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Microsoft Excel 2003 Advanced Manual

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About This Course

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Runtime: 1hr. 14min.

Lessons: 18

Course Description

Understand the more advanced features of Excel 2003, the spreadsheet program widely used for financial and data management purposes. Learn how to use array formulas, special formatting, and VLOOKUP to make tasks easier..

Microsoft Excel 2003 Advanced Manual

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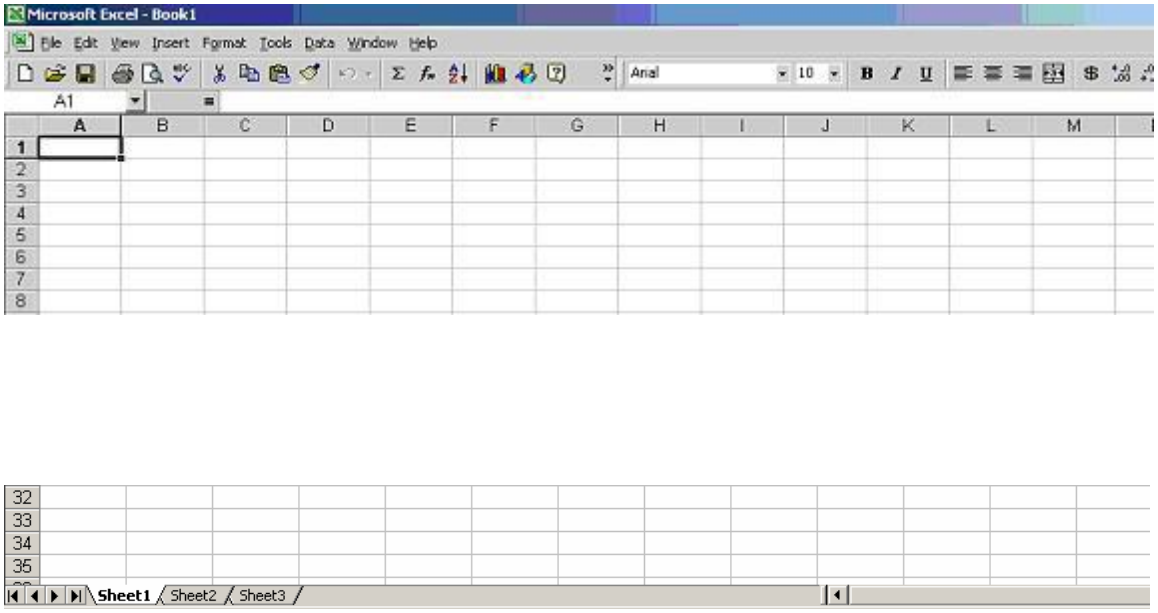
Introduction

Microsoft's Excel is a spreadsheet. A spreadsheet is essentially a table of rows and columns containing (1) data and (2) formulas. A check register for a checkbook is a spreadsheet. A more sophisticated spreadsheet might be a company's financial data consisting of budgets, accruals, and corporate consolidations.

When Excel is launched, a blank ***workbook*** opens with a pre-set number of ***worksheets***.



In this advanced course in Excel 2003, we will be going more in depth into the functions and formulas that Excel has to offer.

Array Formulas

In the introductory course, a spreadsheet was created that reflected automobile sales and pricing.

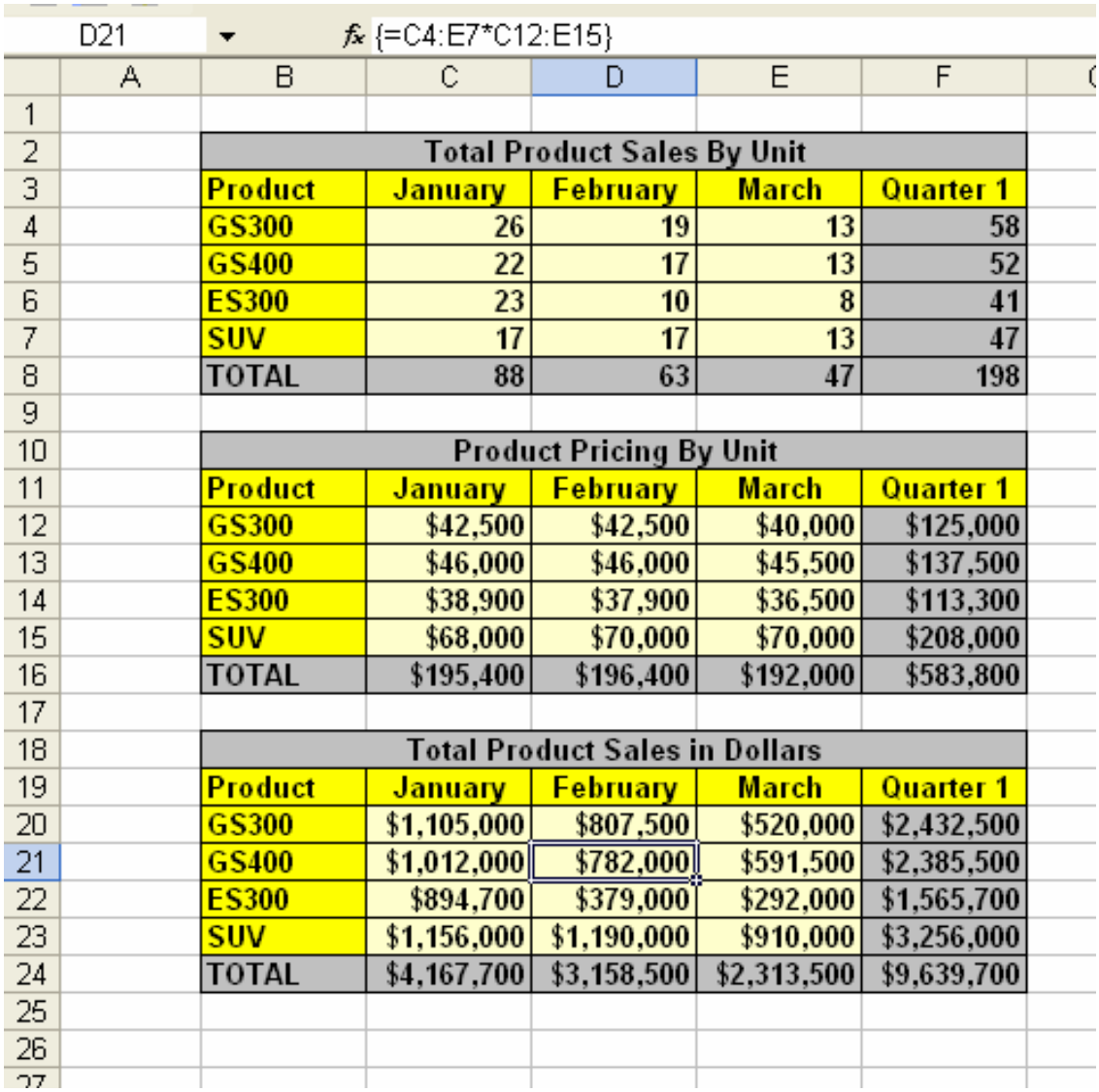
One of the spreadsheets looked like this:

	A	B	C	D	E	F
1						
2		Total Product Sales By Unit				
3		Product	January	February	March	Quarter 1
4		GS300	26	19	13	58
5		GS400	22	17	13	52
6		ES300	23	10	8	41
7		SUV	17	17	13	47
8		TOTAL	88	63	47	198
9						
10		Product Pricing By Unit				
11		Product	January	February	March	Quarter 1
12		GS300	$42,500	$42,500	$40,000	$125,000
13		GS400	$46,000	$46,000	$45,500	$137,500
14		ES300	$38,900	$37,900	$36,500	$113,300
15		SUV	$68,000	$70,000	$70,000	$208,000
16		TOTAL	$195,400	$196,400	$192,000	$583,800
17						
18		Total Product Sales in Dollars				
19		Product	January	February	March	Quarter 1
20		GS300	$1,105,000	$807,500	$520,000	$2,432,500
21		GS400	$1,012,000	$782,000	$591,500	$2,385,500
22		ES300	$894,700	$379,000	$292,000	$1,565,700
23		SUV	$1,156,000	$1,190,000	$910,000	$3,256,000
24		TOTAL	$4,167,700	$3,158,500	$2,313,500	$9,639,700
25						

In order to calculate the various figures for the third block of data (“Total Product Sales in Dollars”), this formula was placed in C20: =C4*C12 and filled down and across.

Array Formulas

Alternatively, if we select the full range of cells (C20:E23) and type the formula: =C4:E7*C12:E15, then, enter this formula using the command: CTRL+SHIFT+Enter, the formula will be populated throughout the entire range (as an array formula). When you examine the formula in one cell, notice that braces surround the formula. These are NOT entered by the user, but are a result of using the array formula entry (CTRL+SHIFT+Enter).



	A	B	C	D	E	F
1						
2		Total Product Sales By Unit				
3		Product	January	February	March	Quarter 1
4		GS300	26	19	13	58
5		GS400	22	17	13	52
6		ES300	23	10	8	41
7		SUV	17	17	13	47
8		TOTAL	88	63	47	198
9						
10		Product Pricing By Unit				
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12		GS300	$42,500	$42,500	$40,000	$125,000
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14		ES300	$38,900	$37,900	$36,500	$113,300
15		SUV	$68,000	$70,000	$70,000	$208,000
16		TOTAL	$195,400	$196,400	$192,000	$583,800
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18		Total Product Sales in Dollars				
19		Product	January	February	March	Quarter 1
20		GS300	$1,105,000	$807,500	$520,000	$2,432,500
21		GS400	$1,012,000	$782,000	$591,500	$2,385,500
22		ES300	$894,700	$379,000	$292,000	$1,565,700
23		SUV	$1,156,000	$1,190,000	$910,000	$3,256,000
24		TOTAL	$4,167,700	$3,158,500	$2,313,500	$9,639,700
25						
26						

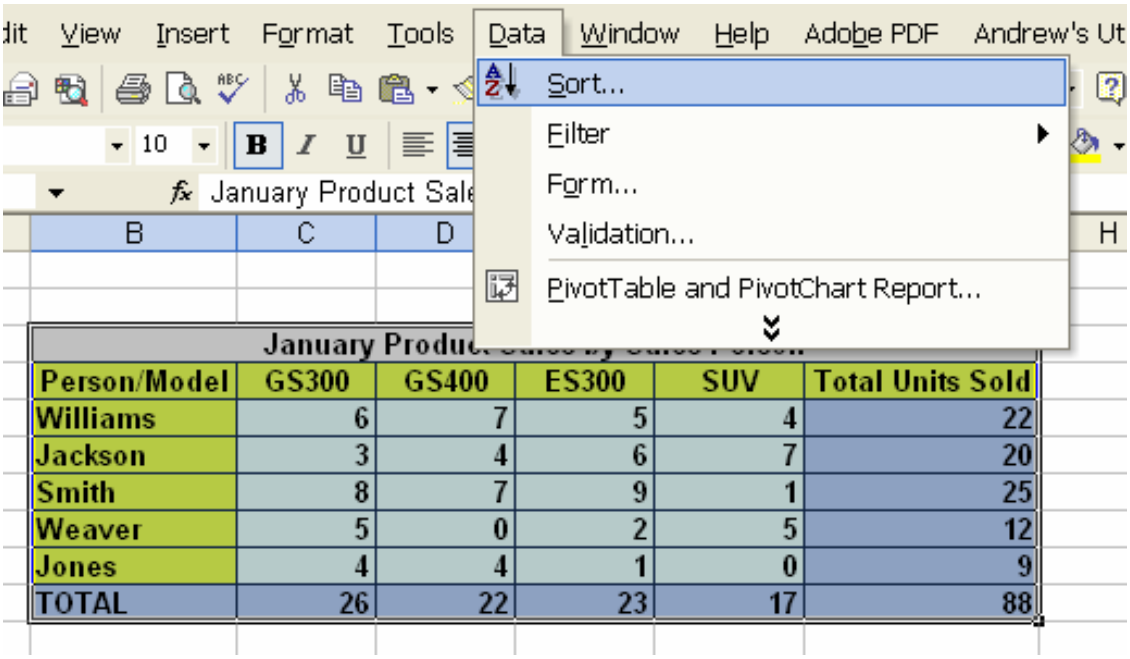
Array formulas are very powerful for a variety of calculations. We'll work on others later.

Sorting

Another powerful feature of Excel is the ability to SORT data. If we examine a small spreadsheet as shown below, we'll apply sorting based on the "total" column.

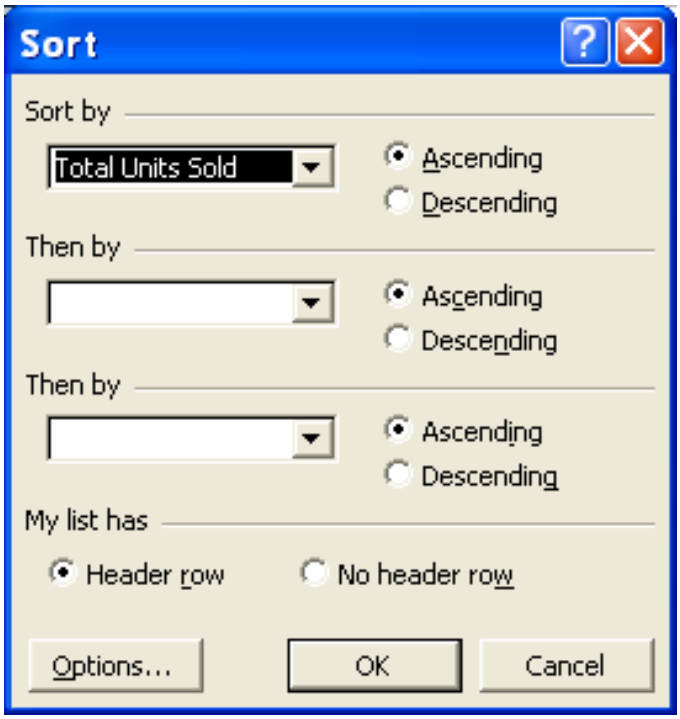
January Product Sales by Sales Person					
Person/Model	GS300	GS400	ES300	SUV	Total Units Sold
Williams	6	7	5	4	22
Jackson	3	4	6	7	20
Smith	8	7	9	1	25
Weaver	5	0	2	5	12
Jones	4	4	1	0	9
TOTAL	26	22	23	17	88

After selecting all of the data from the "Person/Model" row through and including the "9" in the row associated with "Jones," click on the menu bar: Data → Sort…



Person/Model	GS300	GS400	ES300	SUV	Total Units Sold
Williams	6	7	5	4	22
Jackson	3	4	6	7	20
Smith	8	7	9	1	25
Weaver	5	0	2	5	12
Jones	4	4	1	0	9
TOTAL	26	22	23	17	88

The dialog window that appears is:



Notice that we have indicated that this block of data has a “header row” and we’re sorting by the “Total Units Sold” header (column) in ascending order.

The sorted data:

January Product Sales by Sales Person					
Person/Model	GS300	GS400	ES300	SUV	Total Units Sold
Jones	4	4	1	0	9
Weaver	5	0	2	5	12
Jackson	3	4	6	7	20
Williams	6	7	5	4	22
Smith	8	7	9	1	25
TOTAL	26	22	23	17	88

PMT Functions

Another powerful and useful built-in function, PMT is in the financial section of the functions. This function calculates the payment for a loan based on constant payments and a constant interest rate.

The function has the following arguments:

=PMT(rate,nper,pv,fv,type),where:

- Rate - is the interest rate per period for the loan

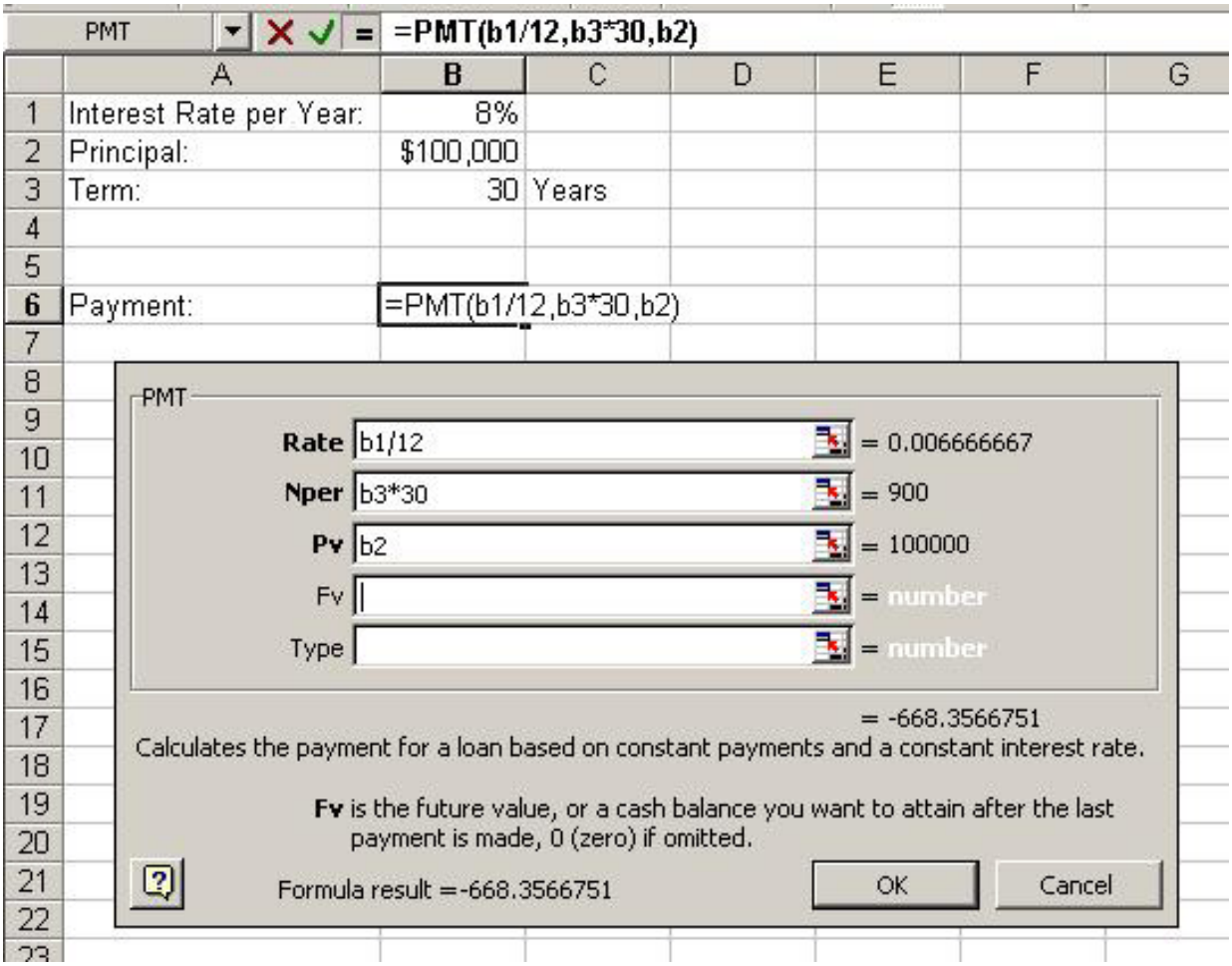
- Nper - is the number of payments for the loan

- Pv - is the present value (value today) or principal of the loan

- Fv - is an optional future value or cash balance you want to reach after the last payment is made (set to zero if omitted)

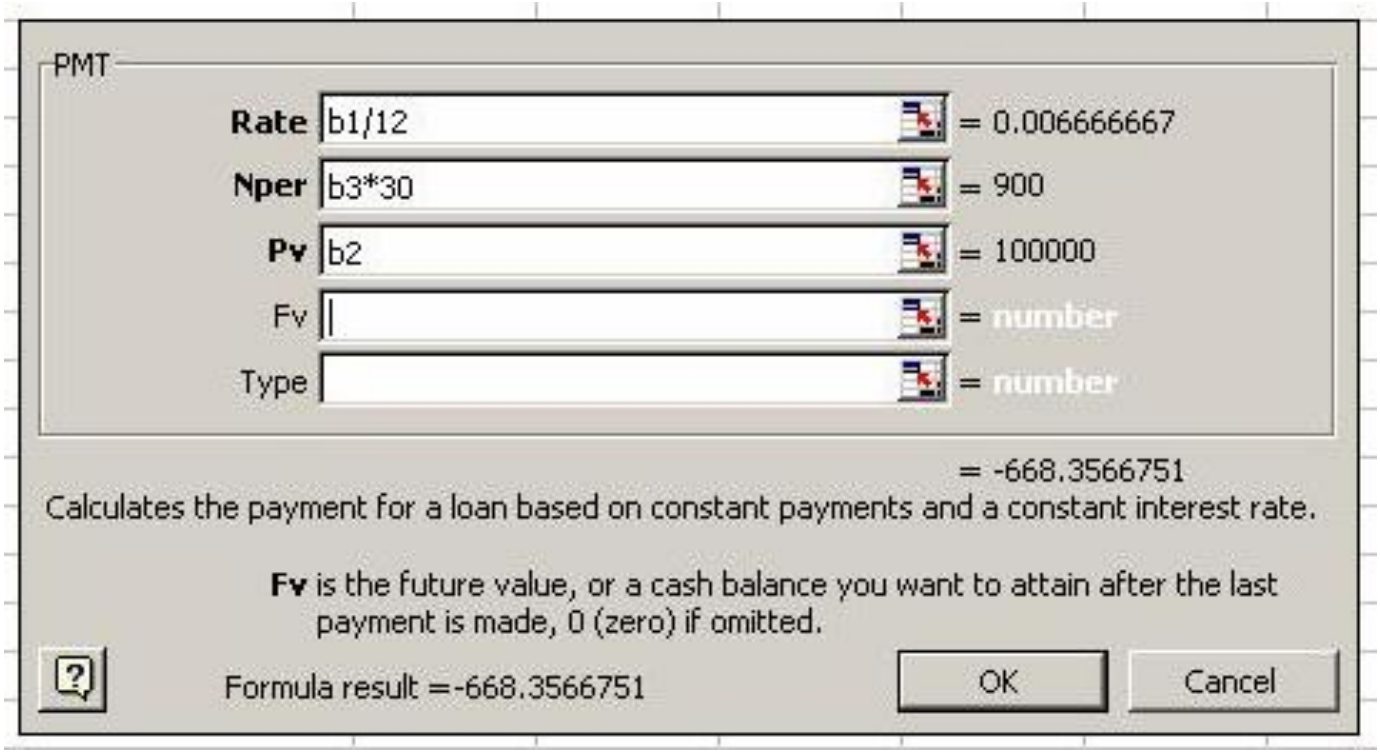
- Type - determines if the payments are made at the beginning of each period (1) or at the end of each period (0)
    - If omitted, the default is 0 (end)

If you want to calculate the payment amount for a loan of $100,000 for 30 years with an annual interest rate of 8%, the spreadsheet would appear as follows:



Notice that as you enter the cell references, the calculations are displayed.

Since the interest rate is annual, and payments will be made monthly, the Rate reference in B1 is divided by 12; since this is a 30-year loan and payments are monthly, the number of periods is 30 years times 12 months/year.



The resulting number is negative because it's a payout rather than income.

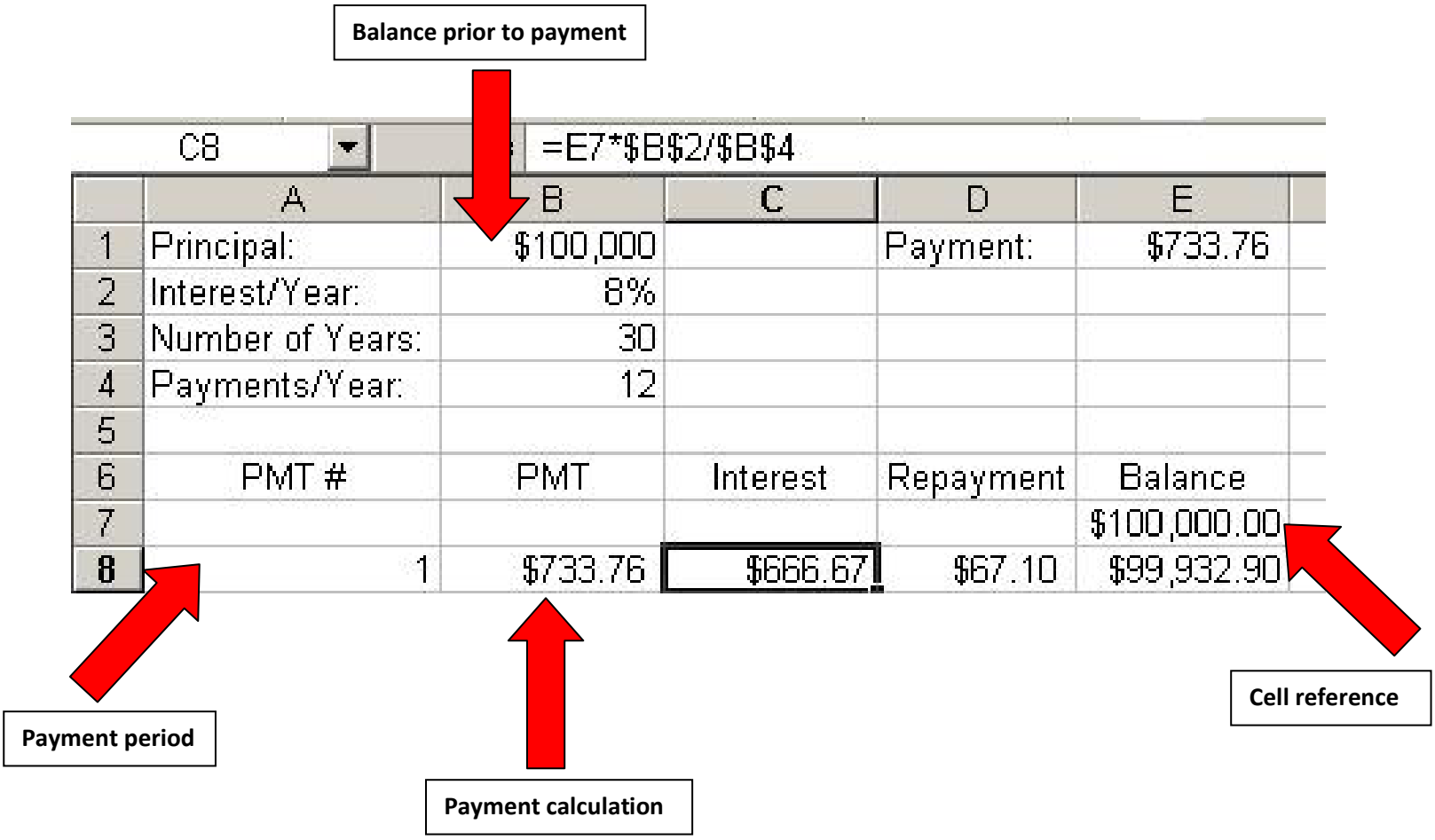
	A	B	C
1	Interest Rate per Year:	8%	
2	Principal:	$100,000	
3	Term:	30	Years
4			
5			
6	Payment:	($668.36)	
7			
8			
9			

Amortization Schedule

Let's construct an amortization schedule.

Begin by entering the text describing the four key components: Principal, interest per year, number of years, and the number of payments per year: A1:A4. Then, enter the corresponding data in B1:B3.

Create headings for the columns: Pmt #, PMT, Interest, Repayment, Balance. Prior to any payment, the balance is B1. This cell reference is entered into E7. Cell A8 is the first payment period. Cell B8 is the payment calculation.



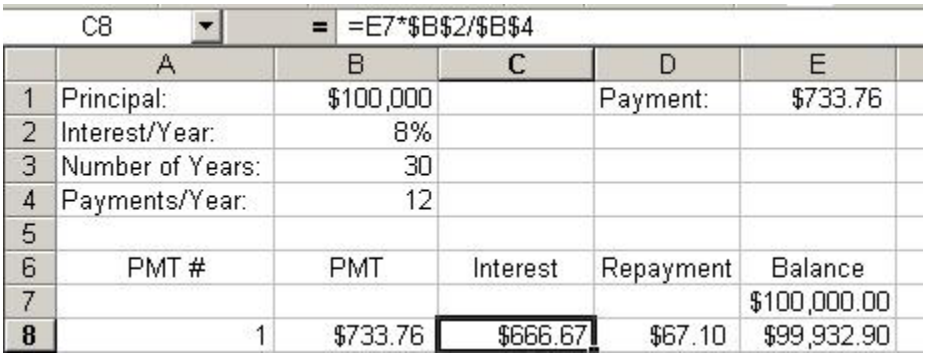
	A	B	C	D	E
1	Principal:	$100,000		Payment:	$733.76
2	Interest/Year:	8%			
3	Number of Years:	30			
4	Payments/Year:	12			
5					
6	PMT #	PMT	Interest	Repayment	Balance
7					$100,000.00
8	1	$733.76	$666.67	$67.10	$99,932.90

The interest portion of this payment is the current balance times the annual interest divided by the number of payments. The current balance is the full amount (E7), times the annual interest (B2) divided by the number of payments (B4).

The formula is:

=E7*$B$2/$B$4

Why is the interest and number of payments an absolute reference while the balance is a relative reference?



C8 = =E7*$B$2/$B$4

	A	B	C	D	E
1	Principal:	$100,000		Payment:	$733.76
2	Interest/Year:	8%			
3	Number of Years:	30			
4	Payments/Year:	12			
5					
6	PMT #	PMT	Interest	Repayment	Balance
7					$100,000.00
8	1	$733.76	$666.67	$67.10	$99,932.90

The repayment is the fixed payment less the interest paid within this payment, or

B8 – C8. The balance remaining is the previous balance (E7) less the repayment (D8).

This information can now be filled down to create the schedule.

If-Then Statements

Now, let's get fancy and use some of the additional features of Excel.

The next payment is technically the second. However, as we progress down the payment schedule, the "next" payment is 1 plus the previous unless we've made all the payments (12*B3). Therefore, A9 will be a formula:

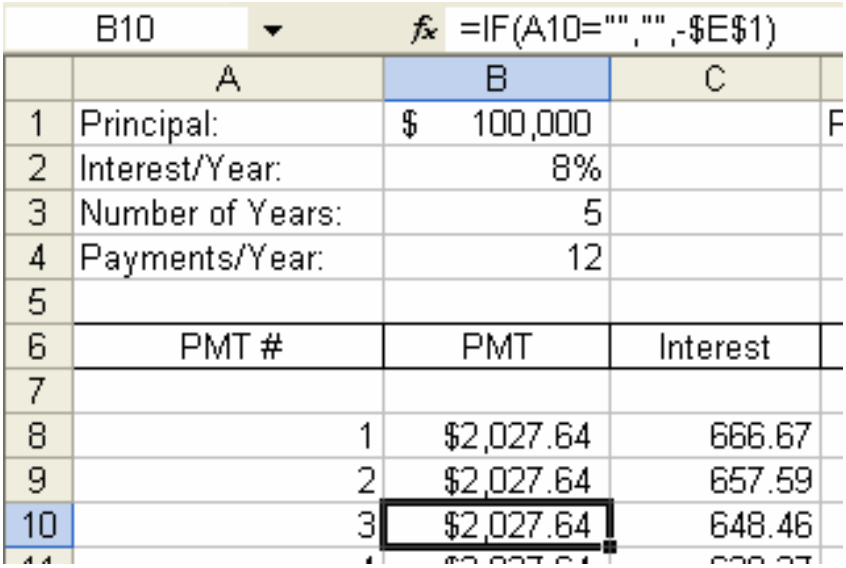
=IF(A8<(12*$B$3),A8+1,"") IF(condition, true, false)

This formula says: if the previous payment number is less than the total number of payments, this cell should be 1 plus the previous payment number; otherwise, make the cell blank.

A10 =IF(A9<$B$4*$B$3,A9+1,"")

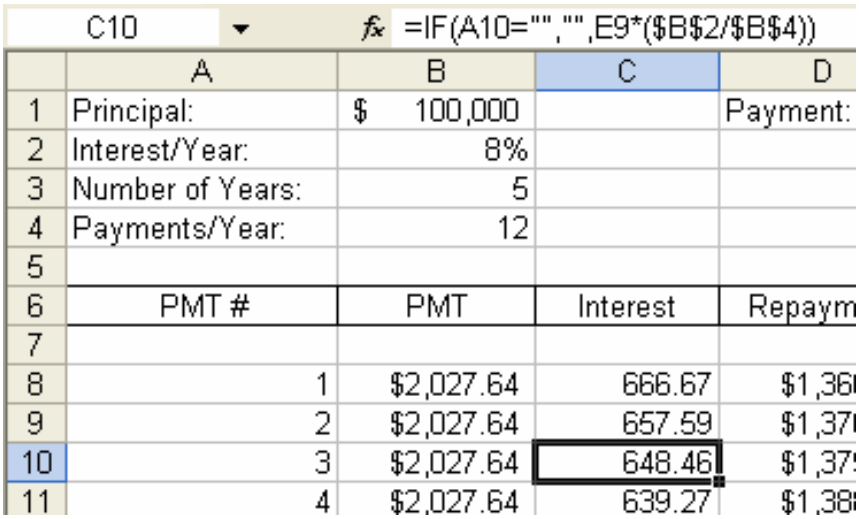
	A	B	C	D	E
1	Principal:	$ 100,000		Payment:	($733.76)
2	Interest/Year:	8%			
3	Number of Years:	30			
4	Payments/Year:	12			
5					
6	PMT #	PMT	Interest	Repayment	Balance
7					$ 100,000.00
8	1	$733.76	666.67	$67.10	$99,932.90
9	2	$733.76	666.22	$67.55	$99,865.36
10	3	$733.76	665.77	$68.00	$99,797.36
11	4				

The PMT (B9, etc.) is the constant payment unless we're finished with the payments. Therefore, we'll use another similar IF statement.



B10 =IF(A10="","",-$E$1)

	A	B	C
1	Principal:	$ 100,000	
2	Interest/Year:	8%	
3	Number of Years:	5	
4	Payments/Year:	12	
5			
6	PMT #	PMT	Interest
7			
8	1	$2,027.64	666.67
9	2	$2,027.64	657.59
10	3	$2,027.64	648.46



C10 =IF(A10="","",E9*($B$2/$B$4))

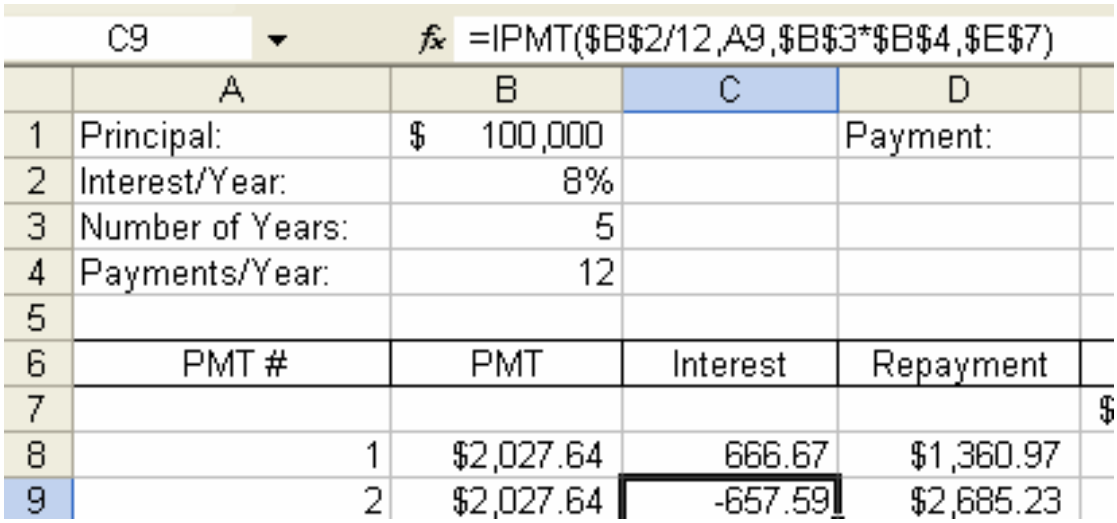
	A	B	C	D
1	Principal:	$ 100,000		Payment:
2	Interest/Year:	8%		
3	Number of Years:	5		
4	Payments/Year:	12		
5				
6	PMT #	PMT	Interest	Repaym
7				
8	1	$2,027.64	666.67	$1,36
9	2	$2,027.64	657.59	$1,37
10	3	$2,027.64	648.46	$1,37
11	4	$2,027.64	639.27	$1,38

(The number of years and payments/year have been changed above to simplify the sheet)

	A	B	C	D	E
1	Principal:	$ 100,000		Payment:	($2,027.64)
2	Interest/Year:	8%			
3	Number of Years:	5			
4	Payments/Year:	12			
5					
6	PMT #	PMT	Interest	Repayment	Balance
7					$ 100,000.00
8	1	$2,027.64	666.67	$1,360.97	$98,639.03
9	2	$2,027.64	657.59	$1,370.05	$97,268.98
10	3	$2,027.64	648.46	$1,379.18	$95,889.80
11	4	$2,027.64	639.27	$1,388.37	$94,501.43
12	5	$2,027.64	630.01	$1,397.63	$93,103.80

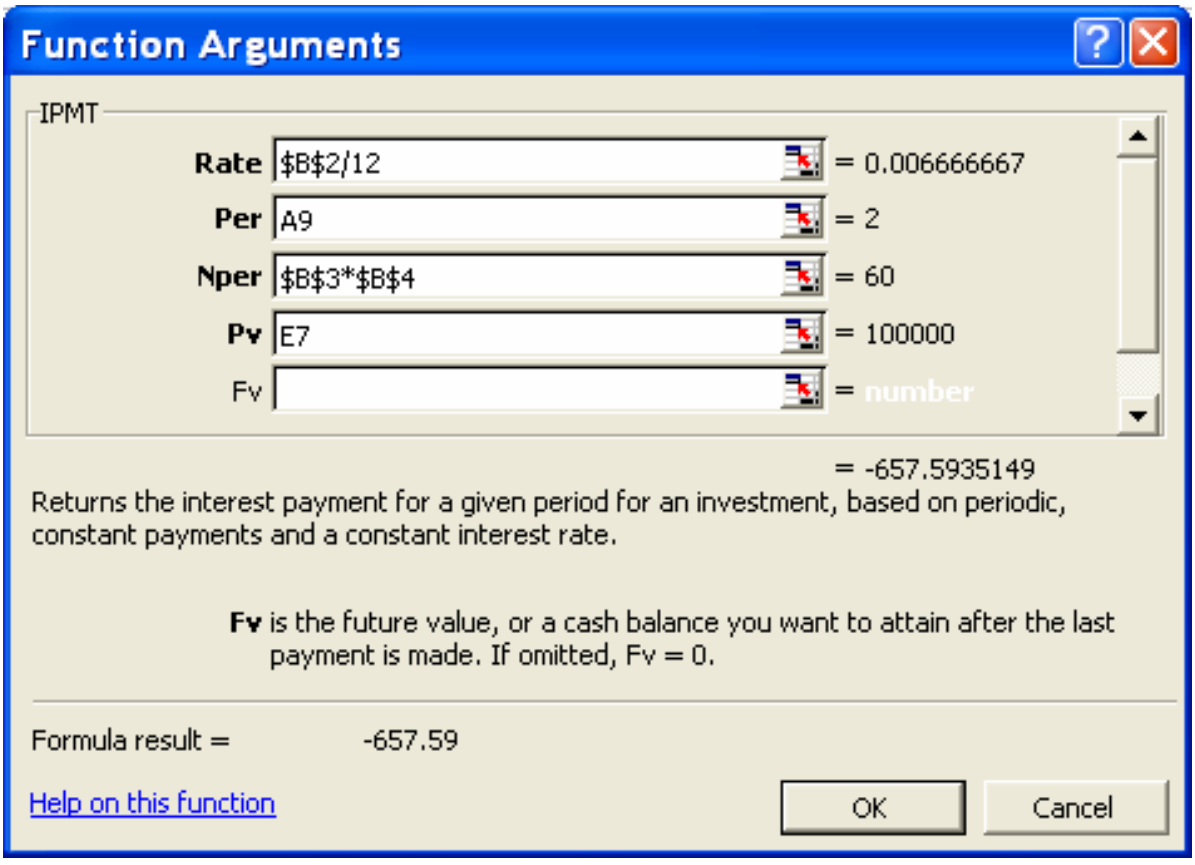
63	56	$2,027.64	66.26	$1,961.38	$7,977.16
64	57	$2,027.64	53.18	$1,974.46	$6,002.70
65	58	$2,027.64	40.02	$1,987.62	$4,015.08
66	59	$2,027.64	26.77	$2,000.87	$2,014.21
67	60	$2,027.64	13.43	$2,014.21	($0.00)
68					

- NOTE: In the financial formula, there is also an IPMT function that calculates the interest that we just computed. You might want to consider using the built-in formula rather than our calculation. The calculation was used for illustration purposes to show how to incorporate a formula into the sheet.



C9 =IPMT($B$2/12,A9,$B$3*$B$4,$E$7)

	A	B	C	D
1	Principal:	$ 100,000		Payment:
2	Interest/Year:	8%		
3	Number of Years:	5		
4	Payments/Year:	12		
5				
6	PMT #	PMT	Interest	Repayment
7				
8	1	$2,027.64	666.67	$1,360.97
9	2	$2,027.64	-657.59	$2,685.23

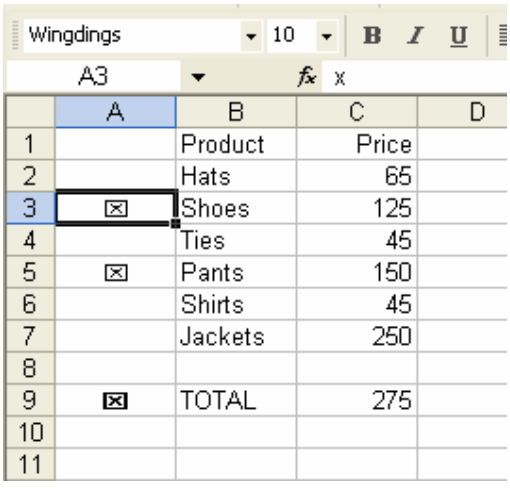


In the car-pricing example, an array formula was used. The example that follows not only uses an array formula in a simple but also in very useful way, and it uses a clever twist on fonts.

Suppose a product list and the respective prices are in columns B and C, respectively. Drag over cells A2:A7 and change the font for this range to Wingdings. When you enter a lowercase "x," the character of this font group is selected. It's a square with an "x" inside: ☒

Now, in cell C9, enter the array formula: =SUM((A2:A7="x")*(C2:C7))by typing the formula then CTRL+Shift+Enter (rather than just "enter").

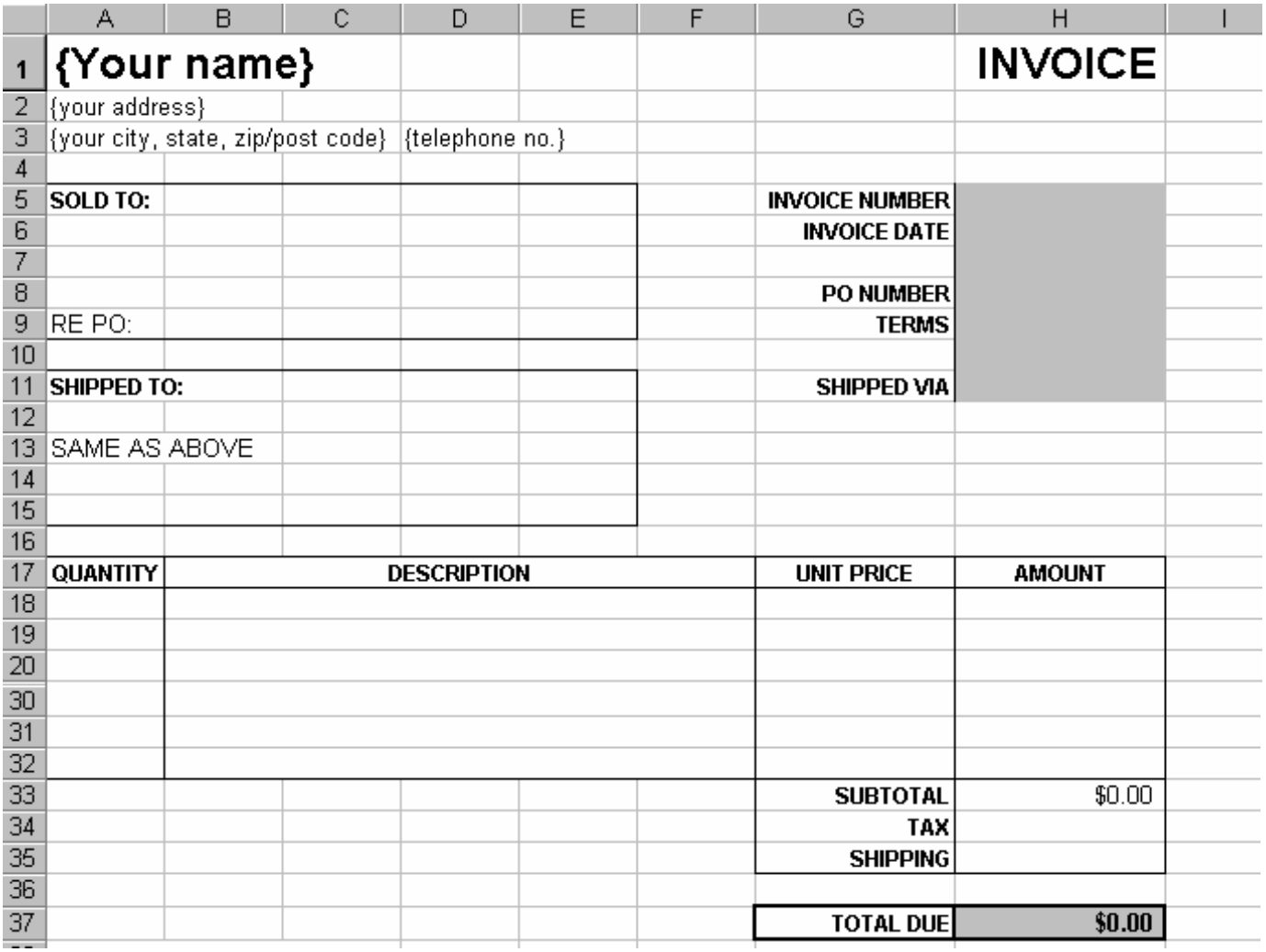
This formula looks at the range A2:A7 and finds where those cells respectfully equal an "x" (the check box). The result of this logical comparison is a set of 1s and 0s (1 meaning the corresponding cell is equal to an "x", 0 meaning it isn't). Cells C2 through C7 are multiplied by the 1s and 0s, respectively. The product is then summed.



	A	B	C	D
1		Product	Price	
2		Hats	65	
3	☒	Shoes	125	
4		Ties	45	
5	☒	Pants	150	
6		Shirts	45	
7		Jackets	250	
8				
9	☒	TOTAL	275	
10				
11				

Invoice Spreadsheet

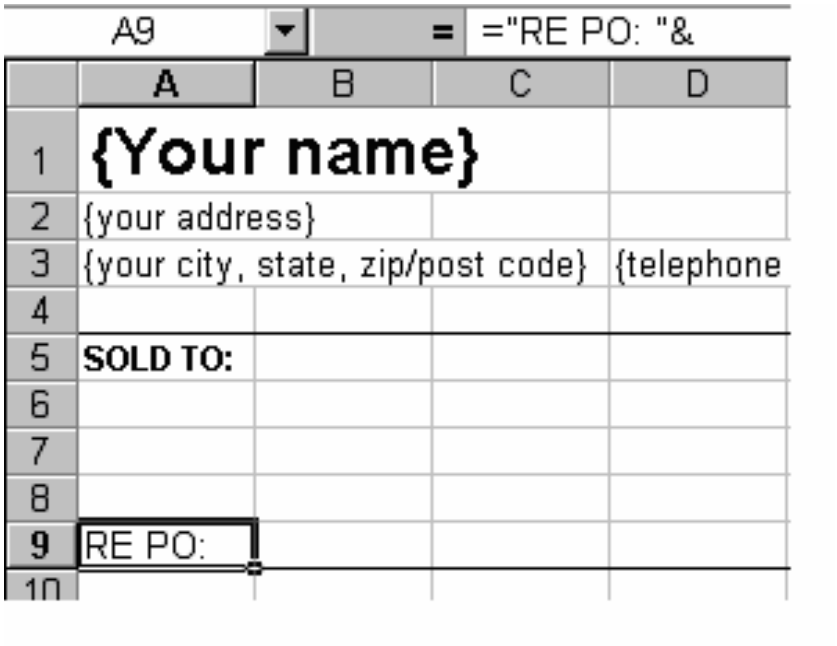
Everyone likes to bill for their efforts – personal services, product sales, etc. If you're not using an accounting package such as QuickBooks, you can create an invoice using Excel. How it's structured depends on personal taste, the type of service or product being sold, etc. Naturally, an Excel user could take advantage of the built-in invoice template provided with the product. However, for the purposes of this course, we'll construct our own.



	A	B	C	D	E	F	G	H	I
1	{Your name}							INVOICE	
2	{your address}								
3	{your city, state, zip/post code}			{telephone no.}					
4									
5	SOLD TO:						INVOICE NUMBER		
6							INVOICE DATE		
7									
8							PO NUMBER		
9	RE PO:						TERMS		
10									
11	SHIPPED TO:						SHIPPED VIA		
12									
13	SAME AS ABOVE								
14									
15									
16									
17	QUANTITY	DESCRIPTION					UNIT PRICE	AMOUNT	
18									
19									
20									
30									
31									
32									
33							SUBTOTAL	$0.00	
34							TAX		
35							SHIPPING		
36									
37							TOTAL DUE	$0.00	

As someone already familiar with the basics of Excel, you should be able to easily enter the text information, adjust the column widths as needed, and apply borders and shading.

Cell A9 contains not only the text RE PO: but also the actual purchase order number entered in cell H8. This is accomplished by using the ampersand (&) which concatenates the text with the value in cell H8.



Simply, we're interested in multiplying the quantity ordered by the unit price in order to arrive at the amount. However, there may be instances where there is no charge applied to something, but the invoice should reflect this. And, we'll make an adjustment in the event no quantity is entered.

H18 = =IF(ISBLANK(A18)," ",IF(G18=0,"N/C ",A18*G18))

	A	B	C	D	E	F	G	H
16								
17	QUANTITY	DESCRIPTION					UNIT PRICE	AMOUNT
18	5	Widgets					12.00	60.00
19								
20	10	Thingees					14.50	145.00
21								
22	3	Thingee attachments					0.00	N/C
23								
24								

The first check determines if A18 (filled down as well) is blank. If so, a blank is placed in the corresponding cell in column H. Otherwise, if G18 (unit prices) is 0, we'll place an "N/C" in the "amount" cell.

Show me the formulas!

Using CTRL+` you can toggle the spreadsheet to display the formulas in each cell

5		
6	PMT #	PMT
7		
8	1	=-$E$1
9	=IF(A8<$B$4*$B$3,A8+1,"")	=IF(A9="","",-$E$1)
10	=IF(A9<$B$4*$B$3,A9+1,"")	=IF(A10="","",-$E$1)
11	=IF(A10<$B$4*$B$3,A10+1,"")	=IF(A11="","",-$E$1)
12	=IF(A11<$B$4*$B$3,A11+1,"")	=IF(A12="","",-$E$1)

Show me the cell references!

Click in a blank cell where there are ample cells below this reference

Click: Insert →Name →Paste…→Paste List

G	H	I	J	K
Total		Brown	=Sheet1!$C$7:$F$7	
92		HrRate	=Sheet1!$D$10	
129		Jones	=Sheet1!$C$3:$F$3	
45		Names	=Sheet1!$C$3:$F$7	
112		Smith	=Sheet1!$C$6:$F$6	
67		Weaver	=Sheet1!$C$4:$F$4	
445		Week_1	=Sheet1!$C$3:$C$7	
		Week_2	=Sheet1!$D$3:$D$7	
		Week_3	=Sheet1!$E$3:$E$7	
		Week_4	=Sheet1!$F$3:$F$7	
Total		Week1	=Sheet1!$C$3:$C$7	
6900		Week2	=Sheet1!$D$3:$D$7	
0		Week3	=Sheet1!$E$3:$E$7	
0		Week4	=Sheet1!$F$3:$F$7	
0		Ziegler	=Sheet1!$C$5:$F$5	
0				
6900				

V-Lookup

Excel provides a number of ways to look up, locate, or fine information in a spreadsheet. Let's examine one of these, the VLOOKUP feature. It searches for a value in the leftmost column of a table, and then returns a value in the same row from a column you specify in the given table.

VLOOKUP is a vertical lookup whereas HLOOKUP is a horizontal lookup.

The syntax is:

VLOOKUP(lookup_value,table_array,col_index_num,range_lookup)

- The lookup_value - is the value to be found in the first column of the table_array

- The col_index_num - is the column number from which the matching value is to be returned

If the values in the first column are sorted in ascending order, the range_lookup may either be TRUE or omitted. Otherwise, the range_lookup should be FALSE. If the range_lookup is TRUE or omitted, and an exact match isn't found, the next largest value that is less than lookup_value is returned.

D4 = =VLOOKUP(C4,$F$3:$H$6,3)

	A	B	C	D	E	F	G	H
1								
2								
3		Name	Score	Letter Grade		0	Fail	Fail
4		Mary	79	A		40	Pass	C
5		John	34	Fail		60	Merit	B
6		Kevin	45	C		70	Distinction	A
7		Marti	86	A				
8		Frank	67	B				
9								

We can use this same procedure to create a discount table for merchandise.

C3 = =VLOOKUP(B3,$F$4:$G$7,2)

	A	B	C	D	E	F	G
1							
2		Units Sold	Price	Total $		Discount Schedule	
3		45	10.00	450.00		# Units	Price
4		100	9.00	900.00		1	10.00
5		275	8.50	2337.50		50	9.50
6		55	9.50	522.50		100	9.00
7		120	9.00	1080.00		200	8.50
8		150	9.00	1350.00			
9		20	10.00	200.00			
10							

Keep in mind that VLOOKUP and HLOOKUP return values from the right. For example:

B10 = =VLOOKUP(5,B2:C8,2)

	A	B	C	D	E
1					
2		1	a		
3		2	b		
4		3	c		
5		4	d		
6		5	e		
7		6	f		
8		7	g		
9					
10		e			

The traditional use of VLOOKUP allows you to find the “e” by looking up the 5.

Microsoft Excel 2003 Advanced Manual

Excel Specifications

Spreadsheets can take on a wide variety of complexities. Excel 2003, like most applications, has limitations. As spreadsheet applications increase in complexity, users should be aware of a few critical issues:

- Number of Open Workbooks at any given time is dependent on system resources

- Worksheet Size: 65,536 rows by 256 columns (although spreadsheets of this size are often very slow to recalculate and process)

- Column Width: 255 characters

- Row Height: 409 points

- Length of Cell Content (text): 32,767 characters. Only 1,024 display in a cell; all 32,767 display in the formula bar

- Sheets in a Workbook: limited by system resources

- Colors in a Workbook: 56

- Number Precision: 15 digits

- Undo Levels: 16