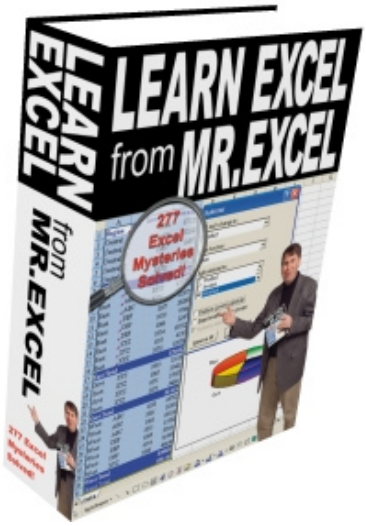

Free Preview – Week #33
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This week - six topics. Goal Seek, Protecting Formulas, Exponents, Roots, Growth Rate, PI().

USE ^ SIGN FOR EXPONENT

Problem: You have a room that is 10 feet x 10 feet x 10 feet. What is the volume of the cube?

Strategy: The formula for volume is width x length x height. In this case, it is 10 x 10 x 10, or ten to the third power. In Excel, the carat symbol (also known as "the little hat", or "the symbol when you press Shift 6") is used to calculate exponents. In cell B2, enter 10; in cell B3, enter the formula =B2^3. The result will be 1000 cubic feet of volume in the room, as shown in Fig. 435.

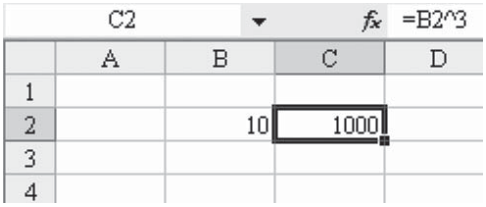

Fig. 435

Summary: Use a carat to calculate exponents.

RAISE A NUMBER TO A FRACTION TO FIND THE SQUARE OR THIRD ROOT

Problem: Excel offers a SQRT function to find the square root of a number. What if you need to figure out the third root or the fourth root?

Strategy: You can raise a number to a fraction to find a root. To find the square root of a number, you can raise the number to (1/2). To find the cube root of a number, you can raise the number to (1/3). To find the eighth root of a number, you can raise the number to (1/8).

Here are several examples.

If you need to find the square root, you can use the SQRT function, as shown in Fig. 436.

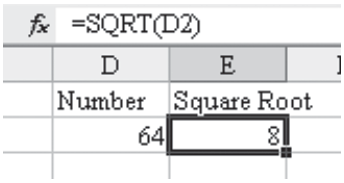

Fig. 436

As shown in Fig. 437, you can also raise the number to the one-half (1/2) power.

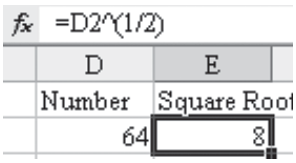

Fig. 437

Or, you can raise the number to 0.5, as shown in Fig. 438.

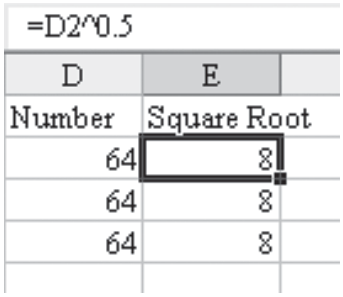

Fig. 438

To find the cube root of a number, you can raise the number to the one-third (1/3) power, as shown in Fig. 439.

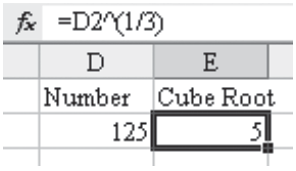

Fig. 439

To find the fourth root of a number, raise the number to either one-forth (1/4) or 0.25 power, as shown in Fig. 440 and Fig. 441, respectively.

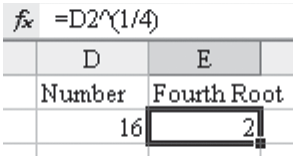

Fig. 440

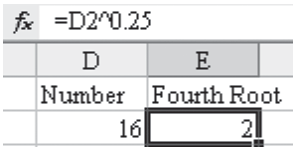

Fig. 441

To find the seventeenth root of a number, raise it to the one-seventeenth (1/17) power, as shown in Fig. 442.

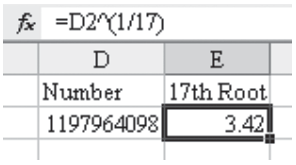

Fig. 442

Summary: Although Excel only offers a function for a square root, you can use the technique of raising to a fractional power in order to determine any root of a number.

Commands Discussed: Exponent operator

Functions Discussed: =SQRT()

CALCULATE A GROWTH RATE

Problem: You work for a fast growing company. In the first year, they had $970,000.00 in sales. In the fifth year, they had $6,175,000.00 in sales. What was the compounded annual growth rate?

Strategy: Sales in the fifth year are 6175/970 higher than the first year. The formula for growth is (year 5/year 1) – 100 percent. So, as shown in Fig. 443, the growth rate is 537 percent.

D6 =(B6/B2)-1

	A	B	C	D
1				
2	Year 1	970,000		
3	Year 2	2,250,000		
4	Year 3	4,580,000		
5	Year 4	5,850,000		
6	Year 5	6,175,000	Growth Year 1 - Year 5	537%

Fig. 443

However, a compounded growth rate is a number, x, that will calculate out like this: Year 1 * (100% + x) *(100% + x) *(100% + x) * (100% + x)= Year 5

This is the same as:

Year 1 * (100% + x)^4 = Year 5

So, in order to calculate x, you have to be able to find the fourth root of (Year5/Year1). The formula to find the fourth root is to raise the number to the (1/4) power. Thus, as shown in Fig. 444, the formula to calculate the compounded growth rate is:

(Year 5/Year 1)^(1/4)–100% = x

D6 =(B6/B2)^(1/4)-100%

	A	B	C	D
1				
2	Year 1	970,000		
3	Year 2	2,250,000		
4	Year 3	4,580,000		
5	Year 4	5,850,000	Growth Year 1 - Year 5	537%
6	Year 5	6,175,000	Compounded Growth	59%
7				

Fig. 444

The compounded growth rate is 59 percent.

Summary: Compounded growth rates are common calculations that require you to raise a number to a fractional power.

FIND THE AREA OF A CIRCLE

Problem: You need to order pizza for the department staff meeting. The pizza joint has two deals. You can buy three Medium (12") pizzas for $15 or two Large (16") pizzas for $16. Which is the better deal?

Strategy: You will have to figure out the area of a 12" pizza vs. the area of a 16" pizza. The formula for the area of a circle is Pi times the square of the radius.

The radius of a pizza is one-half the diameter. If you enter the diameter of the pizza in B2, the radius is =B2/2.

Pi is a Greek letter that represents 3.141592654. Excel offers the PI function to return this number, as shown in Fig. 445. It is a lot easier to remember =PI() instead of 3.141592654.

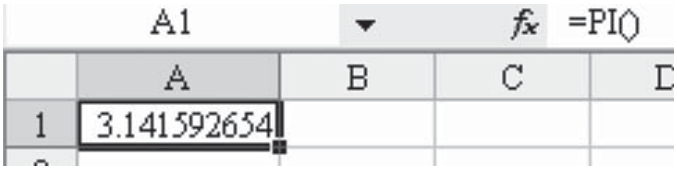

Fig. 445

1) Set up a worksheet. In cell B2, enter the diameter of the pizza.

2) In cell C2, calculate the radius as =B2/2, as shown in Fig. 446.

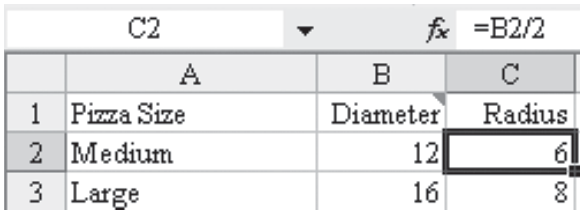

Fig. 446

3) In cell D2, calculate the area of the pizza in square inches, using =PI()*C2^2, as shown in Fig. 447.

D2 =PI()*C2^2

	A	B	C	D
1	Pizza Size	Diameter	Radius	Area
2	Medium	12	6	113.0973
3	Large	16	8	201.0619

Fig. 447

4) In column E, enter the quantity of pizzas.

5) Calculate the total square inches in column F using =E2*D2, as shown in Fig. 448.

F2 =E2*D2

	A	B	C	D	E	F
1	Pizza Size	Diameter	Radius	Area	Quantity	Total Square Inches
2	Medium	12	6	113.0973	3	339.2920066
3	Large	16	8	201.0619	2	402.1238597

Fig. 448

6) Enter the cost for the special in column G. In column H, calculate the pennies per square inch of pizza using =G2/F2, as shown in Fig. 449.

H2 =G2/F2

	A	B	C	D	E	F	G	H
1	Pizza Size	Diameter	Radius	Area	Quantity	Total Square Inches	Cost	Cost/Sq Inch
2	Medium	12	6	113.0973	3	339.2920066	$15.00	$0.0442
3	Large	16	8	201.0619	2	402.1238597	$16.00	$0.0398

Fig. 449

Result: From a purely mathematical point of view, the special with two large pizzas is a slightly better deal, pricing the pizza at 3.98 cents per square inch.

Additional Information: My seventh grade math teacher, Mr. Irwin, would like me to mention, for the sake of completeness, that the circumference of the pizza is Pi times the diameter. That would be =PI()*B2, as shown in Fig. 450.

J2 =PI()*B2

	A	B	J	K
1	Pizza Size	Diameter	Circumference	
2	Medium	12	37.70	
3	Large	16	50.27	
4				

Fig. 450

Summary: To calculate the area of a circle, use the PI function times the radius squared.

Functions Discussed: =PI()

Part II

BACK INTO AN ANSWER USING GOAL SEEK

Problem: You've determined that you want to obtain a 48-month loan for a car. The interest rate is 5 percent. You want to find out what loan amount would result in a $490 monthly payment. As shown in Fig. 604, the sticker price of the car results in a $575 payment.

	A	B
1		
2	Price	25000
3	Term	48
4	Rate	5%
5		
6	Pmt	$575.73

Fig. 604

Strategy: Although there is a financial function to determine the Present Value (PV), it is easier to use the Goal Seek command on the Tools menu.

1) From the Tools menu, select Goal Seek. This will bring up the dialog shown in Fig. 605.

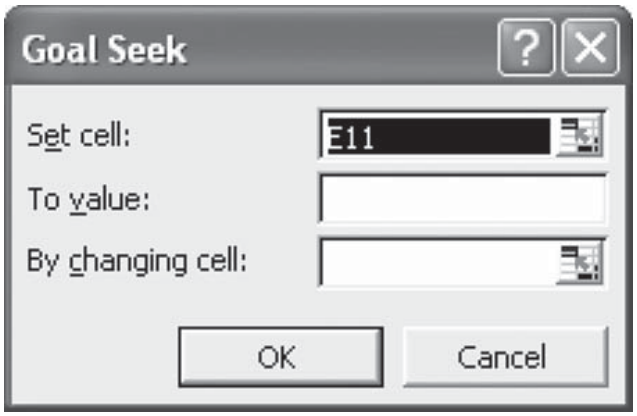

Fig. 605

2) In Fig. 604, you want to set cell B6 to $490 by changing cell B2. Enter these values and choose OK, as shown in Fig. 606.

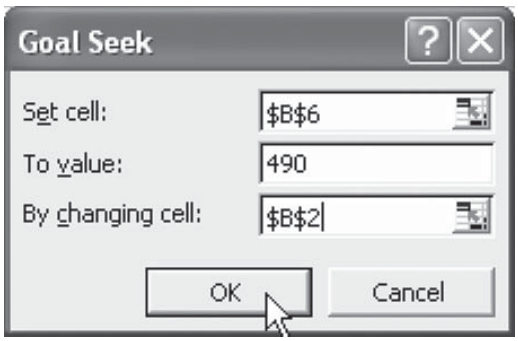

Fig. 606

In a simple case like this one, Goal Seek will almost always succeed. It will report back that it found a solution, as shown in Fig. 607.

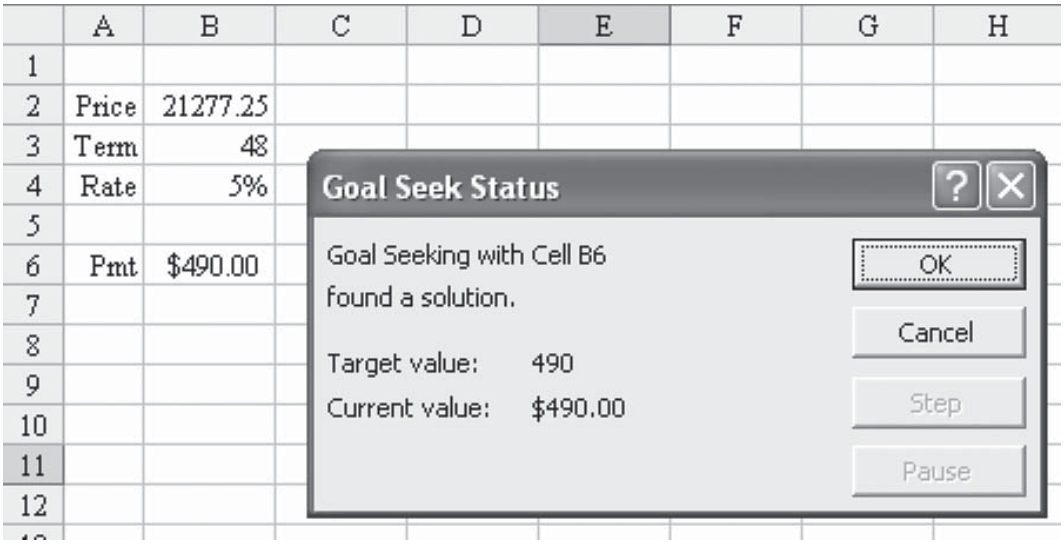

Fig. 607

3) To accept the solution, choose OK. To revert to the original value, select Cancel.

Result: You can afford to borrow $21,277.25.

Summary: The Goal Seek command on the tools menu is great for solving certain equations backwards.

PROTECT CELLS WITH FORMULAS

Problem: You have to key-in data in a large number of cells in a month-end financial statement, as shown in Fig. 608. You don't want to accidentally key-in a number in a cell with a formula. How can you protect just the formula cells?

	A	B	C	D	E	F	G	H	I	J	K
1							Jan	Feb	Mar	Q1	Apr
2			Income								
3				Revenue							
4					Education		11,767.30	12,551.48	15,261.14	**39,579.92**	15,857.08
5					Freight		1,609.12	1,672.02	1,176.79	**4,457.92**	1,452.94
6					Prof Fees		151,655.17	148,880.39	159,366.05	**459,901.61**	137,394.75
7					Referral Fees		43,343.06	64,238.33	47,738.11	**155,319.50**	57,320.46
8					Retail Sales		176,287.63	221,382.87	234,778.49	**632,448.99**	172,630.89
9				Total Revenue			384,662.28	448,725.08	458,320.58	**1,291,707.94**	384,656.11
10			Total Income				384,662.28	448,725.08	458,320.58	**1,291,707.94**	384,656.11
11			Cost of Goods Sold								
12				Cost of Goods Sold			48,067.54	44,100.56	30,651.39	**122,819.49**	31,099.77
13				Cost of Sales			20.48	26.89	24.83	**72.20**	19.96
14			Total COGS				48,088.03	44,127.44	30,676.22	**122,891.69**	31,119.73
15		Gross Profit					336,574.25	404,597.64	427,644.36	**1,168,816.25**	353,536.38
16			Expense								
17				Research			83.80	88.27	59.24	**231.31**	57.50
18				Agent Fees			438.30	312.61	388.65	**1,139.55**	421.66

Fig. 608

Strategy: After unlocking all cells, use the Edit – Go To – Special dialog to select only the cells with formulas and lock just those cells.

By default, all cells in the worksheet start with their Locked property set to TRUE. You don't realize this until you turn on protection for the first time. The first step is to unlock all of the cells.

1) Select all cells with Ctrl+A. From the menu, select Format – Cells. Click on the Protection tab. As shown in Fig. 609, you will see that the Locked option is chosen.

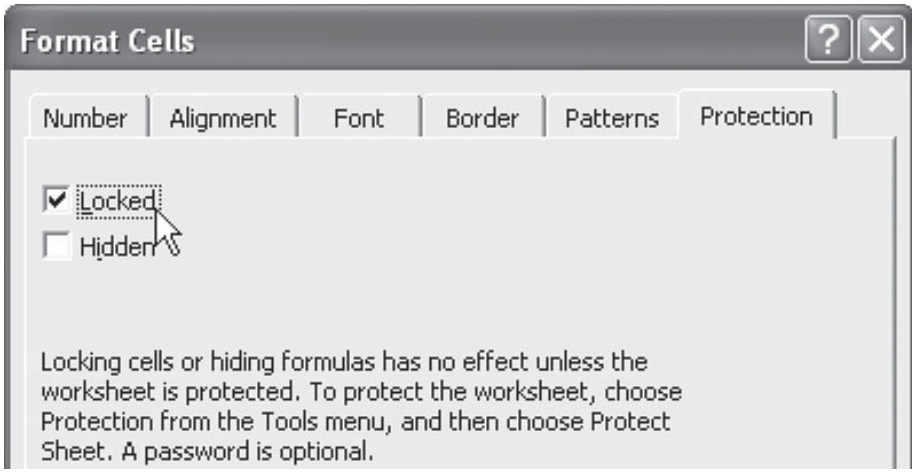

Fig. 609

2) Uncheck the Locked box. Choose OK to dismiss the Format Cells dialog.

3) You should still have all of the cells highlighted. From the menu, select Edit – Go To. On the Go To dialog, choose the Special button in the lower left corner, as shown in Fig. 610.

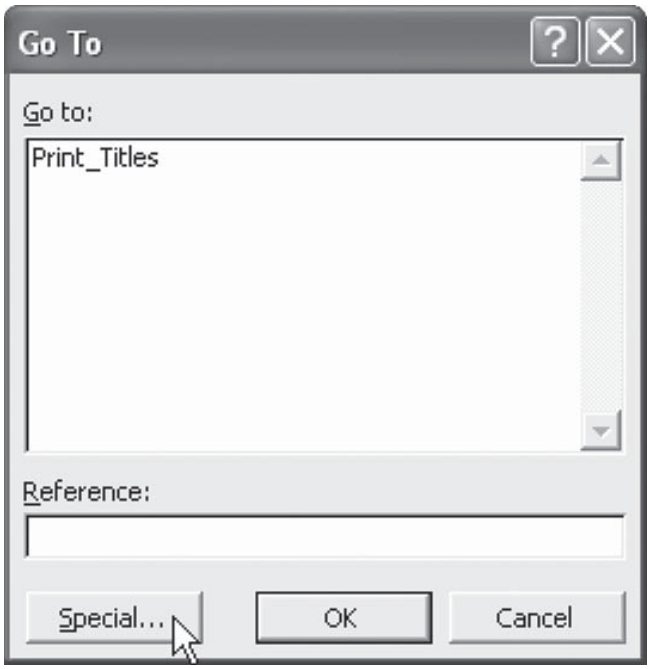

Fig. 610

4) On the Go To Special dialog box, choose the option button for Formulas, as shown in Fig. 611.

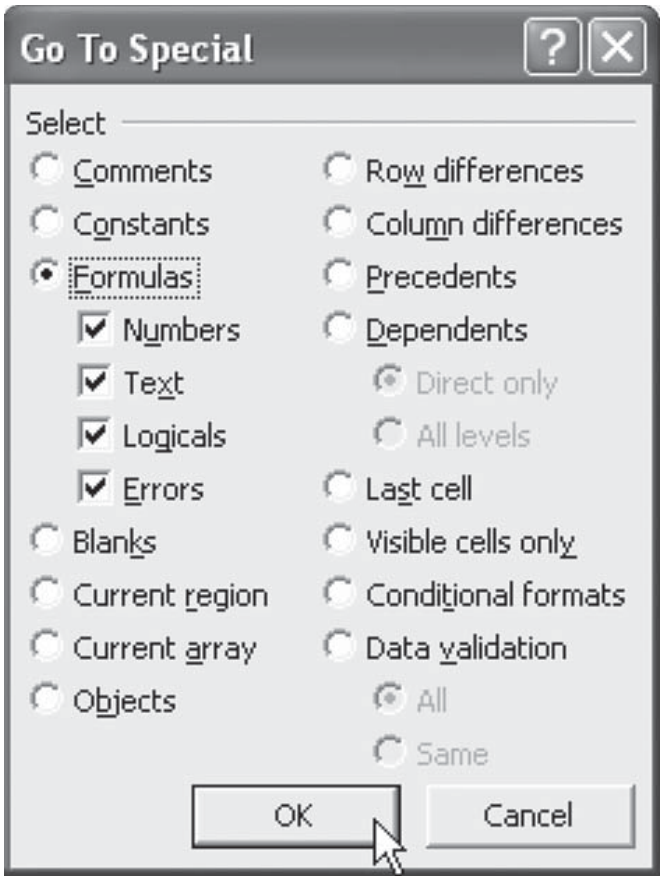

Fig. 611

5) Choose OK to close the Go To Special dialog. As shown in Fig. 612, you will see that only the cells with formulas are selected.

	A	B	C	D	E	F	G	H	I	J	K
1							Jan	Feb	Mar	Q1	A
2			Income								
3				Revenue							
4					Education		11,767.30	12,551.48	15,261.14	**39,579.92**	15,857.
5					Freight		1,609.12	1,672.02	1,176.79	**4,457.92**	1,452.
6					Prof Fees		151,655.17	148,880.39	159,366.05	**459,901.61**	137,394.
7					Referral Fees		43,343.06	64,238.33	47,738.11	**155,319.50**	57,320.
8					Retail Sales		176,287.63	221,382.87	234,778.49	**632,448.99**	172,630.
9				Total Revenue			384,662.28	448,725.08	458,320.58	**1,291,707.94**	384,656.
10			Total Income				384,662.28	448,725.08	458,320.58	**1,291,707.94**	384,656.
11			Cost of Goods Sold								
12				Cost of Goods Sold			48,067.54	44,100.56	30,651.39	**122,819.49**	31,099.
13				Cost of Sales			20.48	26.89	24.83	**72.20**	19.
14			Total COGS				48,088.03	44,127.44	30,676.22	**122,891.69**	31,119.
15		Gross Profit					336,574.25	404,597.64	427,644.36	**1,168,816.25**	353,536.

Fig. 612

6) From the menu, select Format – Cells. On the Protection tab, choose the Locked checkbox. This will lock only the selected cells, which are the formula cells.

7) The final important step is to enable protection for the sheet. If you miss this final step, you can still accidentally overwrite your formulas. From the menu, select Tools – Protection – Protect Sheet to display the Protect Sheet dialog, as shown in Fig. 613.

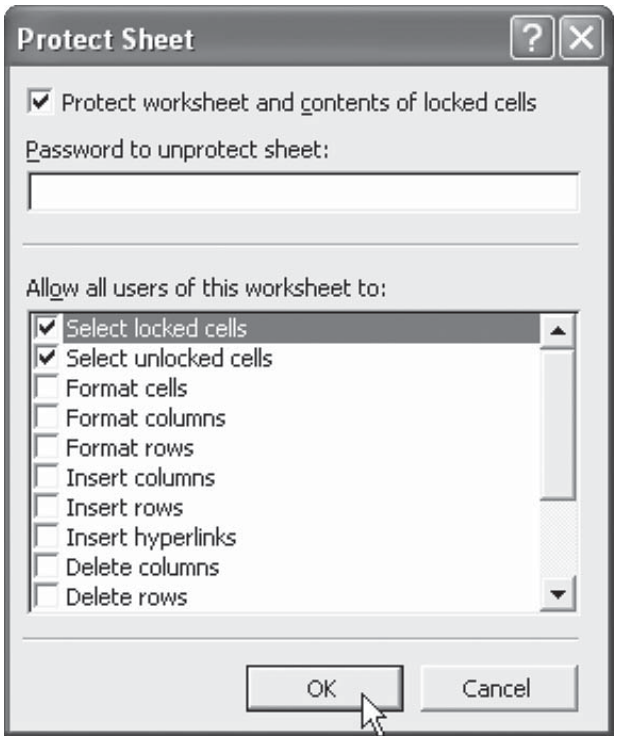

Fig. 613

Now, if you accidentally try to enter something in a formula cell, Excel will warn you, as shown in Fig. 614.

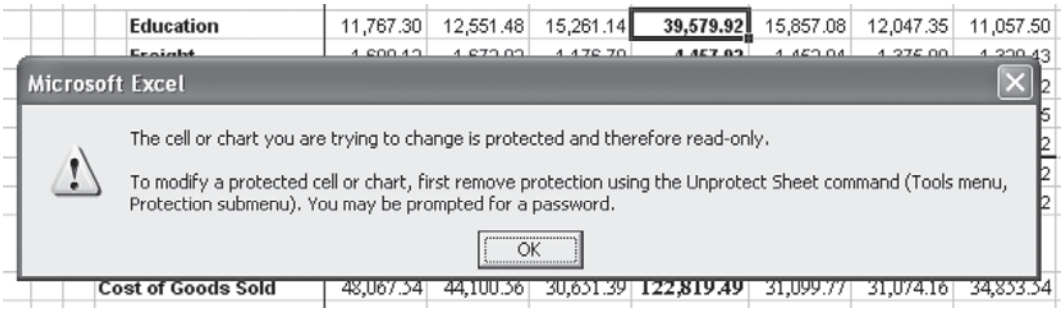

Fig. 614

Summary: Use the Go To Special dialog to select only the formula cells to protect just those cells. Remember to protect the sheet from overwriting.

Commands Discussed: Format – Cells – Protection; Edit – Go To Special