel will now subtotal after each change in Company, ie Company 1001, Company 1002, etc in our example.

Select SUM in the 'Use function:' drop down list. The SUM function will add the totals of the columns we select.

Place a check in TOTAL PURCHASE for our example. This will apply the SUM function to our TOTAL PURCHASE amounts for each Company. Click OK.

We see that our data has now been subtotalled by each change in Company.

	A	B	C	D	E
	INVOICE NUMBER	COMPANY	PURCHASE AMOUNT	TAX AMOUNT	TOTAL PURCHASE
1					
2	BBH080606-01	COMPANY 1001	\$ 7,904.09	\$ 691.61	\$ 8,595.70
3	BBH080606-11	COMPANY 1001	\$ 1,694.51	\$ 148.27	\$ 1,842.78
4	BBH080606-21	COMPANY 1001	\$ 1,820.94	\$ 159.33	\$ 1,980.27
5	BBH080606-31	COMPANY 1001	\$ 5,636.01	\$ 493.15	\$ 6,129.17
6	BBH080606-41	COMPANY 1001	\$ 9,161.80	\$ 801.66	\$ 9,963.45
7	BBH080606-51	COMPANY 1001	\$ 2,880.57	\$ 252.05	\$ 3,132.62
8	BBH080606-61	COMPANY 1001	\$ 9,044.06	\$ 791.36	\$ 9,835.42
9	BBH080606-71	COMPANY 1001	\$ 5,670.68	\$ 496.18	\$ 6,166.86
10	BBH080606-81	COMPANY 1001	\$ 4,084.00	\$ 357.35	\$ 4,441.35
11	BBH080606-91	COMPANY 1001	\$ 9,168.76	\$ 802.27	\$ 9,971.03
12		COMPANY 1001 Total			\$ 62,058.65
13	BBH080606-02	COMPANY 1002	\$ 3,832.39	\$ 335.33	\$ 4,167.73
14	BBH080606-12	COMPANY 1002	\$ 1,028.78	\$ 90.02	\$ 1,118.79

	A	B	C	D	E
	INVOICE NUMBER	COMPANY	PURCHASE AMOUNT	TAX AMOUNT	TOTAL PURCHASE
1					
12		COMPANY 1001 Total			\$ 62,058.65
23		COMPANY 1002 Total			\$ 52,929.69
34		COMPANY 1003 Total			\$ 57,628.80
45		COMPANY 1004 Total			\$ 59,202.96
56		COMPANY 1005 Total			\$ 68,537.99
67		COMPANY 1006 Total			\$ 53,658.98
78		COMPANY 1007 Total			\$ 39,263.92
89		COMPANY 1008 Total			\$ 51,928.42
100		COMPANY 1009 Total			\$ 53,512.84
111		COMPANY 1010 Total			\$ 49,712.20
112		Grand Total			\$ 548,434.44

In addition, to the left of the row numbers, we see the numbers 1, 2, 3. These represent the detail levels of our subtotal feature. At level 3 (shown above), we see the Company subtotal and all of the individual records which comprise the subtotal. If we click level 2, our spreadsheet will display only the Company name and subtotal lines, useful if you need a summary of just company totals. At level 1, we would only see the Grand Total of the list, not usually very useful.

VLOOKUP

The VLOOKUP function is used to return a value based on another cell's value. The function will look up the value you specify in a table (array) of cells and return a value you specify in the same row of the table. Remember, in an earlier class we used the nested IF function, to test a value and return another value, however, we stated that the nested IF can only go seven levels deep, so we would use the VLOOKUP if we had several values levels to set.

In our example, we looked up tax rates based on gross income from our salespeople. Use the VLOOKUP tab in our example file to practice. Our tax rate table was listed separately in cells I8 through K27. We calculated our salesperson bonus, using the IF statement, then added the bonus to the sales for their gross income. We then used the **VLOOKUP** to calculate the tax amount based on their gross income.

The formula we used was **=VLOOKUP(E8,I8:K27,3)** where **E8** was the gross income to look up in the first column of the table, **I8:K27** was the table array (our tax rate table), and **3** was the column number in the table of the value we wished to return (in this case column 3 of the table contained our tax rate).

So our VLOOKUP function will look at the gross income amount in E8, then go down the values of the first column of our tax table until it finds the corresponding value range, then it will return whatever percentage rate is on that same row in the third column (tax rate).

Remember, the information in your table needs to be sorted in order in order for the function to return the proper value because it just goes down the first column looking for a value that is not greater than the value you selected.

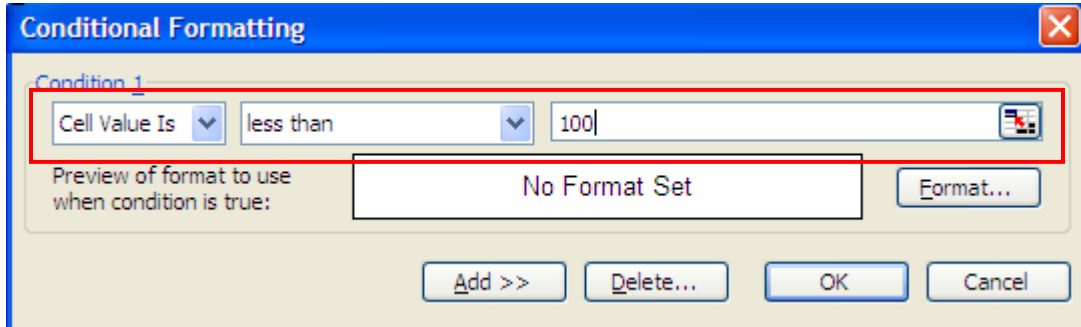
	B	C	D	E	F	G	H	I	J	K
7		Sales	Bonus	Gross Income	Tax Rate	Taxes		Tax Table		
8	Anne Smith	\$ 10,000.00	\$ -	\$ 10,000.00	9.5%	\$ 950.00		0	2500	8.0%
9	George Jones	\$ 12,537.00	\$ -	\$ 12,537.00	10.5%	\$ 1,316.39		2501	5000	8.5%
10	Barbara Mandrell	\$ 55,785.00	\$ 1,000.00	\$ 56,785.00	17.5%	\$ 9,937.38		5001	7500	9.0%
11	Tanya Tucker	\$ 32,451.00	\$ 1,000.00	\$ 33,451.00	14.5%	\$ 4,850.40		7501	10000	9.5%
12	Dolly Parton	\$ 18,541.00	\$ -	\$ 18,541.00	11.5%	\$ 2,132.22		10001	12500	10.0%
13	Linda Ronstadt	\$ 19,542.00	\$ -	\$ 19,542.00	11.5%	\$ 2,247.33		12501	15000	10.5%
14	Jackson Browne	\$ 21,854.00	\$ -	\$ 21,854.00	12.0%	\$ 2,622.48		15001	17500	11.0%
15	Emmylou Harris	\$ 42,584.00	\$ 1,000.00	\$ 43,584.00	16.5%	\$ 7,191.36		17501	20000	11.5%
16	Stevie Nicks	\$ 27,568.00	\$ 1,000.00	\$ 28,568.00	13.5%	\$ 3,856.68		20001	22500	12.0%
17	Barbara Streisand	\$ 29,458.00	\$ 1,000.00	\$ 30,458.00	14.0%	\$ 4,264.12		22501	25000	12.5%
18								25001	27500	13.0%
19								27501	30000	13.5%
20								30001	32500	14.0%
21								32501	35000	14.5%
22								35001	37500	15.0%
23								37501	40000	15.5%
24								40001	42500	16.0%
25								42501	45000	16.5%
26								45001	50000	17.0%
27								50000		17.5%

TAX VALUES USED FOR THE TABLE
ARRAY TO RETURN THE TAX RATE
BASED ON THE GROSS INCOME

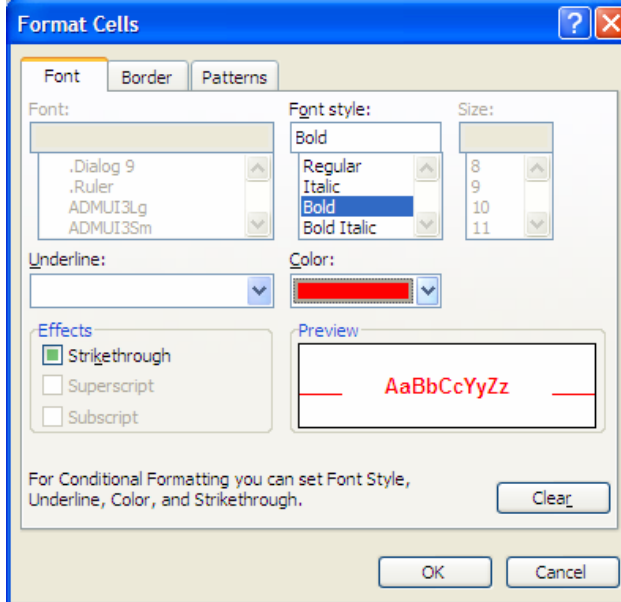
CONDITIONAL FORMATTING

Conditional Formatting is used to format cells based on their value. For example, in our Qtr 1 Tab, I applied a conditional format which will display any values less than \$100 as Red.

To apply a conditional format, highlight the cells you want the conditional format to apply to. Click **FORMAT** in the menu bar and select **CONDITIONAL FORMATTING....** This will open the Conditional Formatting dialogue window.



Select the conditions you want Excel to test for. On the QTR 1 tab, I chose 'Cell Value Is', then selected 'Less Than' from the next drop down list, then entered '100' in the next field. This set my condition to where Excel will apply the selected format to all cells whose value is less than \$100.



Next, select the Formatting you wish to apply to these cells by clicking the 'Format....' Button in the Conditional Formatting dialogue window.

This will open the Format Cells dialogue window. Select the appropriate formats. For our example, I chose Bold and Red Color. Click OK to apply the Format selections.

Click OK in the Conditional Formation dialogue window.

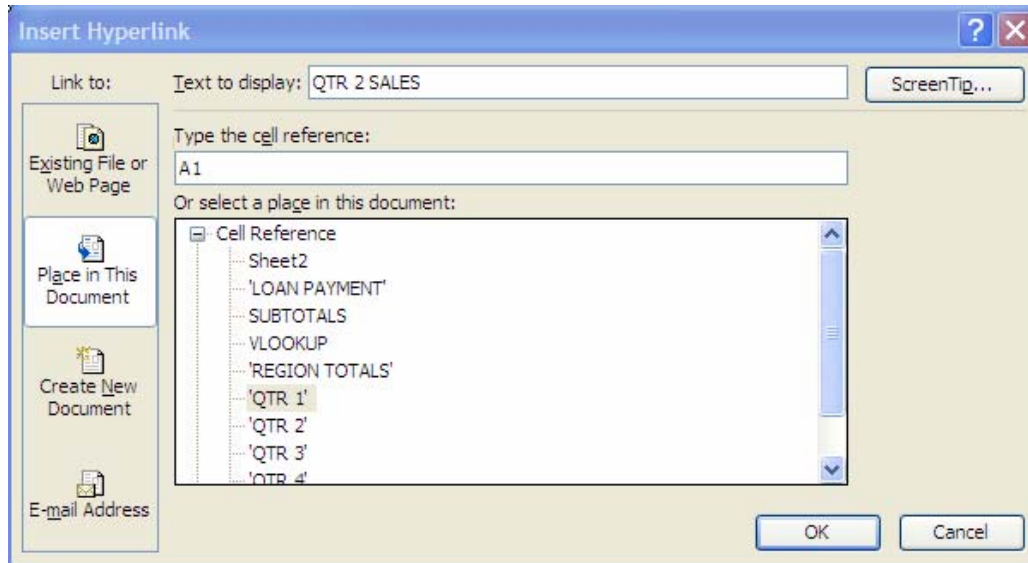
Any cells whose value is less than \$100 is now displayed in red. TRY IT!

PROD 4	PROD 5	PROD 6	PROD 7	PROD 8	PROD 9	PROD 10	PROD 11
\$ 586.00	\$ 720.55	\$ 842.97	\$ 677.79	\$ 913.00	\$ 205.62	\$ 828.02	\$ 62.29
\$ 326.98	\$ 248.69	\$ 557.08	\$ 995.55	\$ 576.62	\$ 96.31	\$ 510.41	\$ 431.96
\$ 57.36	\$ 970.10	\$ 786.11	\$ 993.10	\$ 615.56	\$ 794.26	\$ 224.39	\$ 956.76
\$ 267.40	\$ 357.38	\$ 254.16	\$ 87.60	\$ 50.78	\$ 330.84	\$ 244.48	\$ 379.22
\$ 742.14	\$ 486.50	\$ 76.89	\$ 96.99	\$ 8.33	\$ 105.81	\$ 867.78	\$ 654.51

HYPERLINKS

Hyperlinks create shortcuts or links to another cell, tab, file, etc. In our example, we linked the cells containing our QTR 1, 2, 3, and 4 Sales headings on the Regional Totals Tab to each of the individual QTR worksheets.

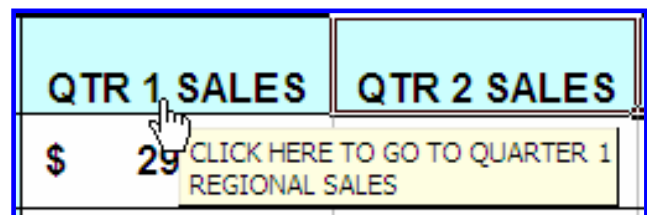
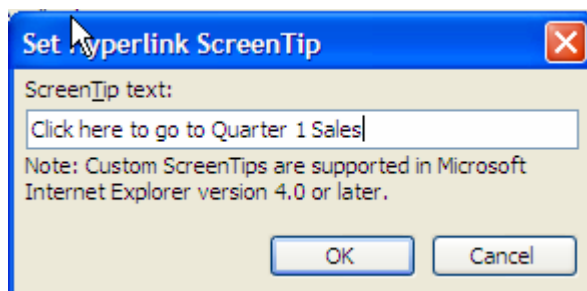
To insert a hyperlink to another work sheet, select the cell, click **INSERT** in the menu bar, select **HYPERLINK...** The Insert Hyperlink dialogue box will appear.



Choose '**Place in This Document**' on the Link to: navigation pane. The "Or select a place in this document:" field will display all the worksheet tabs in the current workbook. **Click the corresponding tab name. In our example we clicked ' QTR 1'.**

In the '**Text to display:**' field at the top of the dialogue box, enter what you want to display or appear in the selected cell with the hyperlink.

You may also add a **Screen Tip** by clicking the ScreenTip... button in the dialogue box. Type the message you want to display as a screen tip. The screen tip will display when the user hovers the mouse over the cell with the hyperlink.



RESULT: When someone clicks on cell C3, our QTR 1 SALES heading, they will be taken to the QTR 1 worksheet to view all of Quarter 1 details.

NOTE: The hyperlinked text to display will appear in the cell as a hyperlink (blue underlined text). You must format it if you want it to appear as normal text.

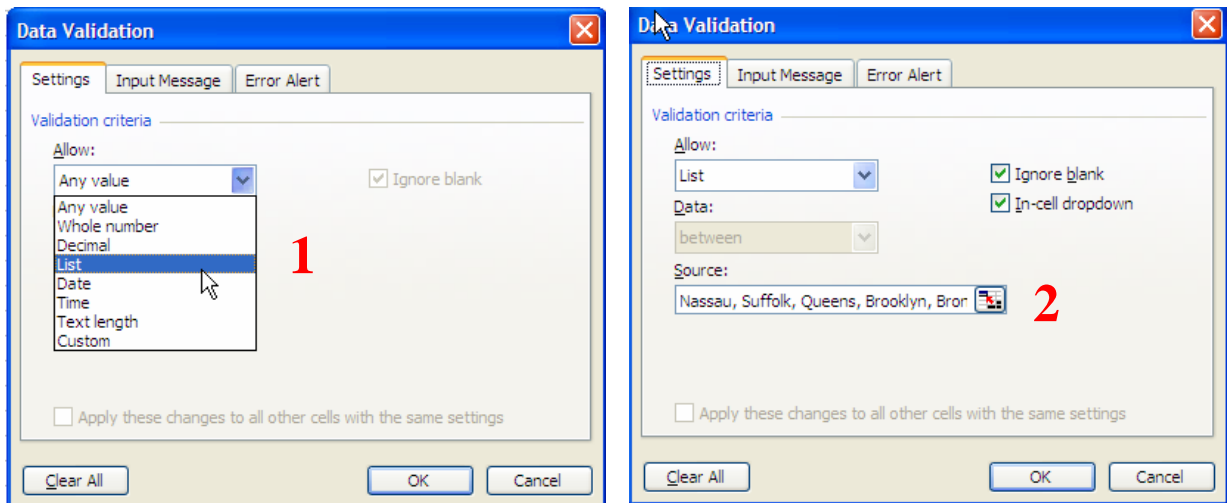
DATA VALIDATION

Data Validation is used when you want to be sure a user will only enter specific values in a cell. This is helpful when you have formulas that test for or count specific values. By using the Data Validation feature you can make certain that each user enters the value exactly the same so the resulting formula calculations will be accurate.

For example, one user may enter QTR 1, another may type Quarter 1, and another may type Quarter One. If a formula was used to look for the values based on QTR 1, then the other entries would not be counted. By using a Data Validation list you can have the user select from a list of values in a drop down list. This insures that any formulas using that field value will be accurate. Another use is to limit or confine the entry to a specific list.

Let's say I want the Location column of a worksheet to be limited to Nassau, Suffolk, Queens, Brooklyn, Bronx, Manhattan, or Staten Island only. I would create a data validation list for the cells in that column. **Use the DATA VAL worksheet in our file.**

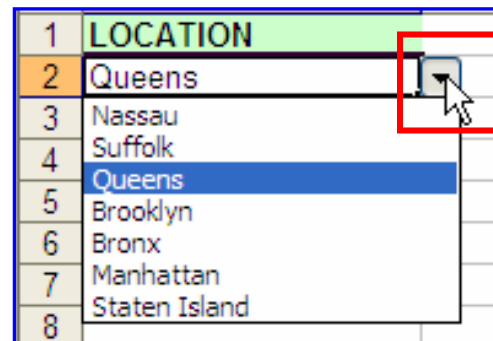
To create a data validation list, select the cell or cells, click **DATA** in the menu bar and select **Validation**. The Data Validation dialogue box appears.



On the Setting tab, enter the validation criteria. For our example, we want to choose **LIST** from the Allow: drop down box list (1). Then in the source field, type the required list of values: *Nassau, Suffolk, Queens, Brooklyn, Bronx, Manhattan, Staten Island*, using commas to separate the values. (2) (NOTE: You can also type your list in a column and then select those cells for the source field) Click OK.

Your cell will now display a small black arrow when clicked on, indicating that a drop down list exists for that cell. The user clicks on the arrow and selects a value from the list which you defined.

If the user attempts to type something other than a choice in the list, they will receive an error message.



ABSOLUTE CELL VALUES

We discussed **RELATIVE** cell reference in class 2. We found that when we copied our formula to other cells, Excel used relative cell reference to adjust the formula relative to where we copied it. In class 2, we entered a formula using the SUM function in our first row and copied it down to all other rows. We saw the Excel entered the SUM formula into all the selected cells, however, changed the row number in each formula relative to the row it was being copied to. For example, our first formula was **=SUM(B2:E2)**. When we copied this to the remaining rows, the formula was adjusted to **=SUM(B3:E3)**, then on the next row, **=SUM(B4:E4)**, etc. This relative cell reference allowed us to easily copy formulas to other cells.

There will be times when we want to copy an existing formula to other cells and **NOT** have certain cells in the formula change as we copy it. **This is where we use ABSOLUTE CELL REFERENCE.** By making a portion of the formula Absolute, this portion of the formula will not change as we copy the formula to other cells...it will remain absolute.

Please use the ABSOLUTE worksheet in our practice file.

In our example, we are going to calculate our annual employee salary budget for the upcoming year based on the projected salary increase percentage. We will place our Projected Salary Increase percentage in a separate cell and use this percentage to project our salary budget for next year. By using this method, we can easily adjust the projected increase and all new salary totals will be updated.

We enter our first formula in cell C4 to calculate the new 2007 Salary Increase for employee Mary Jones. Normally our formula for her 2007 increase amount would be **=B4*B1**. Her current salary in B4 times our projected increase in cell B1. The result shows us \$3449.54 in cell C4.

If we copy this formula down to all the other employees, we will receive some errors and some incorrect amounts as you can see in the example below. Try it!

	A	B	C	D
1	PROJECTED SALARY BUDGET INCREASE	4.675%		
2				
3	EMPLOYEE	2006 SALARY	2007 INCREASE	2007 SALARY
4	Mary Jones	\$ 73,787.00	\$ 3,449.54	\$ 77,236.54
5	Paul Smith	\$ 64,605.00	\$ -	
6	Barbra Waters	\$ 39,672.00	#VALUE!	
7	John Jamison	\$ 42,903.00	\$ 3,165,683,661.00	
8	Susan Lee	\$ 94,524.00	\$ 6,106,723,020.00	
9	Carly Jones	\$ 80,252.00	\$ 3,183,757,344.00	
10	Ramona Brown	\$ 71,311.00	\$ 3,059,455,833.00	
11	Kathy Lee	\$ 96,813.00	\$ 9,151,152,012.00	

The reason we received all these incorrect results was because when we copied the original formula of =B4*B1 down, Excel used Relative Cell reference.

Therefore, the resulting formula in cell C5 became =B5*B2, then in cell C6 the resulting formula would be =B6*B3, then in C7, the resulting formula would be =B7*B4, etc. The original formula changed relative to where it was copied to. This is obviously incorrect.

What we need to do is make the Projected Salary Increase an absolute in our formula. This way when we copy it down to the other employees, the projected salary increase percentage in cell B1 is always used.

Our original formula in cell C4 was **=B4*B1**

To make the Projected Salary Increase cell an absolute, we click on cell C4 to select the cell with the original formula. Now, in the formula bar, click in B1. You will see your insertion point appear in B1 of the formula.

	A	B	C	D
1	PROJECTED SALARY INCREASE	4.675%		
2				
3	EMPLOYEE	2006 SALARY	2007 INCREASE	2007 SALARY
4	Mary Jones	\$ 73,787.00	=B4*B1	\$ 77,236.54
5	Paul Smith	\$ 64,605.00		

Now that the insertion point is located in the cell we want to make an absolute value, press the **F4** key on your key board. You will see that Excel will add \$ in front of the B and in front of the 1. This will make cell B1 and absolute in this formula. The formula will now be **=B4*\$B\$1**. Press the **ENTER** key to accept this.

Now copy the formula down to our other employees. As you can see below, the result will be accurate this time because as we copied the formula to other cells, Excel kept the Projected Salary Increase (cell B1 in the formula) constant (absolute) and only changed the first part of our formula, the employees current salary (cell B4) relative to each row the formula was copied to.

	A	B	C	D
	PROJECTED SALARY INCREASE	4.675%		
2				
3	EMPLOYEE	2006 SALARY	2007 INCREASE	2007 SALARY
4	Mary Jones	\$ 73,787.00	\$ 3,449.54	\$ 77,236.54
5	Paul Smith	\$ 64,605.00	\$ 3,020.28	
6	Barbra Waters	\$ 39,672.00	\$ 1,854.67	
7	John Jamison	\$ 42,903.00	\$ 2,005.72	
8	Susan Lee	\$ 94,524.00	\$ 4,419.00	
9	Carly Jones	\$ 80,252.00	\$ 3,751.78	
10	Ramona Brown	\$ 71,311.00	\$ 3,333.79	
11	Kathy Lee	\$ 96,813.00	\$ 4,526.01	

So the original formula of **=B4*\$B\$1** in cell C4 was copied down and the resulting formula in cell C5 was **=B5*\$B\$1**, and in cell C6 the resulting formula was **=B6*\$B\$1**, In cell C7 the resulting formula was **=B7*\$B\$1**, etc. Cell B1 was an absolute (by adding the \$ signs) and remained the same in each formula as it was copied to other cells.