EXCEL 2002 (XP)

FOCUS ON: ADVANCED FUNCTIONS

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FOCUS ON: ADVANCED FUNCTIONS

LESSON 1 -
USING OTHER FUNCTIONS

In this lesson, you will learn how to:

- Use function arguments
- Use financial functions
- Use logical functions
- Use date functions
- Format dates
- Revise formulas

USING FUNCTION ARGUMENTS

Discussion

Excel functions serve as shortcuts for worksheet computations. A function is a prewritten formula that takes one or more values, performs an operation on them, and returns a value. Functions simplify and shorten formula creation by performing lengthy or complex calculations with a single command.

The values that a function uses to perform a calculation are called arguments. Arguments can consist of cell addresses, values, text, cell names, or a combination thereof. Other functions can also be used as arguments; this is known as nesting functions.

Functions require a set of parentheses around the function itself. More complex functions may also require additional sets of parentheses around the arguments within it. No matter how many sets of parentheses are included in a function, they must always appear in pairs; if you include an opening parenthesis without a matching closing parenthesis or vice versa, Excel cannot calculate the function and will display an error message.

The syntax of a function is its required structure; if the syntax of a function is not correct, Excel cannot perform the calculation. The basic function syntax requires an equal sign (=), the function name, the opening parenthesis, the required arguments, and the closing parenthesis.

The Insert Function dialog box provides an easy and accurate method of creating a function containing several arguments. This dialog box allows you to browse functions and view an explanation of each one. When you select a function, the Function Argument dialog box opens and guides you in creating the function arguments in their proper order.

	Text can be used as a function argument. When text is used in a function, it must be enclosed in quotation marks.

	Function tooltips are provided to help you in creating functions. A function tooltip displays the function syntax and appears as soon as you type the equal sign, the name of the function, and the opening parenthesis.

USING FINANCIAL FUNCTIONS

Discussion

Excel organizes its functions into categories. The **Financial** category includes a large number of functions that can be used to create calculations such as the payment on a loan, the interest rate on an investment or loan, the interest payment on an investment over time, and the future value of an annuity or investment.

Financial function arguments must be entered in the proper order. Most financial functions include required arguments and additional optional arguments. The definitions of some common financial functions and the syntax of their required arguments are listed in the following table:

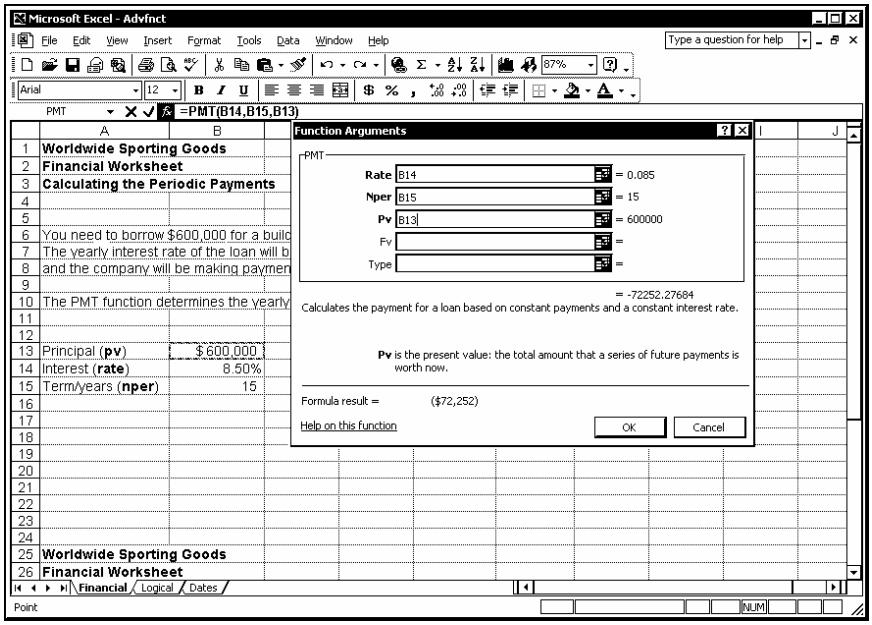
Function	Syntax
PMT (Payment) calculates the payment on a loan, such as a mortgage, based on a constant interest rate payment.	=PMT(rate,nper,pv)
FV (Future Value) calculates the value an annuity will be worth given a series of payments invested at an interest rate over a specified period.	=FV(rate,nper,pmt)
PV (Present Value) calculates the current value of a series of payments.	=PV(rate,nper,pmt)
RATE calculates the interest rate of periodic payments to an annuity or loan.	=RATE(nper,pmt,pv)

Some of the common arguments required by financial functions are defined in the following table:

Arguments	Definition
rate	The amount of interest charged yearly for a loan or investment. The interest can be entered as a decimal or percentage. For example, 10% can be entered as 0.1 or 10%.
nper	The number of payments it will take to repay the loan or investment.
pv	The value an annuity is worth at the present time if a series of future payments are made. In the case of a loan, this would be the full amount of the loan. You should be careful not to include a comma in the amount.

Arguments	Definition
fv	The value that an annuity will be worth in the future after the last payment has been made. You should be careful not to include a comma in the amount.
pmt	A fixed payment made each period.

The entries for **rate** and **nper** should be in consistent units. When calculating the payment on a loan of $170,000 at 10% annual interest over 30 years, the result of the function **=PMT(10%,30,170000)** is payments of approximately $18,000 per year. To calculate the monthly payments, divide the interest rate by 12 and multiply the number of payment periods by 12. The result of the function **=PMT(10%/12,30*12,170000)** is payments of approximately $1,500 per month.



Creating a financial function

Procedures

1. Select the cell into which you want to enter the formula.
2. Click the **Insert Function** button on the formula bar.
3. Select the **Or select a category** list.
4. Select **Financial**.
5. Select the desired function from the **Select a function** list box.

6. Select **OK**.
7. Select the cell or type the value for the first argument.
8. Continue entering arguments as necessary.
9. When you have finished entering arguments, select **OK**.

USING LOGICAL FUNCTIONS

Discussion

Logical functions make decisions based on criteria. If the criteria evaluates to false, one action is taken; if the criteria evaluates to true, a different action is taken. This decision-making capability makes logical functions one of the most powerful groups of functions in Excel.

Logical functions can be applied to many different situations. For example, if a salesperson meets his or her quota, he or she can get a bonus in addition to his or her regular commission. You can use a logical function to test whether or not the sales are greater than the quota. If the sales are greater, the function adds the bonus to the commission; if not, the bonus is not added to the commission.

The **IF** function returns one value if a condition is true and another value if a condition is false. For example, you can compare the values of goods shipped to a customer. If a shipped value is greater than a set figure, the customer receives a discount. If a shipped value is less than a set figure, the customer does not receive a discount.

You can also use the **IF** function to display text as a result of a logical test, but you must enclose the text in the formula in quotation marks.

The syntax of an **IF** function is:

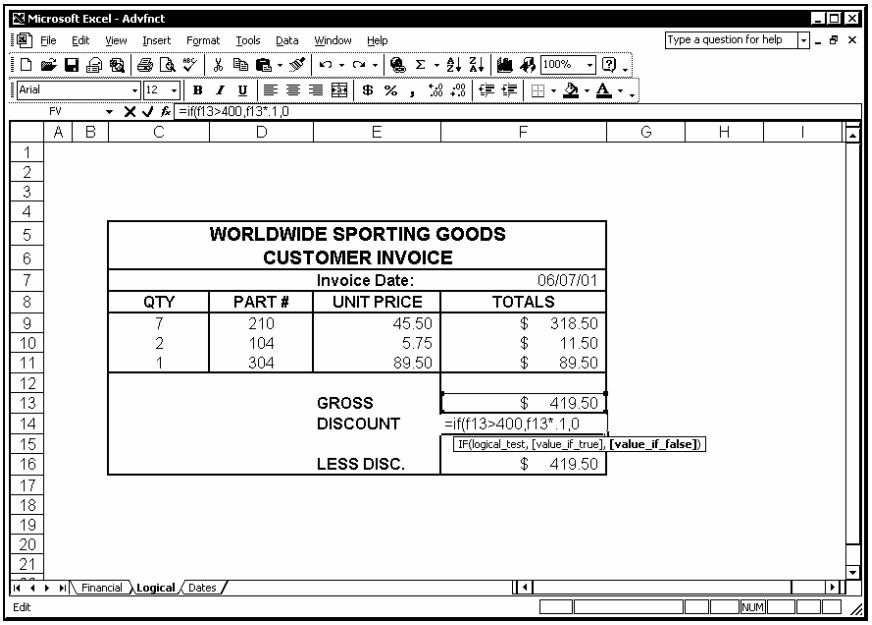
=IF(logical test,value if true,value if false)

The **IF** function arguments are described in the following table:

Component	Description
logical test	This component is the test condition. It can contain cell references, text in quotes, cell names, and numbers. You can use one or more of the following comparison operators: = equal to <> not equal to > greater than >= greater than or equal to < less than <= less than or equal to
value if true	The result produced if the logical test is true. It can be a number, formula, cell reference, cell name, text in quotes, or another function.
value if false	The result produced if the logical test is false. It can be a number, formula, cell reference, cell name, text in quotes, or another function.

Some examples of the **IF** function are listed in the following table:

IF Function	Result
=IF(B7>10,C7*.1,0)	The function tests if the number in cell B7 is greater than 10. If this is true, the number in cell C7 is multiplied by 0.1 and the result is entered into the current cell. If it is not true, a zero is entered into the current cell.
=IF(B7<>10,"GOOD","NO GOOD")	The function tests if the number in cell B7 is not equal to 10. If this is true, the text **GOOD** is entered into the current cell. If the number in cell B7 is equal to 10, the text **NO GOOD** is entered into the current cell.



Creating an IF function

If you want a function to display a blank cell as the result of either the true or false argument, you can enter two quotation marks with no intervening text (**“”**). For example, if you use the function, **=IF(B6>10,"GOOD","")**, no message will display if cell B6 is not greater than 10.

Procedures

1. Select the cell where you want the result of the **IF** function to appear.
2. Type **=if** and an open parenthesis (**(**).
3. Type the logical test.
4. Type a comma (**,**) to separate the arguments.
5. Type the action to be taken if the logical test is true.
6. Type a comma (**,**) to separate the arguments.
7. Type the action to take if the logical test is false.
8. Type a closing parentheses (**)**).
9. Press **[Enter]**.

USING DATE FUNCTIONS

Discussion

When you enter a date into a cell, Excel formats the date and stores it as the serial number that represents that date on the calendar. Excel treats dates as numbers so that it can perform calculations on them, such as determining how many days a bill is past due.

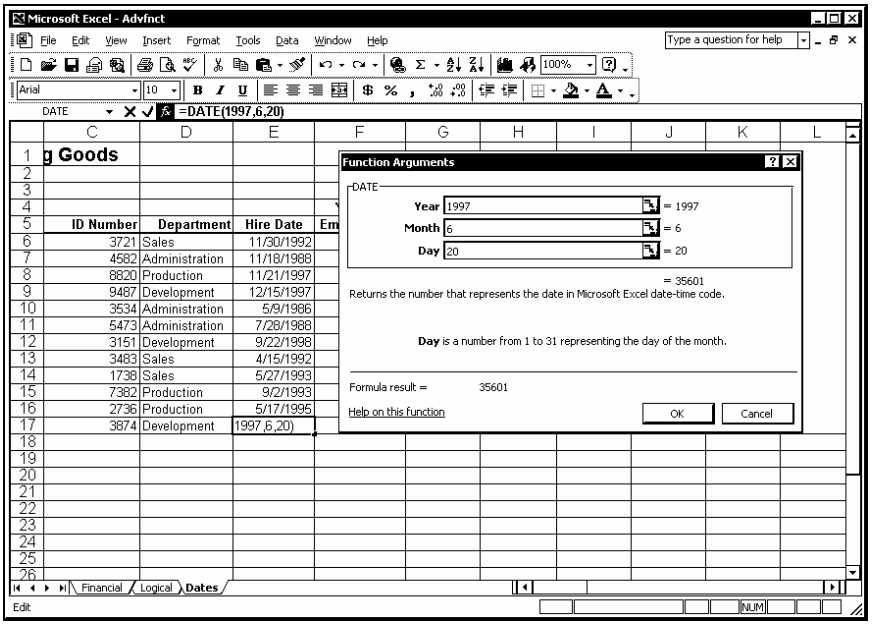
You can either type a specific date into a worksheet or use a date function to enter a date. For example, you can enter the same date by typing **2/20/99** or by entering the function **=DATE(1999,2,20)**. The date function is often used when the year, day, and month information already exist in separate cells in the worksheet.

Excel also provides a date function that inserts the current date as a field that automatically updates each time you open the workbook. Some formulas require an updated current date to increment. For example, to calculate a person's age, you need two dates: the birth date and the current date. The birth date is an absolute date, since that date cannot change. The current date, however, would have to change each day for the formula to calculate the result correctly.

Similarly, to calculate how many days a bill is past due, you also need two dates: the date when the bill was due and the current date. The date when the bill was due is an absolute date, since that date does not change. The current date, however, would have to change each day for the formula to calculate the result correctly .

The most commonly used date functions are described in the following table:

Function	Description
=DATE(year,month,day)	The DATE function is used to enter a specific date into a cell. You enter the number of the month, day, and year as the arguments. You can also reference cell addresses, if one or more arguments are stored in a cell.
=TODAY()	The TODAY function displays the current date in a date format. This function does not use arguments. The serial number for this function is a whole number.
=NOW()	The NOW function displays the current date and time in a date format. This function does not use arguments. The serial number for this function displays the time of day as a decimal.



Creating a DATE function

> If you type a year between 1900 and 1929 as two digits, Excel assumes that the date is in the 21st century. Therefore, typing 2/13/25 returns the serial number for the date 2/13/2025. You must type all four digits to designate any years between 1900 and 1929.

> You can also calculate time of day values. Time of day values can be formatted using the **Time** category on the **Number** page in the Format Cells dialog box.

Procedures

1. Select the cell into which you want to enter the formula.
2. Click the **Insert Function** button on the formula bar.
3. Select the **Or select a category** list.
4. Select **Date & Time**.
5. Select the desired function from the **Select a function** list box.
6. Select **OK**.
7. Type the value or select the cell for the first argument.

8. Continue entering arguments as necessary.
9. When you have finished entering arguments, select **OK**.

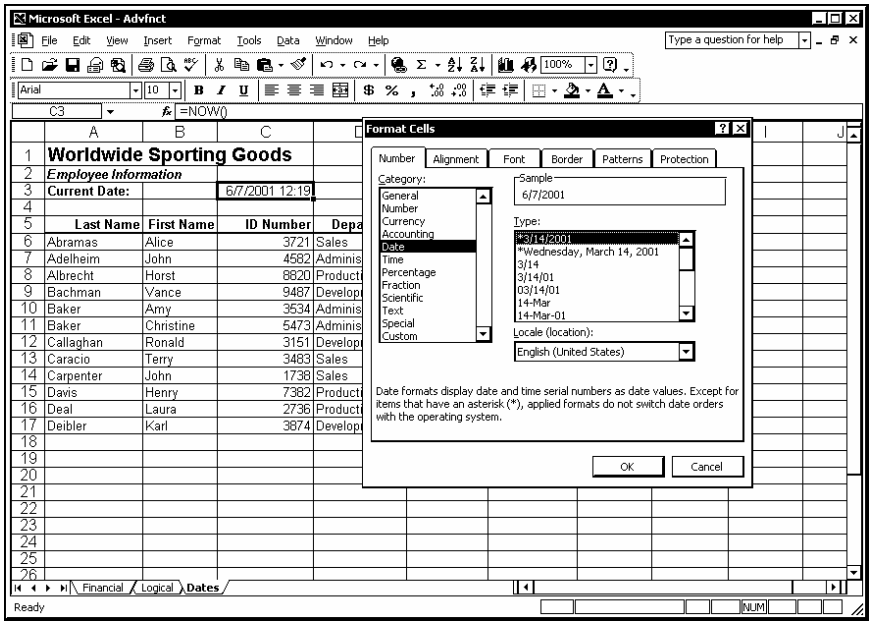
FORMATTING DATES

Discussion

The default formatting used by Excel for dates, times, currency, and numbers is a Windows function controlled by the Regional Options dialog box in Windows 2000, or the Regional Settings Properties dialog box in Windows 95/98.

If the default short date format for your system is **M/d/yy**, then Excel uses this format for dates and only displays the last two digits of the year. Therefore, even if you type 3/11/2001 into a cell or use the DATE function **=DATE(2001,3,11)**, the cell displays **3/11/01**. If you want to display all four digits of the year in a date, you can either change the default system format or format the worksheet cell containing the date.

In addition to the short date format, there are many other preset formats available on the **Number** page of the Format Cells dialog box.



Formatting a date

> You can change your default system settings by opening the Control Panel and selecting the **Regional Options** (Windows 2000) or **Regional Settings** (Windows 95/98) icon.

Procedures

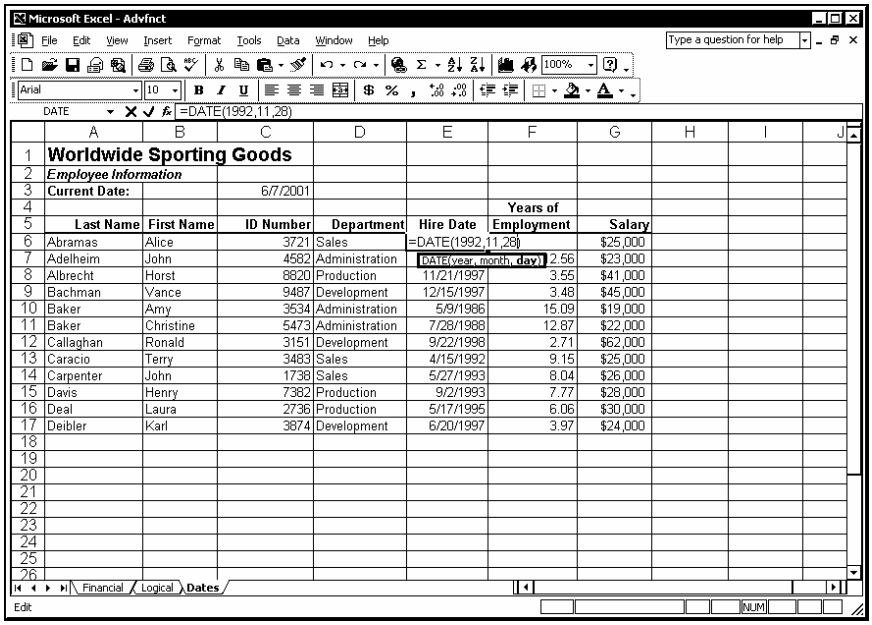
1. Select the cells you want to format.
2. Select the **Format** menu.
3. Select the **Cells** command.
4. Select the **Number** tab.
5. Select **Date** from the **Categories** list box.
6. Select the desired format from the **Type** list box.
7. Select **OK**.

REVISING FORMULAS

Discussion

You can revise a formula or function in the same manner you would edit any cell. You can modify the cell addresses, arguments, operators, or even the name of the function used. Formulas are often revised to create an absolute reference for one or more cell addresses. Revising a formula is usually more efficient than creating the formula again.

You can revise a formula in the formula bar or in the cell itself, using standard word processing methods. When you edit a function, a tooltip appears. You can use the tooltip to quickly select the text of the argument you want to edit.



Revising a formula

> You can also use the **Insert Function** button on the formula bar to edit a function.

Procedures

1. Double-click the cell containing the formula you want to revise.
2. Click the argument you want to edit in the tooltip, or select the formula text you want to revise.
3. Revise the text as desired.
4. When you have finished revising the formula, press **[Enter]**.

LESSON 2 -
USING ADVANCED FUNCTIONS

In this lesson, you will learn how to:

- Use lookup functions
- Use the VLOOKUP function
- Use the HLOOKUP function
- Use the IF function
- Use nested IF functions
- Use the ISERROR function
- Use an AND condition with IF
- Use an OR condition with IF
- Use the ROUND function
- Limit the precision of numbers

USING LOOKUP FUNCTIONS

Discussion

Lookup functions look up values in a lookup table and return a result based on those values. For example, if you need to look up the amount of a health insurance deduction based on an employee's salary and type of coverage, you can use a lookup function to look up the salary and the type of coverage and return the amount of the deduction.

Before you can use a lookup function, you must create the lookup table elsewhere in the workbook and enter the desired data. This table must be sorted in ascending order.

There are two lookup functions: vertical and horizontal. The VLOOKUP function expects the lookup value to be in the first column. The HLOOKUP function expects the lookup value to be in the first row. The remaining arguments in the lookup function specify the location of the table of information and the column in which to find the matching value.

USING THE VLOOKUP FUNCTION

Discussion

The VLOOKUP function consists of three required arguments, in the following order: lookup value, table array, and column index number. The lookup value is the value for which you want to find matching data and must appear in the first column of the lookup table; it can be a value, a text string, or a cell reference. The table array is the name or address of the lookup table. The column index number is the number of columns Excel must count over to find the matching value.

For example, you may have a parts table consisting of three columns, with the part numbers in column one and the prices in column three. To look up the price for a specified part number (lookup value), you would enter a column index value of **3**; Excel would then look for the lookup value in the first column of the parts table and return the value in the third column of the same row.

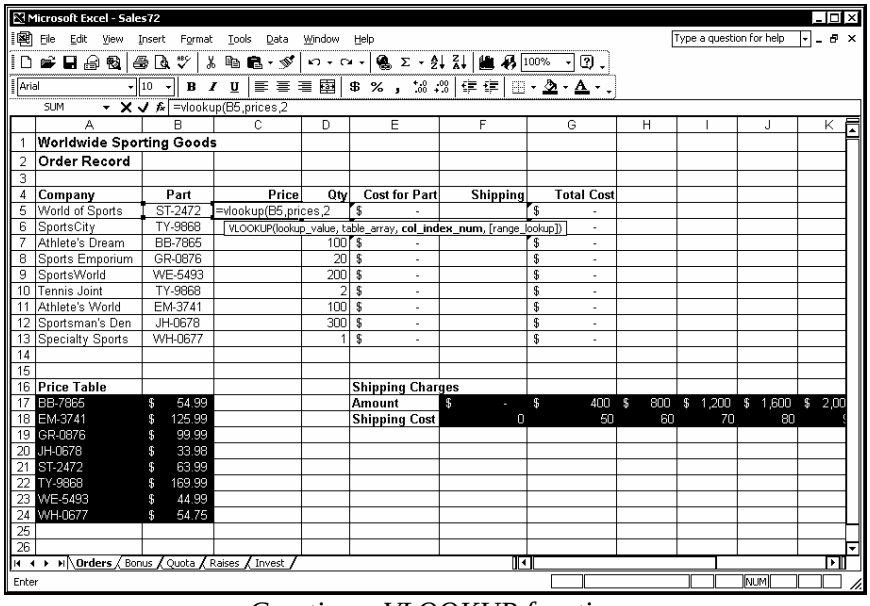
You might want to use the lookup table shown below and a column index number of **2** to look up the percent of commission to be paid to a salesperson, based on various sales levels. For example, if the sales figure you want to look up is 6000, the commission would be 6%; Excel finds the lookup value (6000) in the first column and returns the value in the second column of the same row.

	A	B
1	SALES	COMMISSION
2	1000	1%
3	2000	2%
4	3000	3%
5	4000	4%
6	5000	5%
7	6000	6%
8	7000	7%
9	8000	8%

The VLOOKUP function also has a optional fourth argument, range lookup, which can be either TRUE or FALSE. If the range lookup argument is FALSE, VLOOKUP will find only exact matches. If the range lookup argument is TRUE, or if a range lookup argument is not entered, VLOOKUP can find approximate matches. In this case, the lookup table must be sorted in ascending order by the first column in it; otherwise VLOOKUP may not return the correct value.

If the range lookup argument is TRUE or omitted and the lookup value does not appear in the first column of the lookup table, but falls between two values in it, Excel will use the lower of the two values. If the lookup value is smaller than any value in the first column of the lookup table, Excel returns an error message.

For example, using the lookup table shown above and a column index number of **2**, if the sales figure you look up is 5700, the commission would be 5%. Since Excel determines that 5700 is located between the numbers 5000 and 6000, it returns the value in the second column of the same row as the lower number.



Creating a VLOOKUP function

> In order to copy a VLOOKUP function to other cells, its table array argument must be an absolute reference. Since named ranges are always absolute references, you can assign a name to your lookup table and use that name in the VLOOKUP function.

Procedures

1. Select the cell in which you want the result of the VLOOKUP function to appear.
2. Type **=vlookup** and an open parenthesis (**(**).
3. Select the cell containing the value you want to look up.
4. Type a comma (**,**).
5. Type the name or address of the lookup table.
6. Type a comma (**,**).
7. Enter the column index number.
8. Type the closing parenthesis (**)**).
9. Press **[Enter]**.

USING THE HLOOKUP FUNCTION

Discussion

The HLOOKUP function consists of three required arguments, in the following order: lookup value, table array, and row index number. The lookup value is the value for which you want to find matching data and must appear in the top row of the lookup table; it can be a value, a text string, or a cell reference. The table array is the name or address of the lookup table. The row index number is the number of rows Excel must count down to find the matching value.

For example, you might have a lookup table consisting of two rows, with the total order amount in the top row and the corresponding shipping charge in the second row. To look up the shipping charge for a specified order amount (lookup value), you would enter a row index value of **2**; Excel would then look for the lookup value in the top row of the lookup table and return the value in the second row of the same column.

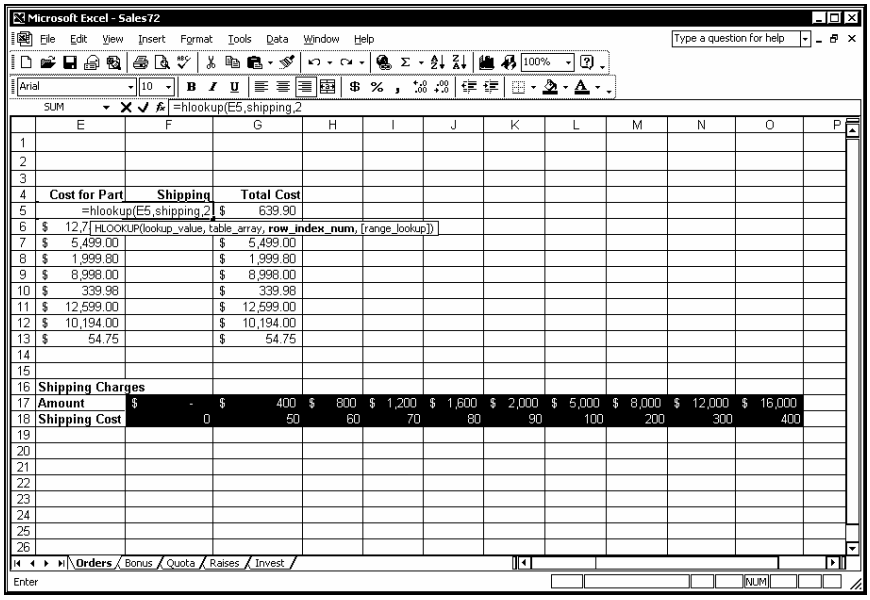
You might want to use the lookup table shown below and a row index number of **2** to look up the percent of commission to be paid to a salesperson, based on various sales levels. For example, if the sales figure you want to look up is 6000, the commission would be 6%; Excel finds the lookup value (6000) in the top row and returns the value in the second row of the same column.

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
1	1000	2000	3000	4000	5000	6000	7000	8000
2	1%	2%	3%	4%	5%	6%	7%	8%

The HLOOKUP function also has a optional fourth argument, range lookup, which can be either TRUE or FALSE. If the range lookup argument is FALSE, HLOOKUP will find only exact matches. If the range lookup argument is TRUE, or if a range lookup argument is not entered, HLOOKUP can find approximate matches. In this case, the lookup table must be sorted in ascending order by its top row; otherwise HLOOKUP may not return the correct value.

If the range lookup argument is TRUE or omitted and the lookup value does not appear in the top row of the lookup table, but falls between two values in it, Excel uses the lower of the two values. If the lookup value is smaller than any value in the top row of the lookup table, Excel returns an error message.

For example, using the lookup table shown above and a row index number of **2**, if the sales figure you look up is 5700, the commission would be 5%. Since Excel determines that 5700 is located between the numbers 5000 and 6000, it returns the value in the second row of the same column as the lower number.



Creating an HLOOKUP function

> In order to copy a HLOOKUP function to other cells, its table array argument must be an absolute reference. Since named ranges are always absolute references, you can assign a name to your lookup table and use that name in the HLOOKUP function.

> You can use the **Options** button in the Sort dialog box to sort a range by row.

Procedures

1. Select the cell in which you want the result of the HLOOKUP function to appear.
2. Type **=hlookup** and an open parenthesis (**(**).
3. Select the cell containing the value you want to look up.
4. Type a comma (**,**).
5. Type the name or address of the lookup table.
6. Type a comma (**,**).
7. Enter the row index number.
8. Type a closing parenthesis (**)**).
9. Press **[Enter]**.

USING THE IF FUNCTION

Discussion

Logical functions make decisions based on criteria. If the criteria evaluate to true, one action is taken; if the criteria evaluate to false, a different action is taken.

This decision-making capability of logical functions can be applied to many different situations. You can use a logical function to decide if a customer receives a discount for goods ordered. If an ordered value is greater than the specified amount, the customer receives a discount. If an ordered value is less than the specified amount, the customer does not receive a discount.

The IF function returns one value if a condition is true and another value if a condition is false. In the example above, if the value of the goods shipped is greater than the

specified amount, a true value would be returned. If the shipped value is less than the specified amount, a false value would be returned.

You can also use the IF function to display text as a result of a logical test, but you must enclose the text you want to display in quotation marks.

The syntax of an IF function is:

=IF(logical test,value if true,value if false)

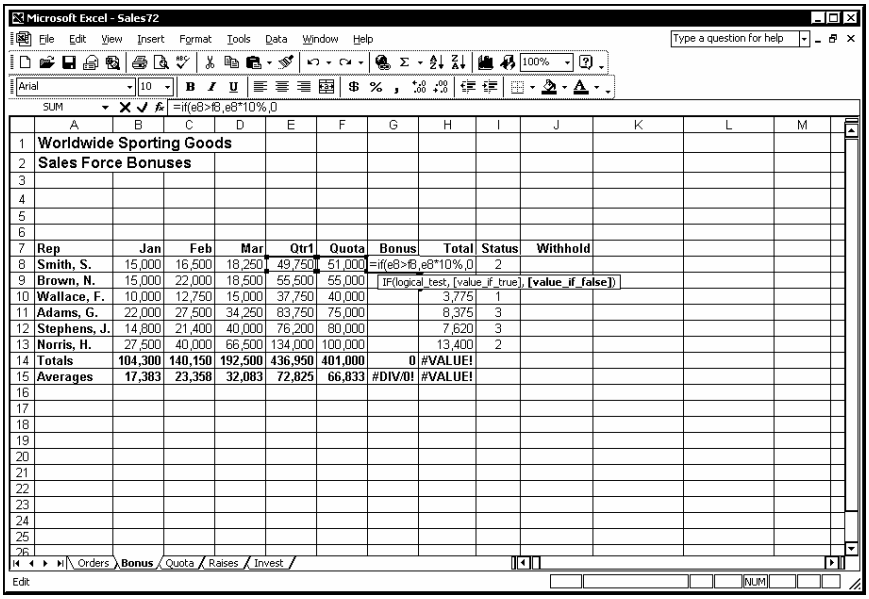
The function arguments are described in the following table:

Component	Description
logical test	The test condition. It can contain cell references, text in quotes, cell names, and numbers. The items are compared using the following comparison operators: = equal to <> not equal to > greater than >= greater than or equal to < less than <= less than or equal to
value if true	The desired result if the logical test is true. It can be a number, formula, cell reference, cell name, text in quotes, or another function.
value if false	The desired result if the logical test is false. It can be a number, formula, cell reference, cell name, text in quotes, or another function.

Some examples of the IF function are listed in the following table:

IF Function	Result
=IF(B7>10,C7*.1,0)	If the number in cell B7 is greater than 10, multiply the number in cell C7 by **.1**; otherwise, return the number 0
=IF(B7<=10,C7*.1,D7*.1)	If the number in cell B7 is less than or equal to 10, multiply the number in cell C7 by **.1**; otherwise, multiply the number in cell D7 by **.1**
=IF(B7<>10,"GOOD","")	If the number in cell B7 is not equal to 10, enter the text **GOOD** in the current cell; otherwise, leave the cell blank

IF Function	Result
=IF(B7="BONUS",C7+1000,C7)	If cell B7 contains the text **BONUS**, add 1000 to the number in cell C7; otherwise, enter the contents of cell C7



Creating an IF function

Procedures

1. Select the cell in which you want the result of the IF function to appear.
2. Type **=if** and an open parenthesis (**(**).
3. Type the logical test.
4. Type a comma (**,**).
5. Type the action to be taken if the logical test is true.
6. Type a comma (**,**).
7. Type the action to be taken if the logical test is false.
8. Type the closing parentheses (**)**).
9. Press **[Enter]**.

USING NESTED IF FUNCTIONS

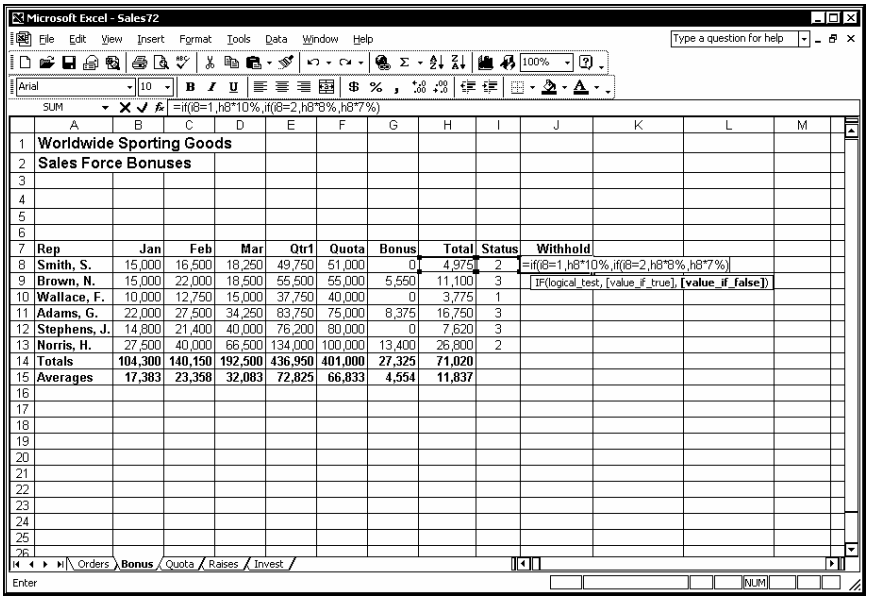
Discussion

You can use an IF function within another IF function to create a nested IF function. A nested IF function allows you to test for a second condition if the first condition is found false. For example, an IF function could test whether or not a number is equal to 1. If false, another IF function within the first could test whether or not the number is equal to 2.

The syntax of a nested IF function is:

=IF(logical test,value if true,IF(logical test,value if true,value if false))

You can create up to seven nested IF functions within an IF function.



	Rep	Jan	Feb	Mar	Qtr1	Quota	Bonus	Total	Status	Withhold
8	Smith, S.	15,000	16,500	18,250	49,750	51,000	0	4,975	2	=if(i8=1,h8*10%,if(i8=2,h8*8%,h8*7%)
9	Brown, N.	15,000	22,000	18,500	55,500	55,000	5,550	11,100	3	
10	Wallace, F.	10,000	12,750	15,000	37,750	40,000	0	3,775	1	
11	Adams, G.	22,000	27,500	34,250	83,750	75,000	8,375	16,750	3	
12	Stephens, J.	14,800	21,400	40,000	76,200	80,000	0	7,620	3	
13	Norris, H.	27,500	40,000	66,500	134,000	100,000	13,400	26,800	2	
14	Totals	104,300	140,150	192,500	436,950	401,000	27,325	71,020		
15	Averages	17,383	23,358	32,083	72,825	66,833	4,554	11,837		

Creating a nested IF function

> You must close all parentheses in a nested IF function; i.e., the number of open parentheses must equal the number of closing parentheses.

Procedures

1. Select the cell in which you want the result of the nested IF function to appear.
2. Type **=if** and an open parenthesis (**(**).
3. Type the first logical test.
4. Type a comma (**,**).
5. Type the action to be taken if the first logical test is true.
6. Type a comma (**,**).
7. Type **if** and an open parenthesis (**(**).
8. Type the logical test for the second IF function.
9. Type a comma (**,**).
10. Type the action to be taken if the logical test for the second IF function is true.
11. Type a comma (**,**).
12. Type the action to be taken if the second logical test is false.
13. Type two closing parentheses (**))**).
14. Press **[Enter]**.

USING THE ISERROR FUNCTION

Discussion

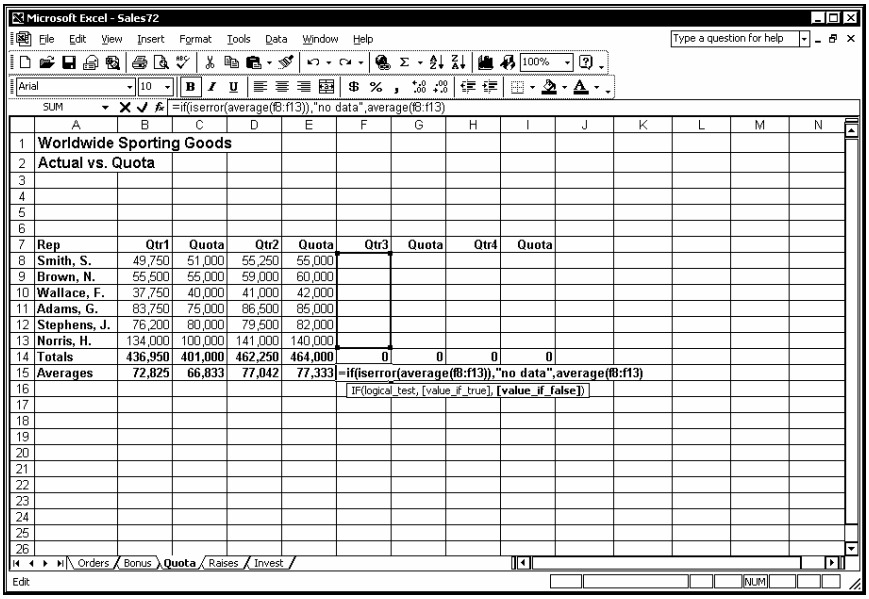
Depending upon the circumstances, a function may return an error message instead of performing the desired calculation. For instance, a function that averages a range will return a **#DIV/0!** error message if the range contains no data. The ISERROR function is commonly used within an IF function to handle errors messages returned by a formula.

The ISERROR function tests TRUE if any of the following error messages are returned by a formula: **#N/A**, **#VALUE**, **#REF**, **#DIV/0!**, **#NUM**, **#NAME?**, or **#NULL**. It tests FALSE if anything other than an error message is returned.

The ISERR function is similar to the ISERROR function, except that it does not respond to the error value **#N/A**.

The syntax of these functions is as follows, where **(value)** is a cell reference or range name:

ISERROR(value)
ISERR(value)



Using the ISERROR function

> If you are unsure of the contents of one or more cells on which the calculations are being made, you can use the ISERROR function because it provides a result regardless of the error condition.

Procedures

1. Select the cell in which you want the result of the IF function to appear.
2. Type **=if** and an open parenthesis (**(**).
3. Type the ISERROR function as the logical test.
4. Type a comma (**,**).
5. Type the action to be taken if the ISERROR function is true.
6. Type a comma (**,**).
7. Type the action to be taken if the ISERROR function is false.

8. Type the closing parenthesis (**)**).
9. Press **[Enter]**.

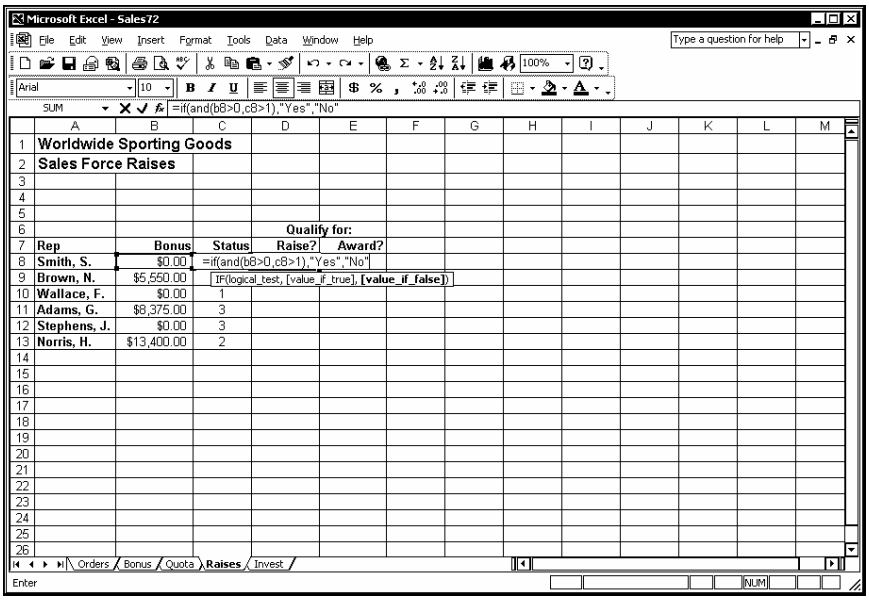
USING AN AND CONDITION WITH IF

Discussion

You can use **AND** conditions to test multiple criteria in IF functions. For example, you may want to give a salesperson a $500 bonus if he or she produces $10,000 in sales and has at least five years experience. This example represents an **AND** condition. When used in an IF function, an **AND** condition returns a TRUE value if both arguments are true and a FALSE value if either argument is false.

The syntax of an **AND** condition is:

=IF(AND(logical test1,logical test2),value if true,value if false)



Creating an AND condition in an IF function

Procedures

1. Select the cell in which you want the result of the IF function to appear.
2. Type **=if** and an open parenthesis (**(**).

3. Type the **AND** condition.
4. Type a comma (**,**).
5. Type the action to be taken if both conditions are true.
6. Type a comma (**,**).
7. Type the action to be taken if either condition is false.
8. Type a closing parenthesis (**)**).
9. Press **[Enter]**.

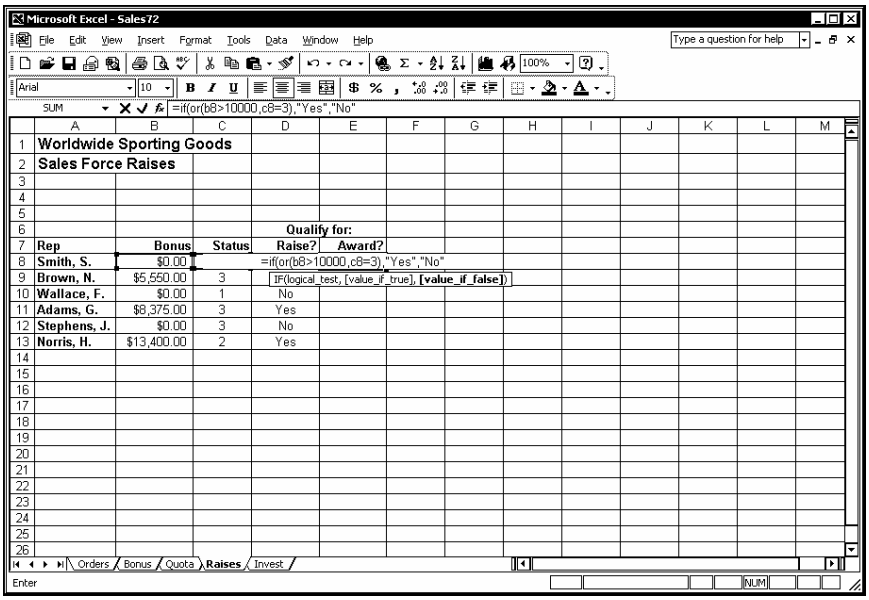
USING AN OR CONDITION WITH IF

Discussion

You can use **OR** conditions to test multiple criteria in IF functions. For example, you may want to give a salesperson a $500 bonus if he or she produces $10,000 in sales or if he or she has at least five years experience. This example represents an **OR** condition. When used in an IF function, the **OR** condition returns a TRUE value if either argument is true and a FALSE value if both arguments are false.

The syntax of an **OR** condition is:

=IF(OR(logical test1,logical test2),value if true,value if false)



Creating an OR condition in an IF function

Procedures

1. Select the cell in which you want the result of the IF function to appear.
2. Type **=if** and an open parenthesis (**(**).
3. Type the **OR** condition.
4. Type a comma (**,**).
5. Type the action to be taken if either of the conditions is true.
6. Type a comma (**,**).
7. Type the action to be taken if both conditions are false.
8. Type the closing parenthesis (**)**).
9. Press **[Enter]**.

USING THE ROUND FUNCTION

Discussion

When you enter a number into an Excel worksheet, Excel can store it with up to 15 digits. Although you can format numbers so that Excel rounds off extra decimal places, Excel uses all decimal places in calculations. This feature can lead to some calculations appearing incorrect.

Rounding a number is different than formatting a number. When you round a number to a certain number of decimal places, the extra decimal places are removed and all calculations are performed using the rounded value.

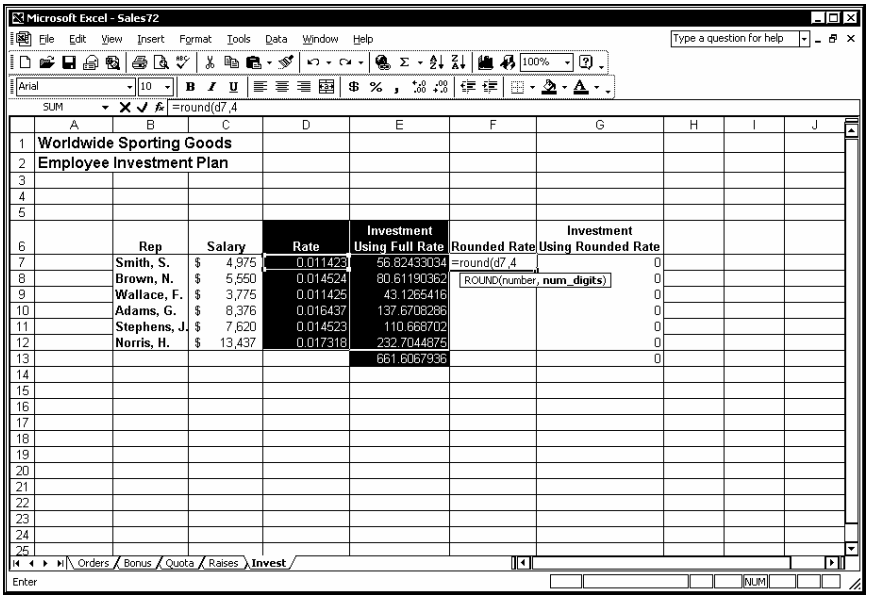
The ROUND function includes the following two arguments:

ROUND(number,number of digits)

The number argument can be a value or a cell address. The number of digits argument determines the precision of the rounded number. A positive number of digits argument returns an equal number of decimal places. If the number of digits argument is 0, Excel rounds to the next whole number. A negative number of digits argument rounds exponentially to the next ten, hundred, thousand, etc.

Some examples of the ROUND function are listed in the following table:

ROUND function	**Cell displays**
=ROUND(4567.4567,1)	4567.5 (one decimal place)
=ROUND(4567.4567,2)	4567.46 (two decimal places)
=ROUND(4567.4567,0)	4567 (no decimal places)
=ROUND(4567.4567,-1)	4570 (rounds to the nearest ten)
=ROUND(B7,2)	The value in cell B7 rounded to two decimal places
=ROUND(B7*.1,2)	The result of the number in cell B7 times **.1**, rounded to two decimal places



Creating a ROUND function

Procedures

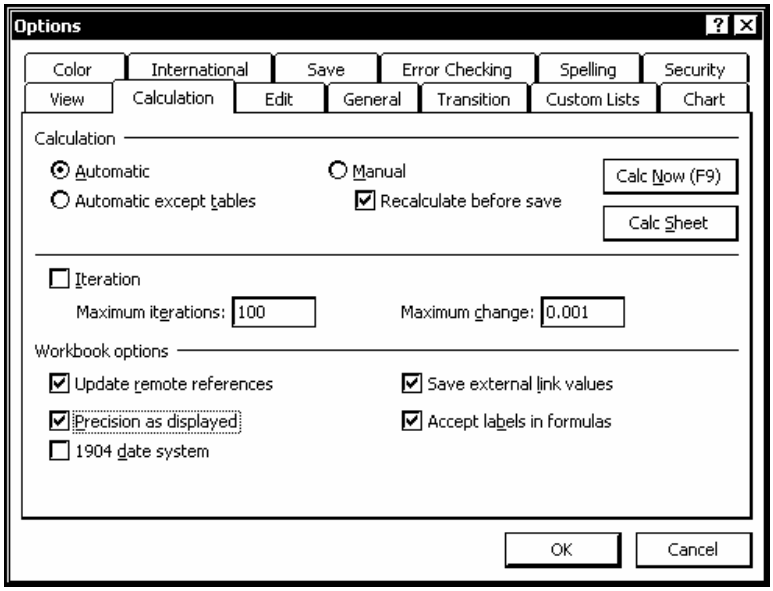
1. Select the cell in which you want the result of the ROUND function to appear.
2. Type **=round** and an open parenthesis (**(**).
3. Type the value, formula, cell address, or function you want to round, followed by a comma.
4. Type the desired number of decimal places.
5. Type the closing parenthesis (**)**).

6. Press **[Enter]**.

LIMITING THE PRECISION OF NUMBERS

Discussion

In order to calculate a worksheet using the numbers as they are displayed, you can limit the precision of formatted numbers. Limiting the precision changes the actual values in the worksheet to their formatted versions. For example, if a cell containing an actual value of 123.4567 is formatted with no decimal places, only 123 will display. In a calculation, however, Excel will still use 123.4567 (the entire number, including all decimal places). If you limit the precision of the cell to the formatted value, Excel will use only the formatted value (123) in calculations and will actually remove all decimal places in the stored number.



Limiting the precision of numbers

> Be careful when limiting the precision of numbers because you cannot undo it. You can, however, restore your original numbers if you immediately exit the worksheet without saving the changes.

Procedures

1. Select the **Tools** menu.
2. Select the **Options** command.
3. Select the **Calculation** tab.
4. Select the **Precision as displayed** option.
5. Select **OK**.
6. Select **OK**.

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