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▶ Lessons at a Glance

Lessons

- [All About Me](#)
- [Animal Logic](#)
- [Bridging the Generation Gap](#)
- [Buy Low/Sell High](#)
- [Buying a Dream Car](#)
- [Campaign Hot Buttons](#)
- [Candy is Dandy](#)
- [Celebrate the U.S.A.](#)
- [Code Crackers Math Game](#)
- [Creating Your Own Web Site](#)
- [Don't Trash the Earth](#)
- [Endangered Species](#)
- [For the Record](#)
- [It's All in the \(Chocolate\) Chips](#)
- [Just Desserts](#)
- [Making Ends Meet](#)
- [Newsworthy Journey](#)
- [Nutrition Track](#)
- [Planning a School Event](#)
- [Solving Polynomial Equations](#)
- [Space Case](#)
- [Three Squirrels and a Pile of Nuts](#)
- [Traits R Us!](#)
- [Understanding Poetry](#)

Buying a Dream Car

Subjects: Math, Economics
Required Software: Microsoft® Excel
Optional Software: Microsoft® Internet Explorer

▶ Teaching Guide
▶ Student Activity

Teaching Guide

Summary

This practical spreadsheet lesson offers easy answers to life's perplexing math problems like How much will my dream car really cost after financing? Students will calculate the cost of purchasing their very own Lamborghini sports car and determine if the ultimate price tag is really worth the investment.

Objectives

To expand students' understanding of mathematics, show practical applications of math in everyday life, and provide practice in using a Microsoft Excel worksheet to solve practical everyday problems.

Prerequisite Skills

Knows how to open and set up a Microsoft Excel worksheet and can access the World Wide Web using Microsoft Internet Explorer.

Time Alloted

Approximately one week

How to Begin

Ask students to name some exotic sports cars. If a student mentions a Lamborghini, have that student tell what he/she knows about this luxury car. Tell students that, although this elite supercar is no longer produced, its popularity stemmed from its reputation as a "menacing road warrior" that could go from 0-60 miles per hour (mph) in 4.2 seconds! Go on to explain that the car was engineered to hug the road at a top speed of 183 mph. Then tell students that a previously owned Lamborghini sells for \$150,000. But thanks to Honest Ed's easy finance plan, they can purchase one of these luxury cars for a mere \$150,000 plus interest.

Review the financial concepts that students will use to complete this project such as interest rate, loan term, and repayment period. Explain that Microsoft Excel has a built-in "Periodic Payment Function" which calculates the amount you pay for a loan based on constant payments and a constant interest rate. The payment function is written as follows: $PMT(\text{rate}, \text{nper}, \text{pv})$ where "rate" is the interest rate for the loan, "nper" is the total number of payments for the loan, and "pv" is the present value or principal (i.e., the total amount that a series of future payments is worth now). For this function to work correctly, proper "syntax" (the order in which the function's variables are entered) must be observed.

Extension Activities

For some added fun, have students use Internet Explorer to visit the [Lamborghini Home page](#) or the web sites of [Porsche](#), [Ferrari](#), or [Corvette](#).



Student Activity

Description

In this activity, you will create a worksheet to calculate the actual cost of purchasing a previously owned Lamborghini sports car that is selling for \$150,000. You will then pose several "what if" questions about the proposed purchase terms of this exotic "dream car" to see how various terms affect the amount of interest paid for the car.

STEP 1 Create a Database

SOFTWARE: Microsoft Excel

WHAT TO DO: Create a new Microsoft Excel worksheet like the one in Example 1.

	A	B	C	D	E
1	Honest Ed's Dream Machine				
2	Dream Car: Lamborghini Countach				
3					
4	Sale Price:	\$150,000.00			
5					
6	Loan Amount	\$140,000.00	\$140,000.00	\$120,000.00	
7	Interest Rate	5%	5%	5%	5%
8	Length of Loan (in years)	30	5	30	30
9	Number of Payment Periods Per Year	12	12	12	12
10	Amount Paid Each Payment Period	\$751.55	\$2,641.97	\$644.19	
11	Total Amount Paid	\$270,558.10	\$158,518.36	\$231,906.94	\$0.00
12	Total Interest Paid	\$130,558.10	\$18,518.36	\$111,906.94	\$0.00

Example 1: Microsoft Excel worksheet designed to calculate interest and total payment for a purchase, based on different loan terms.

Follow these time-saving tips:

Worksheet Titles: To create a bold face and centered worksheet title, type the title in column A and press Enter. Highlight columns A through E and then click the Merge and Center button on Microsoft Excel's Formatting toolbar. Click the Bold button. Increase the font size of the text to 14.

Word Wrap: Enter cell contents in column A. To turn on word wrap, highlight all cells in which text must wrap (A6:A12) then right-click the highlighted cells. Click the Alignment tab, then select Wrap text in the Text

control section.

Column Width: To adjust column width, double click the column boundary to the right of a column heading. To create columns of uniform width, select those columns, choose Column from the Format menu, choose Width, then enter a value, e.g. 14.

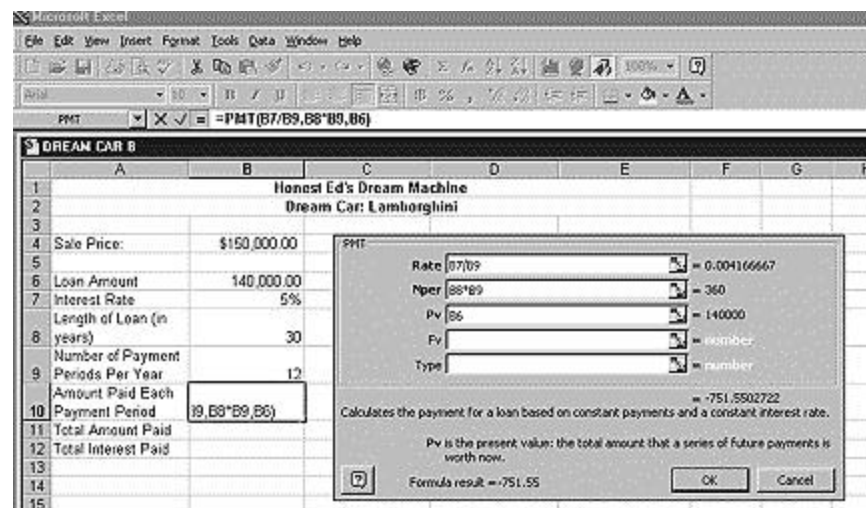
Formatting Currency: Format cells B4, B6, B10, B11, and B12 as Currency, by selecting B4, then pressing the Ctrl key while clicking the other cells. Right-click on a highlighted cell, then choose Format Cells from the pop-up menu. Click the Number tab and choose Currency with 2 decimal places.

Saving Work: Turn on AutoSave to have Microsoft Excel save a workbook automatically at a time interval that you specify. If AutoSave is not available from the Tools menu, choose Add-Ins from the Tools menu, place a check mark in the AutoSave Add-Ins dialog box, click OK. Then choose AutoSave from the Tools menu to specify the time interval for Automatic Save. Now Microsoft Excel will pop up save reminders.

STEP 2 Adding Formulas

SOFTWARE: Microsoft Excel

WHAT TO DO: Follow these time-saving tips for adding formulas:



Example 2: Microsoft Excel's Periodic Payment Function

PMT Function: In Cell B10 paste Microsoft Excel's PMT function (Periodic Payment Function). Click cell B10, then choose Function from the Insert menu. Select Financial from the Function Category list, then choose PMT from the Function Name list. Click OK.

Type the following cell references in the PMT dialog box. For Rate (the interest rate per period for the loan), type =B7/B9; for Nper (the total number of loan payments), type =B8*B9; for Pv (loan amount), type =B6. Choose OK.

Microsoft Excel returns a negative number to indicate that you are making a payment.

Note: To work with positive numbers on the worksheet, calculate PMT as

follows: $=PMT(\text{rate}, \text{nper}, -\text{pv})$.

"Total Amount Paid" Formula: In B11, type the following formula, which will calculate the total amount paid for a loan: $=SUM(B10*(B8*B9))$, where $B10=PMT$ (i.e., the amount paid each payment period) and $B8*B9 = \text{nper}$ (the total number of loan payments).

"Interest Paid" Formula: In B12, type the following formula which calculates the total amount of interest paid: $=SUM(B11-B6)$, which is the total amount paid minus the loan amount.

Showing Formulas: To have Microsoft Excel show formulas, rather than formula results, choose Options from the Tools menu; click the View tab, then select the Formulas check box. To display formula results, clear the check box.

Once you format the cell contents of column B, entering appropriate formulas where necessary, you can copy cell content and format to columns C and D using Autofill or Fill Right.

STEP 3 *Reality Check*

SOFTWARE: Microsoft Excel

WHAT TO DO: Once your worksheet is set up, you can pose different "what if" questions about your loan to see how the total amount of interest paid might change. For example, what if the interest rate was 4% and the length of the loan was ten years? What would your monthly payment be? How much interest would you pay over the life of the loan?

Assume you want to pay a maximum of \$250 per month for a new car. Also, assume that you are willing to take out a five-year loan at an interest rate of 5 percent. Calculate the maximum selling price of a car you can afford, based on those assumption. Use the same worksheet, entering numbers in Column E. First, select E10 (the cell with the PMT function), then choose Clear/ Contents from the Edit menu to delete the formula. Copy contents of cells D7:D9 to E7:E9. Copy formulas in D11 and D12 to E11 and E12 respectively.

Now enter 250 in Cell E10. (This is the amount of money you want to pay each month). On a piece of scratch paper, solve the following algebraic equation where $X = \text{price of car per month}$ and $.05X = \text{monthly cost of interest}$. For example:

$$\begin{aligned} X + .05X &= 250 \\ 1.05X &= 250 \\ X &= 238.1 \end{aligned}$$

Each time you pay \$250, \$238.10 is principal and \$11.90 is interest. You can now determine the amount you can afford to pay for the car, assuming no down payment.

In E6 enter the following formula: $=238.1*(E8*E9)$, where \$238.10 is the monthly principal and the product of $E8*E9$ is the number of total payments.

