2 Mathematics and Formulas

In Hands-On Exercise 1, you created the basic worksheet for OKOS by entering text, values, and a date for items on sale this week. Now you need to insert formulas to calculate the missing results—specifically, the retail (before sale) value, sale price, and profit margin. You will use cell addresses in your formulas, so when you change a referenced value, the formula results will update automatically.

Skills covered: Enter the Retail Price Formula • Enter the Sale Price Formula • Enter the Profit Margin Formula • Copy Formulas with Auto Fill • Change Values and Display Formulas

STEP 1 ENTER THE RETAIL PRICE FORMULA

The first formula you need to create is one to calculate the retail price. The retail price is the price you originally charge. It is based on a percentage of the original cost so that you earn a profit. Refer to Figure 1.12 as you complete Step 1.

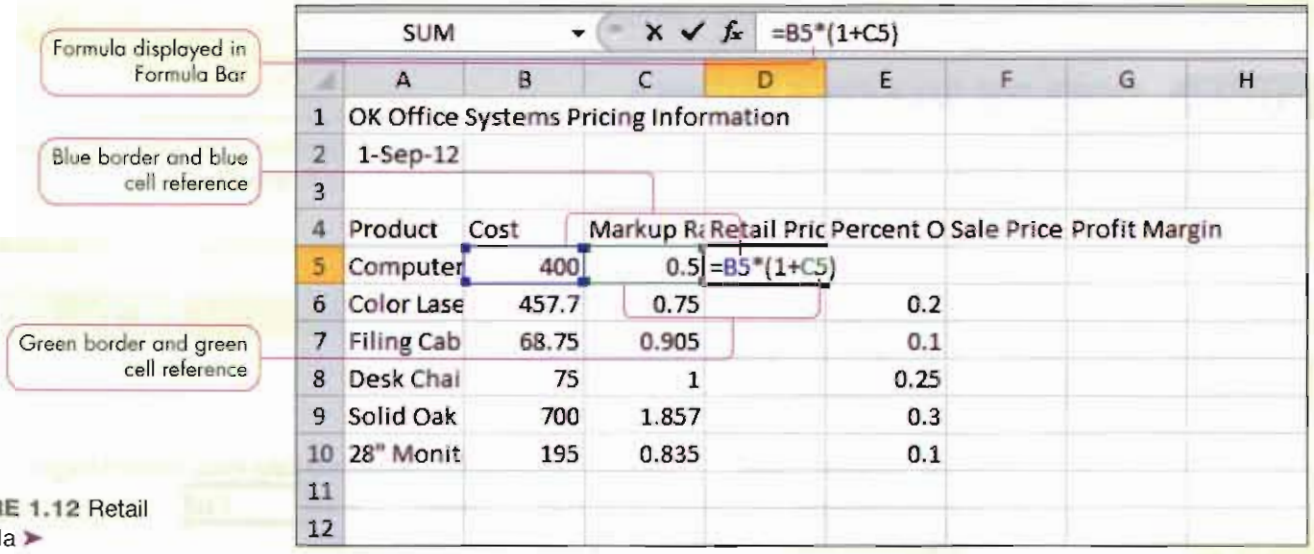


FIGURE 1.12 Retail Formula ➤

a. Open the *e01h1markup_LastnameFirstname* workbook if you closed it after the last Hands-On Exercise, and then save it as **e01h2markup_LastnameFirstname**, changing *h1* to *h2*.

TROUBLESHOOTING: If you make any major mistakes in this exercise, you can close the file, open *e01h1markup_LastnameFirstname* again, and then start this exercise over.

b. Click **cell D5**, the cell where you will enter the formula to calculate the retail selling price of the first item.

c. Type **=B5*(1+C5)** and view the formula and the colored cell borders on the screen.

As you type or edit a formula, each cell address in the formula displays in a specific color, and while you type or edit the formula, the cells referenced in the formula have a temporarily colored border. For example, in the formula =B5*(1+C5), B5 appears in blue, and C5 appears in green. Cell B5 has a temporarily blue border and cell C5 has a temporarily green border to help you identify cells as you construct your formulas (see Figure 1.12).

d. Click **Enter** to the left of the Formula Bar and view the formula.

The result of the formula, 600, appears in cell D5, and the formula displays in the Formula Bar. This formula first adds 1 (the decimal equivalent of 100%) to 0.5 (the value stored in cell C5). Excel multiplies that sum of 1.5 by 400 (the value stored in cell B5). The theory behind this formula is that the retail price is 150% of the original cost.

TIP Alternative Formula

An alternative formula also calculates the correct retail price: =B5*C5+B5 or =B5+B5*C5. In this formula, 400 (cell B5) is multiplied by 0.5 (cell C5); that result (200) represents the dollar value of the markup. Excel adds the value 200 to the original cost of 400 to obtain 600, the retail price. You were instructed to enter =B5*(1+C5) to demonstrate the order of precedence.

TROUBLESHOOTING: If the result is not correct, click the cell and look at the formula in the Formula Bar. Click in the Formula Bar, edit the formula to match the formula shown in step 1c, and then click Enter. Make sure you start the formula with an equal sign.

e. Save the workbook with the new formula.

STEP 2 ENTER THE SALE PRICE FORMULA

Now that you calculated the retail price, you want to calculate a sale price. This week, the computer is on sale for 15% off the retail price. Refer to Figure 1.13 as you complete Step 2.

F5 fx =D5-D5*E5

	A	B	C	D	E	F	G	H
1	OK Office Systems Pricing Information							
2	1-Sep-12							
3								
4	Product	Cost	Markup R	Retail Pric	Percent O	Sale Price	Profit Margin	
5	Computer	400	0.5	600	0.15	510		
6	Color Lase	457.7	0.75		0.2			
7	Filing Cab	68.75	0.905		0.1			
8	Desk Chai	75	1		0.25			
9	Solid Oak	700	1.857		0.3			
10	28" Monit	195	0.835		0.1			
11								
12								

FIGURE 1.13 Sale Price Formula ➤

a. Click **cell F5**, the cell where you will enter the formula to calculate the sale price.

b. Type **=D5-D5*E5** and notice the color-coding in the cell addresses. Press **Ctrl+Enter** to keep the current cell the active cell.

The result is 510. Looking at the formula, you might think D5-D5 equals zero; remember that because of the order of precedence rules, multiplication is calculated before subtraction. The product of 600 (cell D5) and 0.15 (cell E5) equals 90, which is then subtracted from 600 (cell D5), so the sale price is 510. If it helps to understand the formula better, add parentheses: =D5-(D5*E5).

TIP Spot-Check Your Work

You can check the result for logic. Use a calculator to spot-check the accuracy of formulas. If you mark down merchandise by 15% of its regular price, you are charging 85% of the regular price. You can spot-check your formula to ensure that 85% of 600 is 510 by multiplying 600 by 0.85.

c. View the Formula Bar, and then save the workbook with the new formula.

The Formula Bar displays the formula you entered.

STEP 3 ENTER THE PROFIT MARGIN FORMULA

After calculating the sale price, you want to know the profit margin you earn. You paid $400 for the computer and will sell it for $510. The profit is $110, which gives you a profit margin of 21.57%. Refer to Figure 1.14 as you complete Step 3.

G5 =(F5-B5)/F5

	A	B	C	D	E	F	G	H
1	OK Office Systems Pricing Information							
2	1-Sep-12							
3								
4	Product	Cost	Markup Ra	Retail Pric	Percent O	Sale Price	Profit Margin	
5	Computer	400	0.5	600	0.15	510	0.215686	
6	Color Lase	457.7	0.75		0.2			
7	Filing Cab	68.75	0.905		0.1			
8	Desk Chai	75	1		0.25			
9	Solid Oak	700	1.857		0.3			
10	28" Monit	195	0.835		0.1			
11								
12								

FIGURE 1.14 Profit Margin Formula ➤

a. Click **cell G5**, the cell where you will enter the formula to calculate the profit margin.

The profit margin is the profit (difference in sales price and cost) percentage of the sale price. This amount represents the amount to cover operating expenses and tax, which are not covered in this analysis.

b. Type =(F5-B5)/F5 and notice the color-coding in the cell addresses. Press **Ctrl+Enter**.

The formula must first calculate the profit, which is the difference between the sale price (510) and the original cost (400). The difference (110) is then divided by the sale price (510) to determine the profit margin of 0.215686 or 21.6%.

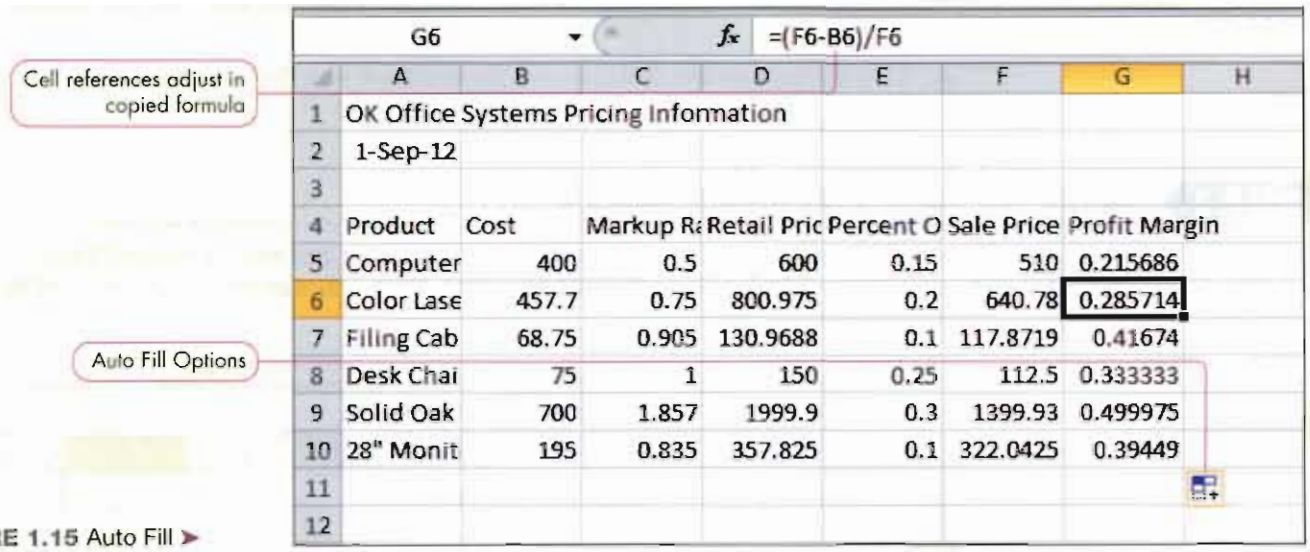
TROUBLESHOOTING: If you type a backslash (\) instead of a forward slash (/), Excel will display an error message box. Make sure you type / as the division operator.

c. Look at the Formula Bar, and then save the workbook with the new formula.

The Formula Bar displays the formula you entered.

STEP 4 COPY FORMULAS WITH AUTO FILL

After double-checking the accuracy of your calculations for the first product, you are ready to copy the formulas down the columns to calculate the retail price, sale price, and profit margin for the other products. Refer to Figure 1.15 as you complete Step 4.



	A	B	C	D	E	F	G	H
1	OK Office Systems Pricing Infonmation							
2	1-Sep-12							
3								
4	Product	Cost	Markup Ra	Retail Pric	Percent O	Sale Price	Profit Margin	
5	Computer	400	0.5	600	0.15	510	0.215686	
6	Color Lase	457.7	0.75	800.975	0.2	640.78	0.285714	
7	Filing Cab	68.75	0.905	130.9688	0.1	117.8719	0.41674	
8	Desk Chai	75	1	150	0.25	112.5	0.333333	
9	Solid Oak	700	1.857	1999.9	0.3	1399.93	0.499975	
10	28" Monit	195	0.835	357.825	0.1	322.0425	0.39449	
11								
12								

FIGURE 1.15 Auto Fill ➤

a. Click **cell D5**, the cell containing the formula to calculate the retail price for the first item.

b. Position the mouse pointer on the fill handle in the bottom-right corner of **cell D5**. When the pointer changes from a white plus sign to a thin black plus sign, double-click the **fill handle**.

Excel's Auto Fill feature copies the retail price formula for the remaining products in your worksheet. Excel detects when to stop copying the formula when it encounters a blank row, such as in row 11.

c. Click **cell D6**, the cell containing the first copied retail price formula, and look at the Formula Bar.

The original formula was =B5*(1+C5). The copied formula in cell D6 is =B6*(1+C6). Excel adjusts the cell addresses in the formula as it copies the formula down a column so that the results are based on each row's data rather than using the original formula's cell addresses for other products.

d. Select the **range F5:G5**. Double-click the **fill handle** in the bottom-right corner of **cell G5**.

Auto Fill copies the selected formulas down their respective columns. Notice Auto Fill Options down and to the right of the cell G10 fill handle, indicating you could select different fill options if you want.

e. Click **cell F6**, the cell containing the first copied sale price formula, and view the Formula Bar.

The original formula was =D5-D5*E5. The copied formula in cell F6 is =D6-D6*E6.

f. Click **cell G6**, the cell containing the first copied profit margin formula, and look at the Formula Bar. Save the changes to your workbook.

The original formula was =(F5-B5)/F5. The copied formula in cell G6 is =(F6-B6)/F6.

STEP 5 CHANGE VALUES AND DISPLAY FORMULAS

You want to see how the prices and profit margins are affected when you change some of the original values. For example, the supplier might notify you that the cost to you will increase. In addition, you want to see the formulas displayed in the cells temporarily. Refer to Figures 1.16 and 1.17 as you complete Step 5.

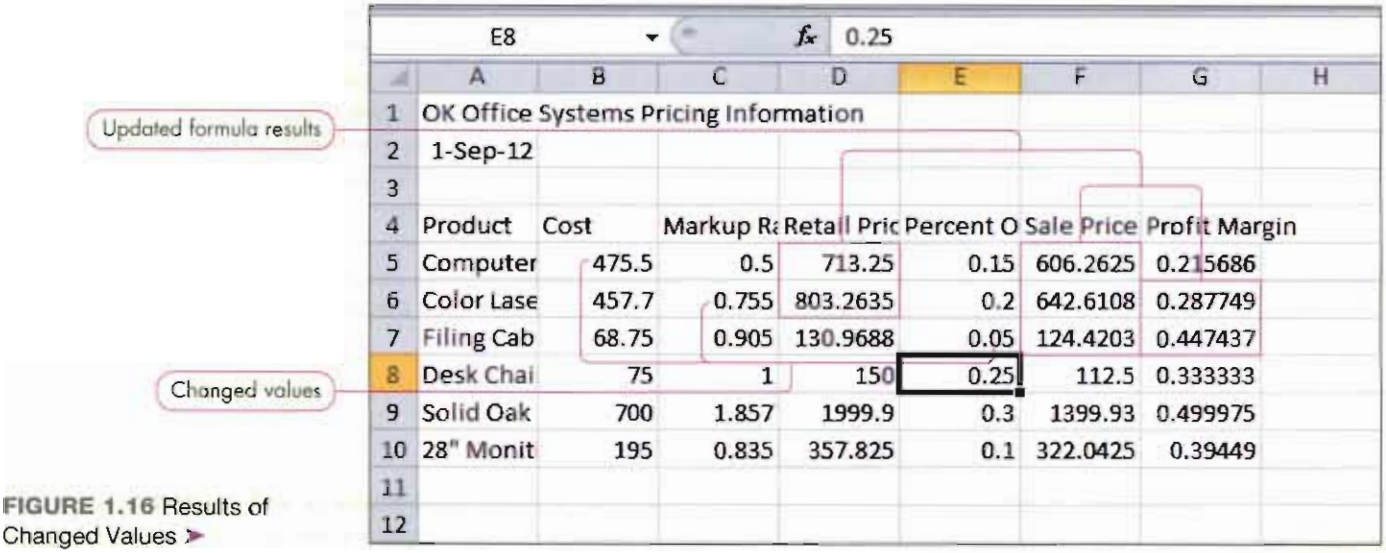


FIGURE 1.16 Results of Changed Values ➤

a. Click **cell B5**, type **475.5**, and then press **Enter**.

The results of the retail price, sale price, and profit margin formulas change based on the new cost.

b. Click **cell C6**, type **0.755**, and then press **Enter**.

The results of the retail price, sale price, and profit margin formulas change based on the new markup rate.

c. Click **cell E7**, type **0.05**, and then press **Enter**.

The results of the sale price and profit margin formulas change based on the new markdown rate. Note that the retail price did not change since that formula is not based on the markdown rate.

d. Press **Ctrl+`** (the grave accent mark).

The workbook now displays the formulas rather than the formula results (see Figure 1.17). This is helpful when you want to review several formulas at one time.

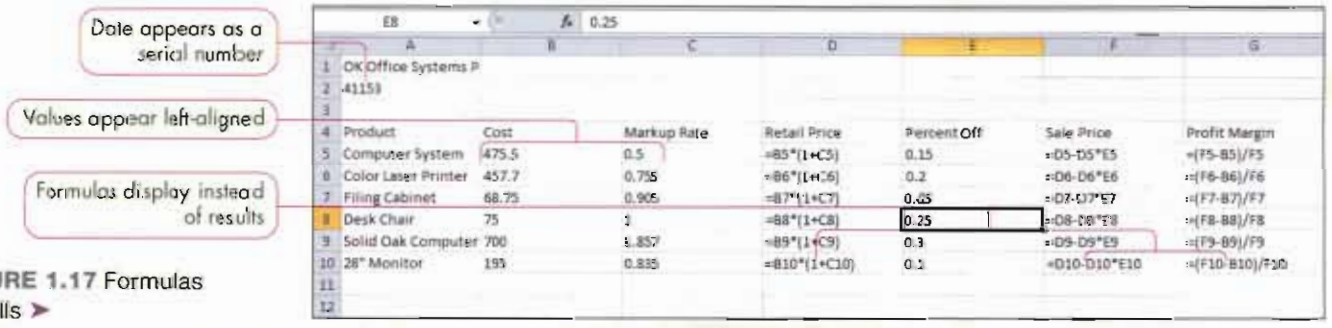


FIGURE 1.17 Formulas in Cells ➤

e. Press **Ctrl+`** (the grave accent mark).

The workbook now displays the formula results in the cells again.

f. Save the workbook. Keep the workbook onscreen if you plan to continue with Hands-On Exercise 3. If not, close the workbook and exit Excel.