**Supplementary exercises**

1. Determine what will be displayed when each of the following lines is executed. Suppose that x = 2 and y = 3.

* 1. Write x
  2. Write x + x
  3. Write “x =”
  4. Write “x \* x”
  5. Write “x \* y”, y + x
  6. Write x \* y + y + x
  7. Write “x \* y + y + x”

1. Write a program that asks the user to enter two numbers, and that displays the sum, the product, the difference, and the quotient of these two numbers.

1. Write a program that asks the user to enter two integers, and that displays the larger number, followed by the words “ is greater than ”, followed by the smaller number. However, if the numbers are equal, the program should display “These numbers are equal.”
2. Write a program that receives three integers entered via the keyboard, and that displays the sum, the average, the product, the smallest, and the largest of these numbers.

1. Write a program that reads the radius of a circle, and that displays the diameter, the circumference, and the area of the circle. Use the constant value 3.14159 for π.

1. Drivers are concerned with the mileage of their automobiles. A driver decides to record the number of kilometers traveled and the number of litres of gasoline used, each time they refill their gas tank. Develop a program with the goal of being able to enter the number of kilometers traveled and the number of litres used upon each gas refill. The program should calculate and display the rate of gas consumption (in litres per 100 kilometers) between each gas refill. After having processed all of the information entered, the program should calculate and display the total rate of gas consumption (in litres per 100 kilometers) for all of the gas refills.

Example of the program’s execution:

Enter the number of litres used (-1 to terminate):

48.5

Enter the number of kilometers traveled:

459

The rate of gas consumption in litres per 100 kilometers for this gas refill is 10.566448.

Enter the number of litres used (-1 to terminate):

40.0

Enter the number of kilometers traveled:

320

The rate of gas consumption in litres per 100 kilometers for this gas refill is 12.500000.

Enter the number of litres used (-1 to terminate):

19

Enter the number of kilometers traveled:

192

The rate of gas consumption in litres per 100 kilometers for this gas refill is 9.8958333.

Enter the number of litres used (-1 to terminate):

-1

The total rate of gas consumption in litres per 100 kilometers is 11.071060.

7 – A large chemical products company compensates its commercial representatives by commission. The representatives receive $200 per week plus 9% of their gross sales per week. For example, a representative who sells $5000 of chemical products in one week receives a salary of $200 plus 9% of $5000, for a total of $650. Develop a program that asks for the gross weekly sales of each representative and that calculates and displays their salary. Process the information of one representative at a time.

Example of the program’s execution:

Enter the representative’s sales in dollars (-1 to terminate):

5000.00

The representative’s salary is $650.00.

Enter the representative’s sales in dollars (-1 to terminate):

6000.00

The representative’s salary is $740.00.

Enter the representative’s sales in dollars (-1 to terminate):

7000.00

The representative’s salary is $830.00

Enter the representative’s sales in dollars (-1 to terminate):

-1

**Supplementary exercises**

1. A palindrome is a number, a word, or a sentence that remains identical whether read from left to right or from right to left. For example, each of the following five-digit numbers is a palindrome: 12321, 55555, 45554, 11611. Write a program capable of reading a positive integer (greater than 0) with five digits, and of determining whether this integer is a palindrome. (Hint: use the modulus and division operators to separate the different digits composing the numbers.)

1. Write a program that converts the input of positive integer greater than 0 that is composed only of the digits 0 and 1 (that is, a “binary” integer) in order to display its decimal equivalent. (Hint: use the modulus and division operators to process the digits of the “binary” number one at a time, from right to left.)

1. Write a program that calculate the square and the cube of the numbers from 0 to 10.
2. Write a program that reads three non-zero integers and that determines and displays whether these integers could form the sides of a right-angled triangle.
3. A company desires to transmit data by telephone, but is concerned about the fact that their telephone lines can be secretly listened in on. All of this data is transmitted in the form of four-digit integers. You are asked to write a program able to encrypt this data, in order to ensure a more secure transmission. Your program should read a four-digit integer and execute the encryption in the following way: replace each of the digits in the integer by ((this digit + 7) modulo 10). Then, exchange the first digit with the third digit, and exchange the second digit with the fourth, and display the encrypted integer.  
   Write a separate program for encrypting the four-digit integer entered, and for decrypting the encrypted integer in order to find the original number.

1. The factorial of a non-negative integer is written with the expression *n*! (pronounced “*n* factorial”), and is defined in the following way:

*n*! = *n* \* (*n* – 1) \* (*n* – 2) \* … \* 1 (for *n* ≥ 1)

and

*n*! = 1 (for *n* = 0)

For example, 5! = 5 \* 4 \* 3 \* 2 \* 1 = 120.

Write a program that reads a non-negative integer, and then calculates and displays its factorial.

1. Write a program that calculates and displays the product of all the odd numbers between 1 to 15, inclusively.