34. The following steps compute the price of ketchup:
   (a) Declare all variables used in steps (b)–(d).
   (b) Assign “ketchup” to the variable item.
   (c) Assign 1.80 to the variable regularPrice.
   (d) Assign .27 to the variable discount.
   (e) Display the phrase “1.53 is the sale price of ketchup.”

35. The following steps display a copyright statement:
   (a) Declare the variable used in step (b).
   (b) Assign “Prentice Hall, Inc.” to the variable publisher.
   (c) Display the phrase “© Prentice Hall, Inc.”

36. The following steps give advice:
   (a) Declare the variable used in step (b).
   (b) Assign “Fore” to the variable prefix.
   (c) Display the phrase “Forewarned is Forearmed.”

In Exercises 37 and 38, write a line of code to carry out the task. Specify where in the program the line of code should be placed.

37. Declare the variable str as a string variable visible to all parts of the program.
38. Declare the variable str as a string variable visible only to the btnTest_Click event procedure.

In Exercises 39 through 42, the interface is specified. Write a program to carry out the stated task.

39. If \( n \) is the number of seconds between lightning and thunder, the storm is \( n/5 \) miles away.
   Write a program that reads the number of seconds between lightning and thunder and reports the distance of the storm. A sample run is shown in Fig. 3.3.

40. The American College of Sports Medicine recommends that you maintain your training heart rate during an aerobic workout. Your training heart rate is computed as \( 0.7 \times 220 - a + 0.3 \times r \), where \( a \) is your age and \( r \) is your resting heart rate (your pulse when you first awaken). Write a program to read a person’s age and resting heart rate and display the training heart rate. (Determine your training heart rate.) A sample run is shown in Fig. 3.4.

41. The number of calories burned per hour by cycling, running, and swimming are 200, 475, and 275, respectively. A person loses 1 pound of weight for each 3500 calories burned.
Write code to read the number of hours spent at each activity and then display the number of pounds worked off. A sample run is shown in Fig. 3.5.

**FIGURE 3.5** Sample output of Exercise 41.

**FIGURE 3.6** Sample output of Exercise 42.

42. Write code to read the name of a baseball team, the number of games won, and the number of games lost, and display the name of the team and the percentage of games won. A sample run is shown in Fig. 3.6.

In Exercises 43 through 48, write a program to carry out the task. The program should use variables for each of the quantities and display the outcome in a text box with a label as in Example 2.

43. Request a company's annual revenue and expenses as input, and display the company's net income (revenue minus expenses). (Test the program with the amounts $550,000 and $410,000.)

44. Request a company's earnings-per-share for the year and the price of one share of stock as input, and then display the company's price-to-earnings ratio (that is, price/earnings). (Test the program with the amounts $5.25 and $68.25.)

45. Calculate the amount of a waiter's tip, given the amount of the bill and the percentage tip as input. (Test the program with $20 and 15 percent.)

46. Convert a percentage to a decimal. For instance, if the user enters 125\% into a text box, then the output should be 1.25.

47. Write a program that contains a button and a read-only text box on the form, with the text box initially containing 100. Each time the button is clicked on, the number in the text box should decrease by 1.

48. Write a program that requests a (complete) phone number in a text box and then displays the area code in another text box when a button is clicked on.

49. Write a program that requests a sentence, a word in the sentence, and another word and then displays the sentence with the first word replaced by the second. For example, if the user responds by typing "What you don't know won't hurt you," into the first text box and know and one into the second and third text boxes, then the message "What you don't one won't hurt you." is displayed.

50. Write a program that requests a letter, converts it to uppercase, and gives its first position in the sentence "THE QUICK BROWN FOX JUMPS OVER A LAZY DOG." For example, if the user responds by typing b into the text box, then the message "B first occurs in position 10." is displayed.

51. The formula $s = \sqrt{24d}$ gives an estimate of the speed in miles per hour of a car that skidded $d$ feet on dry concrete when the brakes were applied. Write a program that requests the
64. Pop up a message dialog box with “Taking Risks Proverb” in the title bar and the message “You can’t steal second base and keep one foot on first.”

In Exercises 65 and 66, write an event procedure with the header Private Sub btnCompute_Click(...) Handles btnCompute.Click, and having one, two, or three lines for each step. Lines that display data should use the given variable names.

65. The following steps calculate the percent increase in the cost of a typical grocery basket of goods:
   (a) Declare all variables used in the steps that follow.
   (b) Assign 200 to the variable begOfYearCost.
   (c) Request the cost at the end of the year with an input dialog box, and assign it to the variable endOfYearCost.
   (d) Assign (endOfYearCost – begOfYearCost) / begOfYearCost to the variable percentIncrease.
   (e) Display a sentence giving the percent increase for the year.
   (Test the program with a $215 end-of-year cost.)

66. The following steps calculate the amount of money earned in a walk-a-thon:
   (a) Declare all variables used in the steps that follow.
   (b) Request the amount pledged per mile from an input dialog box, and assign it to the variable pledge.
   (c) Request the number of miles walked from an input dialog box, and assign it to the variable miles.
   (d) Display a sentence giving the amount to be paid.
   (Test the program with a pledge of $2.00 per mile and a 15-mile walk.)

67. Write a program that requests a year in a masked text box and then displays the number of days in the year. Hint: Use the AddYears method and the DateDiff function.

68. Write a program that calculates the number of days since the Declaration of Independence was ratified (7/4/1776).

69. Write a program that requests a date in a masked text box, and then displays the day of the week (such as Sunday, Monday, ...) for that date.

70. Write a program that requests a date as input and then displays the day of the week (such as Sunday, Monday, ...) for that date ten years hence.

71. Write a program that requests a month and a year as input and then displays the number of days in that month. Hint: Use the AddMonths method.

72. Write a program that requests the user’s date of birth and then displays the day of the week (such as Sunday, Monday, ...) on which they will have (or had) their 21st birthday.

73. Design a form with two text boxes labeled “Name” and “Phone number”. Then write an event procedure that shows a message dialog box stating “Be sure to include the area code!” when the second text box receives the focus.

74. Write a program to calculate the amount of a server's tip given the amount of the bill and the percentage tip obtained via input dialog boxes. The output should be a complete sentence that reiterates the inputs and gives the resulting tip, as shown in Fig. 3.14 on the next page.

75. When $P$ dollars are deposited in a savings account at interest rate $r$ compounded annually, the balance after $n$ years is $P(1 + r)^n$. Write a program to request the principal $P$ and the interest rate $r$ as input, and compute the balance after 10 years, as shown in Fig. 3.15 on the next page.
CHAPTER 3 PROGRAMMING PROJECTS

1. Write a program that allows the user to specify two numbers and then adds, subtracts, or multiplies them when the user clicks on the appropriate button. The output should give the type of arithmetic performed and the result. See Fig. 3.18. Note: If one of the numbers in an input text box is changed, the output text box should be cleared.

![Possible outcome of Programming Project 1.](image)

![Possible outcome of Programming Project 2.](image)

2. Suppose automobile repair customers are billed at the rate of $35 per hour for labor. Also, suppose costs for parts and supplies are subject to a 5% sales tax. Write a program to display a simplified bill. The customer’s name, the number of hours of labor, and the cost of parts and supplies should be entered into the program via text boxes. When a button is clicked, the customer’s name and the three costs should be displayed in a list box, as shown in Fig. 3.19.

3. Write a program to make change for an amount of money from 0 through 99 cents input by the user. The output of the program should show the number of coins from each denomination used to make change. See Fig. 3.20.

![Possible outcome of Programming Project 3.](image)

![Possible outcome of Programming Project 4.](image)

4. Write a program to convert a U.S. Customary System length in miles, yards, feet, and inches to a Metric System length in kilometers, meters, and centimeters. A sample run is shown in Fig. 3.21. After the numbers of miles, yards, feet, and inches are read from the text boxes, the length should be converted entirely to inches and then divided by 39.37 to obtain the value in meters. The Int function should be used to break the total number of
meters into a whole number of kilometers and meters. The number of centimeters should be displayed to one decimal place. The needed formulas are as follows:

\[
\begin{align*}
\text{total inches} &= 63360 \times \text{miles} + 36 \times \text{yards} + 12 \times \text{feet} + \text{inches} \\
\text{total meters} &= \frac{\text{total inches}}{39.37} \\
\text{kilometers} &= \text{Int}(\text{meters}/1000)
\end{align*}
\]

5. Write a program to print a business travel expenses attachment for an income tax return. The program should request as input the name of the organization visited, the dates and location of the visit, and the expenses for meals and entertainment, airplane fare, lodging, and taxi fares. (Only 50% of the expenses for meals and entertainment are deductible.) A possible form layout and run are shown in Figs. 3.22 and 3.23, respectively.

![Business Travel Expenses Form](image)

**Figure 3.22** Form with sample data for Programming Project 5.

**Figure 3.23** Output for sample run of Programming Project 5.

Business Travel Expenses

Trip to attend meeting of SIGCSE 2010
March 10-13 in Milwaukee, WI

- Meals and entertainment: $190.10
- Airplane fare: $250.15
- Lodging: $675.35
- Taxi fares: $45.00

Total other than meals and entertainment: $970.50
50% of meals and entertainment: $95.05

**TOTAL DEDUCTIBLE EXPENSES: $1,065.55**