Advanced Excel/Exercise 4
Making a Loan Calculator

Background Information

Everyone would like to buy a car, a boat, a home theater, and/or a home. Unfortunately, few people have the money to pay cash for these items. Most people need to borrow money from the bank or lending company and pay the money back over time—usually five years for a car and 30 years for a house. When you borrow money from a bank, you sign a contract agreeing to make a monthly payment. If you miss payments, the bank can go to court and repossess the car or even the home. The bank loans you the money and you pay the bank back the original money plus interest. How much interest you pay the bank depends on the interest rate—which is a percent. This is how the bank makes a profit and stays in business.

Two of the most powerful aspects of Excel are its wide array of functions and its ability to answer *what-if* questions. You have learned the Average, Median, Mode, Max, and Min functions. In this exercise, you will learn about the **PMT** function, which allows you to determine the monthly payment of a loan. You will create an easy to read worksheet that determines the monthly payment, the total interest, and the total payment for a loan.

This exercise introduces you to creating macros with Visual Basic. This programming plug-in allows you to create custom keyboard, menu, and toolbar commands, and buttons. Visual Basic commands work in Microsoft Word, Excel, and PowerPoint. In this exercise, you will create a button on the worksheet that prompts you with questions. By answering the questions, you can calculate the monthly payment for your loan. You will also create a custom keyboard shortcut to automatically print two copies of your formula to Ireland in landscape orientation.

Open an Existing Excel File

1. Start Microsoft Excel 2000.

2. Click the **Open** button on the **Standard** toolbar.

3. The Open dialog box opens.

4. Click the drop-down arrow to the right of the **Look in** box and select **your period folder**.

5. Click the **Advanced Excel Exercises** workbook to select it.

6. Click the **Open** button .

7. Click **Insert** on the **Menu** bar and select **Worksheet**.

8. A new worksheet in inserted into your workbook.

9. Double-click the **Sheet1** tab.

10. Rename the sheet **Loan Calculator**

Setting-up the Spreadsheet

It's a good idea to set-up the entire spreadsheet before you add your labels and data.

11. Click in any cell.

12. Press **Ctrl+A** to select all.

13. Press **Ctrl+1**.

14. The **Format Cells** dialog box opens.

15. Click the **Alignment** tab.

16. Under **Text alignment** there are two text boxes.

	A	B
1	**Our Loan Calculator**	
2	Date	
3	Item	
4	Price	
5	Down Payment	
6	Loan Amount	
7	Interest Rate	
8	Years	
9	Monthly Payment	
10	Total Interest	
11	Total Cost	

17. Under **Vertical** click the drop-down arrow and select **Center**.

18. Click the **Font** tab.

19. Change the **Font style** to Bold.

20. Change the **Font Size** to 14-points.

21. Click **OK**.

22. Click **Column Heading A** _____A_____ and drag to **Column Heading B** _____B_____ .

23. Click **Format** on the **Menu** bar, point to **Column,** and select **Width**.

24. Change the **Column Width** to 25.

25. Click **OK**.

26. Click the **Row 1 Heading** and drag down to the **Row 13 Heading**.

27. Click **Format** on the **Menu** bar, point to **Row**, and select **Height**.

28. Change the **Row Height** to 30 points.

29. Click **OK**.

Entering the Text

30. Click in cell **A1** and drag across to cell **B1**.

31. The cells are now selected.

32. On the **Formatting** toolbar, click the **Merge and Center** button ⊞.

33. Click in cell **A1**.

34. Type **Our Loan Calculator**.

35. Copy the text in Figure 1 for all the cells in Column A.

More Formatting the Spreadsheet

36. Click in cell **A1**.

37. On the **Formatting** toolbar, click the drop-down arrow next to the **Font Color** button **A** ▾ and select the **Red color**.

38. Click in cell **A2** and drag to cell **B11**.

39. Press **Ctrl+1**.

40. The **Format Cells** dialog box opens.

41. Click the **Border** tab.

42. Change the **Color** to Red.

43. Under **Line Style**, select the thickest line.

44. Click the **Outline** button.
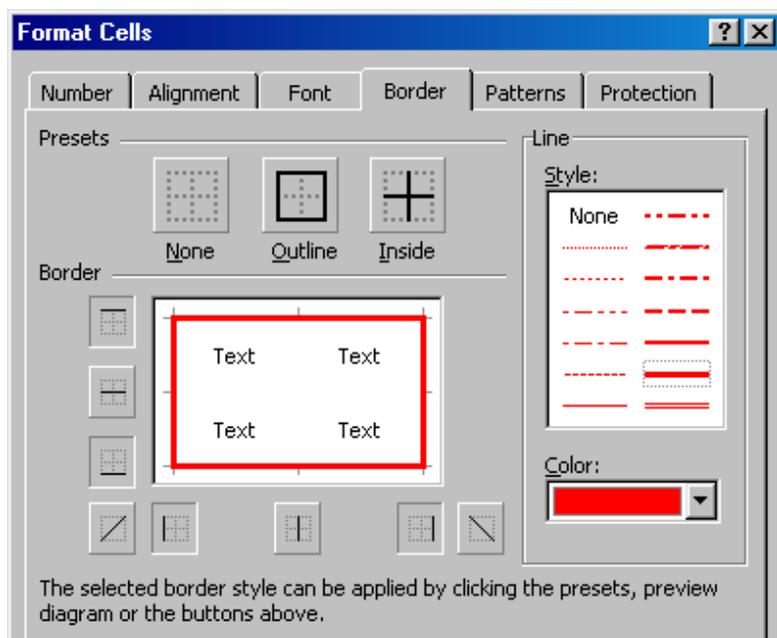
45. Click **OK**.

46. Click in cell **A2** and drag to cell **B2**.

47. Using the **Formatting** toolbar, click the drop-down arrow next to the **Border** button and select **Bottom Border** ▒.

48. Click in cell **A2** and drag down to cell **A11** to select the row labels.

49. Using the **Formatting** toolbar, click the drop-down arrow next to the **Border** button and select **Right Border** ▒.

50. Click in cell **B4** and drag to cell **B6**.

51. Hold the **Control** key down.

52. Click in cell **B9** and drag to cell **B11**.

53. Release the **Control** key.

54. Press **Ctrl+1**.

55. Click the **Number** tab.

56. Under **Category** select **Currency**.

57. Click **OK**.

58. Click in cell **B2** and drag down to cell **B11**.

59. Using the **Formatting** toolbar, click the **Align Right** button.

60. Click in cell **B6**.

61. Press **Ctrl+1**.

62. Click the **Number** tab.

63. Under **Category** select **Percentage**.

64. In the **Decimal places** box type **2**.

65. Click **OK**.
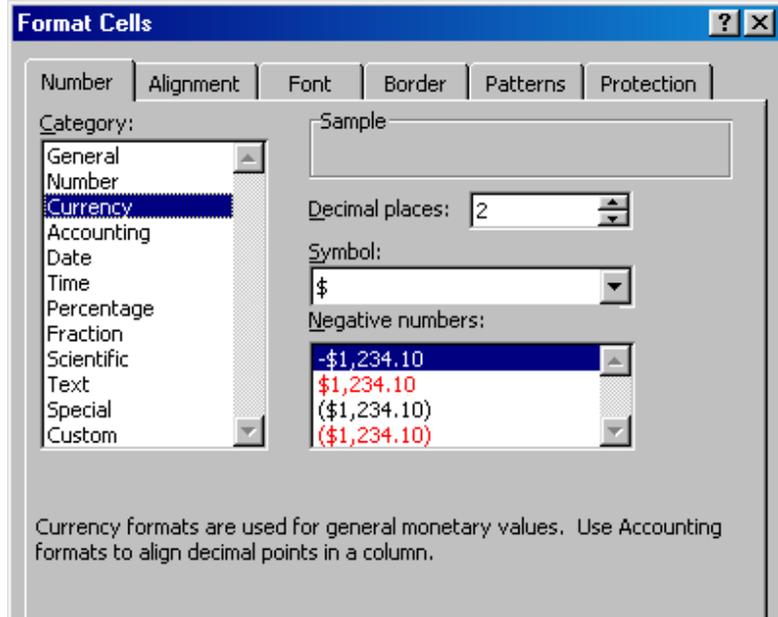
Entering the System Date Function

Here is how to enter the date using the date function. Excel will use the date from your computer.

66. Click in cell **B2**.

67. Type **=today()**.

68. Press **Enter**.

Entering the Loan Data

Let's pretend you want to buy a home theater system and you need to borrow $21,00.00 from the bank. What will be the monthly payment? How much interest will you pay the bank? What will be the total cost of the loan?

69. In cell **B3** type **Home Theater**.

70. Press **Enter**.

71. In cell **B4** type **21000**.

Figure 2

72. Press **Enter**.

73. In cell **B5** type **3500**.

74. Press **Enter twice**.

75. In cell **B7** type **8.25**.

76. Press **Enter**.

77. In cell **B8** type **4**.

78. Press **Enter**.

79. Look at Figure 2.

Calculating the Loan Amount

The loan amount is the price – the down payment.

80. Click in cell **B6**.

81. Type =**b4-b5**.

82. Press **Enter**.

83. The loan amount should be **$17,500** if your formula is correct.

	A	B
1	**Our Loan Calculator**	
2	Date	October 2, 2003
3	Item	Home Theater
4	Price	$21,000.00
5	Down Payment	$3,500.00
6	Loan Amount	
7	Interest Rate	8.25%
8	Years	4
9	Monthly Payment	
10	Total Interest	
11	Total Cost	

Calculating the Monthly Payment with the PMT Function

To determine the monthly payment you will use the PMT function. The PMT function has three arguments.

$$=PMT(rate, payments, loan\ amount)$$

- Rate is the interest rate for each *month*

- Payments is the number of payments

- Loan Amount is the amount of the loan

Cell B7 displays the *annual* interest rate. However, banks calculate interest on a monthly basis. Therefore, the rate value must be divided by 12. The total number of payments is the number of years*12, because there are 12 months or 12 payments per year.

84. Click in cell **B9**.

85. Type =**pmt(b7/12,12*b8,-b6)**.

86. Press **Enter**.

87. You must type "–b6" so that the month payment become a positive number.

6	Loan Amount	$17,500.00
7	Interest Rate	8.25%
8	Years	4
9	Monthly Payment	$429.28

88. The monthly payment should be **$429.28** if your formula is correct.

89. Press **Ctrl+S** to save your workbook.

Calculating the Total Interest

The next step is to calculate the total interest, which is the profit that the bank will make. This is the cost of the loan to you. The total interest is equal to the number of monthly payments (the number of years *12) minus the loan amount.

90. In cell **B10** type, =**12*b8*b9-b6**.

91. Press **Enter**.

92. The total interest that you will pay the bank is **$3,105.57** if your formula is correct.

8	Years	4
9	Monthly Payment	$429.28
10	Total Interest	$3,105.57

Calculating the Total Cost

The total cost of the loan is equal to the number of monthly payments plus the down payment.

93. In cell **B11** type, =**12*b8*b9+b5**.

94. Press **Enter**.

95. The total interest that you will pay the bank is **$24,105.57** if your formula is correct.

9	Monthly Payment	$429.28
10	Total Interest	$3,105.57
11	Total Cost	$24,105.57

Setting-up a Heading on the Spreadsheet

96. Click **File** on the **Menu** bar and select **Page Setup**.

97. The Page Setup dialog box opens.

98. Click the **Page** tab.

99. Under **Orientation**, select **Portrait**.

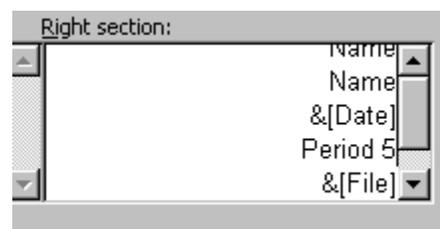100.   Click the **Header/Footer** tab.

101.   Click the **Custom Header** button.

102.   The Header dialog box opens.

103.   Click in the **right pane** of the **Header** window.

104.   Type your name and press **Enter**.

105.   Type the name of your partner and press **Enter**.

Right section:

Name
Name
&[Date]
Period 5
&[File]

106. Click the **Date** button .

107. Press **Enter**.

108. Type the word **Period**, press the **Spacebar**, and type your **period number**.

109. Press **Enter**.

110. Click the **Filename** button .

111. Click **OK**.

112. You can't see the header you just made until you go to Print Preview.

113. Click the **Margins** tab.

114. Set the **Top** margin to 2 inches.

115. Under **Center on page** check the box next to **Horizontal**.

116. Click **OK**.

117. Press **Ctrl+S** to save your workbook.

Spell Check the Document

118. Press the **Spell Check** button on the **Standard** toolbar.

119. Run the Spell Check.

Print Preview the Document

120. Click the **Print Preview** button on the **Standard** toolbar.

121. Your document should look like Figure 3.

122. Click the **Close** button when you have previewed the spreadsheet.

Figure 3

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P.C. User
10/9/03
Period 1
Advanced Excel Exercises

Our Loan Calculator

Date	October 9, 2003
Item	Home Theater
Price	$21,000.00
Down Payment	$3,500.00
Loan Amount	$17,500.00
Interest Rate	8.25%
Years	4
Monthly Payment	$429.28
Total Interest	$3,105.57
Total Cost	$24,105.57

Creating a Macro to Automate Entering Loan Data

Macros allow you to customize a program to your own needs. You can create your own menu items, toolbar buttons, or keyboard shortcuts. A macro is made up of a series of statements that tell Excel how to complete a task. Macros such as the one in Figure 7 can be used to complete routine tasks such as printing, saving, or backing up. In this exercise, you will create macro that will create a sort of "wizard" to guide a user through entering the required loan data in the range B3:B8. Before the macro can be entered, the button that executes the macro must be added to the worksheet.

Adding a Button to the Worksheet to Execute a Macro

123. **Right**-click one of the toolbars and select **Control Toolbox**.

124. The Control Toolbox displays.

125. Click the **Design Mode** button on the **Control Box** toolbar so that it is turned on.

126. Click the **Command** button on the **Control Box** toolbar.

127. Move the mouse pointer (the cross hair) to the **upper-left** corner of cell **A13**.
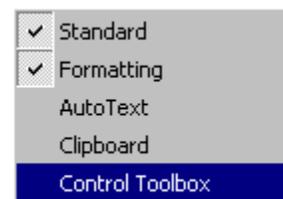
128. Drag the mouse pointer to create a **rectangle** fills up cell **A13**.

129. Use the **resizing handles** to adjust the size of the button.

130. Look at Figure 4.

Figure 4

The button should fit the cell.

## *Editing the Button Name and Setting Button Properties*

Properties are rules that the button follows. The name of the button is a property that you can change. You will also need to change several other properties. For example, you will change the button properties so that the button does not print when the worksheet is printed.

131. **Right**-click the button and select **Properties**.

132. The Properties window opens.

133. Resize the window so you can read the properties.

134. Click the **Alphabetic** tab.

135. Change the **Caption** from **CommandButton1** to **New Loan**.

136. Click **Font** in the Properties window.

Figure 5: Resize the window so you can read the properties.
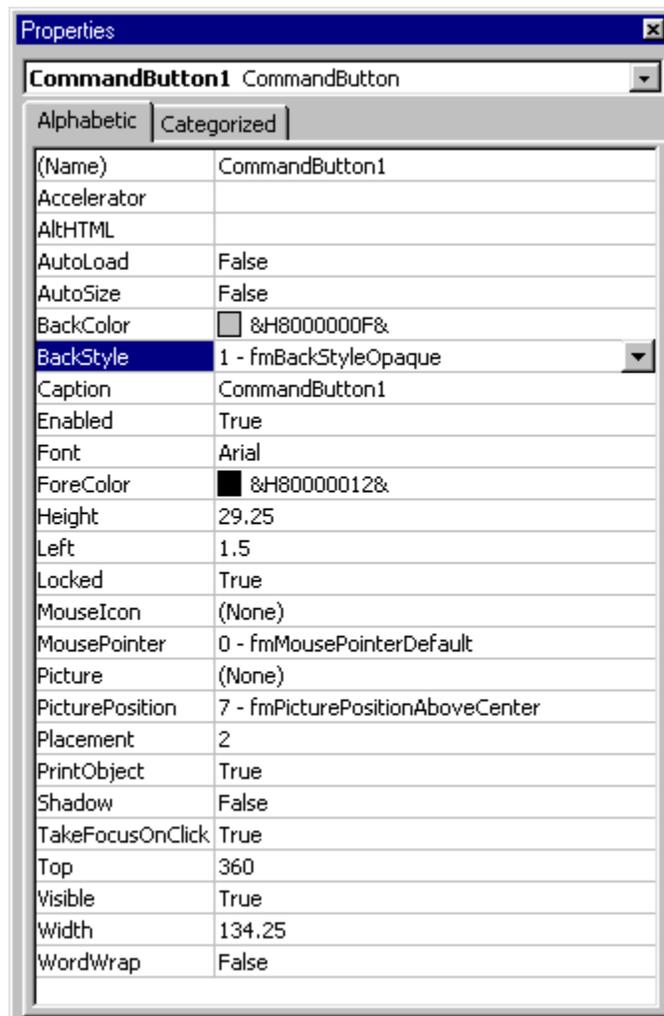
137. In the **Font row** a button ⌷ appears.

138. Click the button ⌷.

139. The Font dialog box appears.

140. Change the **Font** to Arial.

141. Change the **Size** to 14 points.

142. Change the **Font Style** to Bold.

143. Click **OK**.

144. Click **ForeColor** in the Properties window.
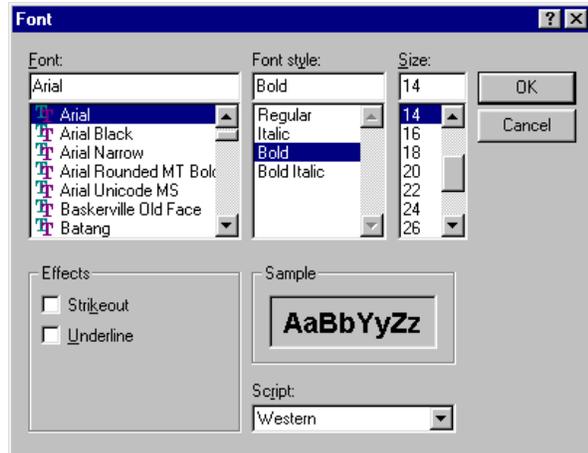
145. Click the drop-down arrow ▾ in the **ForeColor** row.

146. Click the Palette tab.

147. Click the Red color on the palette.

148. Click **PrintObject** in the Properties window.

149. Click the drop-down arrow ▾ in the **PrintObject** row.

150. Select **False**.

151. Now the button will not show up when you print the worksheet.

152. Click the **Close** button on the **Properties** window.
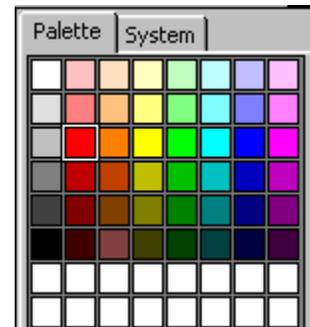
Visual Basic Statements

Macros are written in a powerful programming language called **Visual Basic for Applications (VBA)**. Visual Basic statements are instructions that tell Excel to execute a specific task.

A macro written in VBA begins with a **Sub statement** and ends with an **End Sub statement**. This is like the beginning of the procedure and the end of the procedure. The Sub statement includes the name of the Sub procedure. Look at Figure 7.

Remark or **Rem** statements are comments that do not affect the procedure; they simply add information about the macro. In Figure 6, there are six comment lines before the Sub statement.

When you execute a macro, Excel steps through the Visual Basic statements one a time, beginning at the top of the Sub procedure. Excel bypasses any statements that begin with Remark, Rem, or an apostrophe.

Warning: Some viruses are written in VBA. When try to open your workbook, Excel will warn you that your worksheet contains VBA code that may contain a virus.

Writing the Remark Statements in Visual Basic

Time to start programming.

153. Click the **Design Mode** button ![icon] on the **Control Box** toolbar so that it is turned on.

154. **Right**-click the **New Loan** button [New Loan] and select **View Code**.

155. The **Visual Basic** plug-in will open.

156. You may see two windowpanes.

157. If you do, close the pane on the left.

158. Your window should look like Figure 6.

Figure 6 The remark statement start with Rem. These statements do not affect how the macro will work.
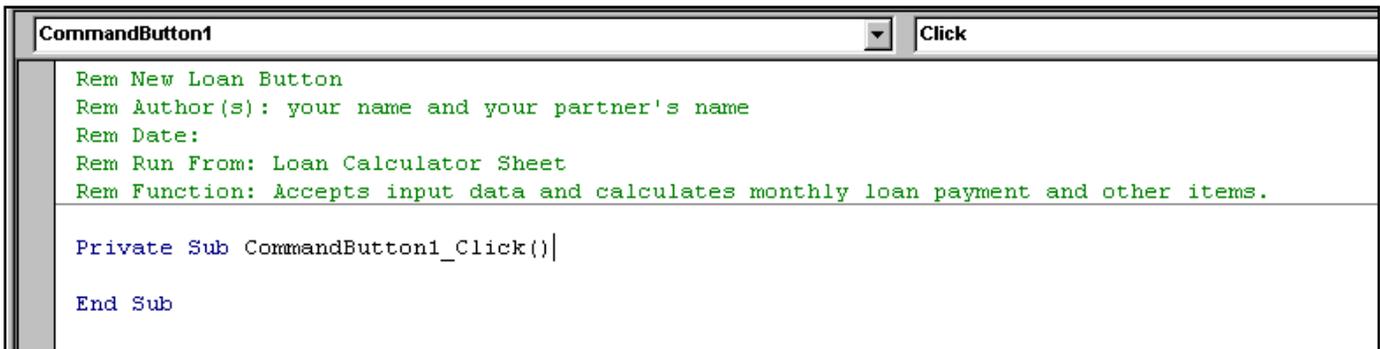
```
CommandButton1                              ▼  Click

Rem New Loan Button
Rem Author(s): your name and your partner's name
Rem Date:
Rem Run From: Loan Calculator Sheet
Rem Function: Accepts input data and calculates monthly loan payment and other items.

Private Sub CommandButton1_Click()|

End Sub
```

159. Move the insertion point to the **left** of the **P** in the word **Private**.

160. Press **Enter twice** to move the **Sub** statement down two lines.

161. Press the **Up Arrow** key **twice** to move back to the first line.

162. Type the **five** remark (Rem) statements you see in **Figure 6**.

163. Check your work for accuracy.

164. Remember to start each comment line with **Rem** and then a **space**.

Writing the Macro in Visual Basic

165. Move the insertion point to the **blank line** between the **Sub** and **End Sub** statements.

166. The Sub statement starts the routine.

167. The End Sub statement stops the routine.

168. Type the Sub procedure shown in Figure 7.

Figure 7: Carefully copy the code below. Make sure that your spaces and punctuation are correct.

```
(General)                                              ▼   (Declarations)

Rem New Loan Button
Rem Author(s): your name and your partner's name
Rem Date: (Type today's date.)
Rem Run From: Loan Calculator Sheet
Rem Function: Accepts input data and calculates monthly loan payment and other items.


Private Sub CommandButton1_Click()
Sheets("Loan Calculator").Select
Range("B3:B8").Select
Selection.ClearContents
Range("B3").Value = InputBox("Item to purchase?", "Enter")
Range("B4").Value = InputBox("Price of Item?", "Enter")
Range("B5").Value = InputBox("Down Payment?", "Enter")
Range("B6").Value = "=b4-b5"
Range("B7").Value = InputBox("Interest Rate in Decimal Form?", "Enter")
Range("B8").Value = InputBox("Time in Years?", "Enter")
Range("B13").Select
End Sub
```
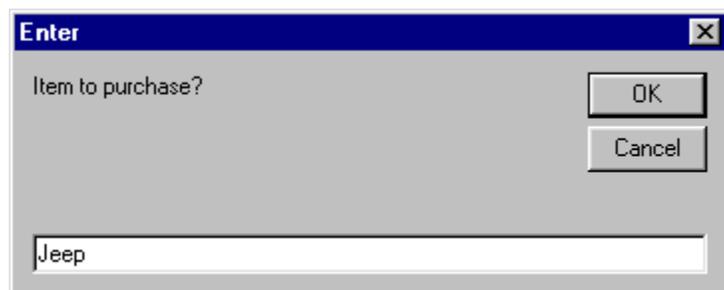
169.   Click the **Close** button on the Visual Basic Title bar to return to the Loan Calculator spreadsheet.

170.   Click the **Design Mode** button ⬛ on the **Control Box** toolbar so that it is turned off.

171.   Press **Ctrl+S** to save your worksheet.

Using the Macro to Purchase a Jeep

Let's pretend you want to buy a new Jeep as your first car. You can only afford to spend **$350** per month. The cost of the Jeep is 23,500. You will make a down payment of $7,500 that you have saved. You want the loan for 3 years. The bank is charging 9.75% interest. How much will your monthly payment be? How much interest will the bank earn? How much will the total cost of the car be?

172.   Click the **New Loan** button ⬛ New Loan ⬛.

173.   The macro executes. The code runs line by line.

174.   First, the **B3:B8** range is **cleared**.

175.   Next, the first input box appears with a question.

```
Enter                                          ✕
Item to purchase?                          [ OK ]
                                           [ Cancel ]

Jeep
```
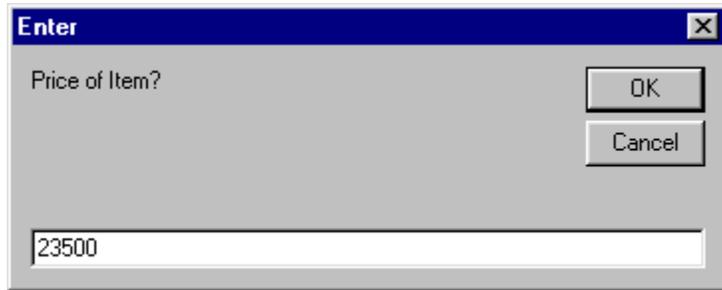
176. Type **Jeep** and click **OK**.

177. **Jeep** is entered into cell **B3**.
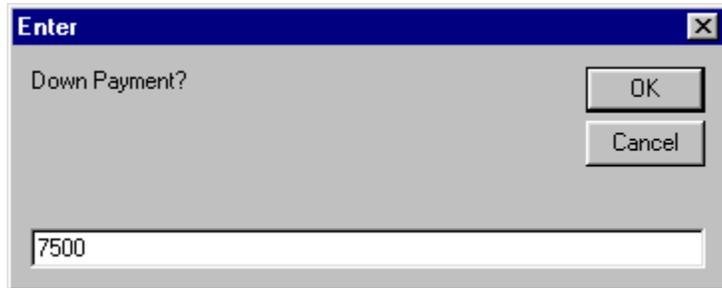
178. The next input box appears.

179. Type **23500** and click **OK**.

180. The **number** is entered into cell **B4** and formatted as currency.

181. The next input box appears.
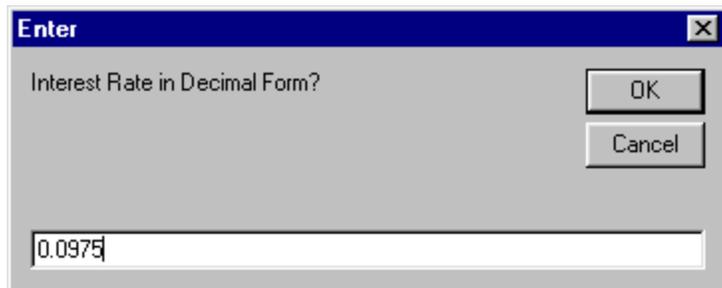
182. Type **7500** and click **OK**.

183. The **number** is entered into cell **B5** and formatted.

184. The down payment is subtracted from the cost and entered into cell B6.

185. The next input box appears.

186. Type **0.0975** and click **OK**.

187. The **number** is entered into cell **B7** and formatted.

188. The next input box appears.

189. Type **3** and click **OK**.

190. The number is entered into cell **B8**.

191. The **Monthly Payment**, **Total Interest**, and the **Total Cost** are now calculated.

192. You *cannot afford* to buy the Jeep because the monthly payment is **too large**.

193. You have two choices—you can save for a while longer to create a larger down payment, or you can increase the number of years to pay back the loan.

Changing the Down Payment to $10,000

If you have a larger down payment, you are borrowing less from the bank. Therefore, your monthly payment is less.

194. Click in cell **B5**.

195. Type **10000**.

196. Press **Enter**.

197. Look at the result.

198. The monthly payment has gone down, but it is still *too high*.

5	Down Payment	$10,000.00
6	Loan Amount	$13,000.00
7	Interest Rate	9.75%
8	Years	3
9	Monthly Payment	$417.95
10	Total Interest	$2,046.17
11	Total Cost	$25,046.17

Changing the Number of Years of the Loan

If you pay back your loan over more years, you can pay back less each month. Therefore, your monthly payment is less.

199. Click in cell **B8**.

200. Type **4**.

201. Press **Enter**.

202. Look at the result.

203. The monthly payment has gone down, and it is under $350.

204. You can now **afford** the Jeep.

8	Years	4
9	Monthly Payment	$328.15
10	Total Interest	$2,751.44
11	Total Cost	$25,751.44

205. However, notice that the total cost of this loan is the greatest because the total interest is has increased.

206. Press **Ctrl+S** to save your worksheet.

Using the Loan Calculator to Purchase a New Computer

After much research, your teacher has decided which computer he wants to buy. He will pay for the computer by making monthly payments over a period of three years. Before he buys the computer, your teacher wants to know how much he actually will pay for the computer with all the interest. The cost of the computer is $2,500; the interest rate is 11% for 3 years. What will be the total cost of the computer?

207. Click the **New Loan** button New Loan .

208. The macro executes. The code runs line by line.

209. First, the **B3:B8** range is **cleared**.

210. Next, the first input box appears with a question.

211. Type **computer** and click **OK**.

212. The next input box appears.

213. Type **2500** and click **OK**.

214. The next input box appears.

215. Type **0** and click **OK**.

216. The next input box appears.

217. Type **0.11** and click **OK**.

218. The next input box appears.

219. Type **3** and click **OK**.

220. The **Monthly Payment**, **Total Interest**, and the **Total Cost** are now calculated.

Creating a Print Macro the Easy Way

Printing would be a lot easier if you had a macro. Here is how to make one without directly typing VBA. The **Macro Recorder** does the work. The Macro Recorder records your keystrokes and turns it into VBA code for you.

Warning! You make the macro perfectly or you must delete the macro and start all over.

221. Click **Tools** on the **Menu** bar, point to **Macros**, and select **Record New Macro**.

222. The Record Macro Dialog box opens.

223. Copy the **Macro name** in the picture to the right.

224. Click in the **Shortcut key** text box.

225. Press the **Shift** key and the **P** key.

226. The keyboard shortcut will be **Ctrl+Shift+P**.

227. Copy the other two text boxes in the picture to the right.

228. Click **OK**.

229. The Macro Recorder opens and begins recording.
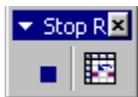
230. Press **Ctrl+P**.

231. The Print dialog box opens.

232. Under **Name**, select Ireland.

233. Under **Print what**, select Active sheet(s).

234. Under **Copies**, type **2**.

235. Click **OK**.

236. Click the **Stop** button on the **Macro Recorder** ▪.
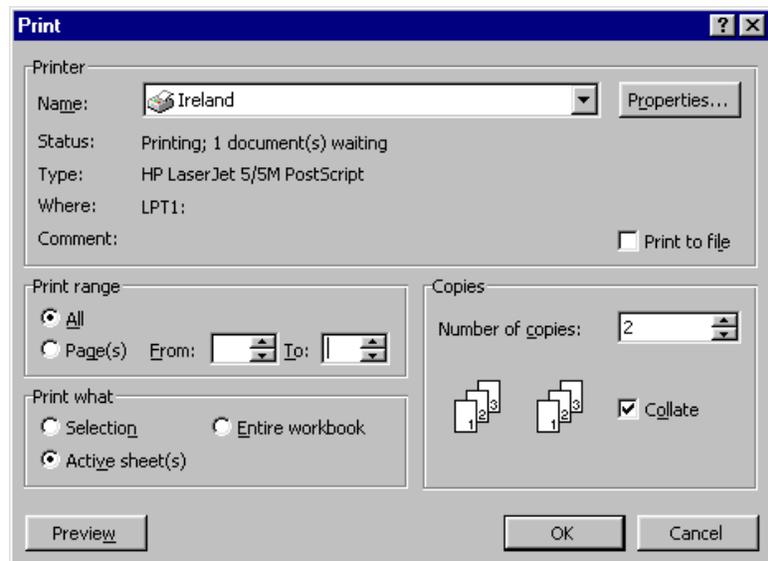
237. You now have a macro that can be used with this workbook.

238. Press **Ctrl+S** to save your worksheet.

Using the Loan Calculator to Purchase a Dream Car

In a few years, you will probably shop for a new car. The Loan Calculator will help your figure out your monthly payment. **Your monthly payment cannot exceed $500 per month**.

239. Use the Web site: **www.edmonds.com** to find the price of a car that you want.

240. Click the **New Loan** button New Loan.

241. The macro executes. The code runs line by line.

242. First, the **B3:B8** range is **cleared**.

243. Next, the first input box appears with a question.

244. Type **the name of your car** and click **OK**.

245. The next input box appears.

246. Type **the price of the car** and click **OK**.

247. The next input box appears.

248. Type **your down payment** and click **OK**.

249. The next input box appears.

250. Type **0.01** and click **OK**.

251. The next input box appears.

252. Type a number between **1 and 5** and click **OK**.

253. The **Monthly Payment**, **Total Interest**, and the **Total Cost** are now calculated.

254. Change the spreadsheet so that you can *afford* your car.

255. The **Down Payment** and **Years** are the variables that you can change.

256. Press **Ctrl+S** to save your worksheet.

Using the Print Selected Sheet Macro

257. Press **Ctrl+Shift+P**.

258. Automatically, two copies of the worksheet will be printed to Ireland.