

37. Write pseudocode for the main module and Display Welcome Message module. You do not have to write pseudocode for the other three modules.
38. Add pseudocode for the Input Data, Calculate Average, and Output Results modules to the pseudocode created in Review Exercise 37.
39. Construct a flowchart for this program (viewing it as a single module).
40. Give three examples of reasonable input data for testing this program.

Programming Challenges

Each of the following Programming Challenges can be solved by a program that performs three basic tasks—Input Data, Process Data, and Output Results. For each problem, use pseudocode to design a suitable program to solve it. Be sure to identify the data type of each variable used.

1. Prompt for and input a saleswoman's sales for the month (in dollars) and her commission rate (as a percentage). Output her commission for that month. Note that you will need to convert the percentage to a decimal. You will need the following variables:

SalesAmount CommissionRate CommissionEarned

You will need the following formula:

$$\text{CommissionEarned} = \text{SalesAmount} * (\text{CommissionRate}/100)$$

2. The manager of the Super Supermarket would like to be able to compute the unit price for products sold there. To do this, the program should input the name and price of an item per pound and its weight in pounds and ounces. Then it should determine and display the unit price (the price per ounce) of that item and the total cost of the amount purchased. You will need the following variables:

ItemName Pounds Ounces
PoundPrice TotalPrice UnitPrice

You will need the following formulas:

$$\text{UnitPrice} = \text{PoundPrice}/16$$

$$\text{TotalPrice} = \text{PoundPrice} * (\text{Pounds} + \text{Ounces}/16)$$

3. The owners of the Super Supermarket would like to have a program that computes the monthly gross pay of their employees as well as the employee's net pay. The input for this program is an employee ID number, hourly rate of pay, and number of regular and overtime hours worked. Gross pay is the sum of the wages earned from regular hours and overtime hours; overtime is paid at 1.5 times the regular rate. Net pay is gross pay minus deductions. Assume that deductions are taken for tax withholding (30 percent of gross pay) and parking (\$10 per month). You will need the following variables:

EmployeeID HourlyRate RegHours OvertimeHours
GrossPay Tax Parking NetPay

You will need the following formulas:

$$\text{GrossPay} = (\text{RegularHours} * \text{HourlyRate}) + (\text{OvertimeHours} * (\text{HourlyRate} * 1.5))$$

$$\text{NetPay} = \text{GrossPay} - (\text{GrossPay} * \text{Tax}) - \text{Parking}$$

4. Shannon and Jasmine bowl as a team. Each of them bowls three games in a tournament. They would like to know their individual averages for their three games and the team average. Allow the user to input the scores for each player. Output Shannon's average, Jasmine's average, and the team's average. You will need the following variables:

Score1	Score2	Score3	avgJasmine
sumShannon	sumJasmine	avgShannon	teamAvg

You will need the following formulas:

$$\text{teamAvg} = (\text{avgShannon} + \text{avgJasmine})/2$$

5. Kim wants to buy a car. Help Kim compute the monthly payment on a loan, given the loan amount, the annual percentage rate of interest, and the number of monthly payments. The program should allow Kim to input the loan amount, interest rate, and how many payments she wants to make. It should then compute and display the monthly payment.

You will need the following variables:

Payment	LoanAmt	InterestRate
MonthlyRate	NumberMonths	

You will need the following formulas:

$$\text{MonthlyRate} = \text{InterestRate}/1200$$

Note: when the user enters InterestRate as a percentage, it must be divided by 100 to make it a decimal (i.e., 18% = 18/100 = 0.18). The InterestRate offered by car dealers is an annual rate so this must be divided by 12 to get the MonthlyRate. The formula given above combines the two steps (i.e., annual rate of 18% = 18/100 = 0.18 and the monthly rate is 0.18/12 = 0.015 or 18/(100*12) = 18/1200.

$$\text{Payment} = \text{LoanAmt} * \text{MonthlyRate} * (1 + \text{MonthlyRate})^{\text{NumberMonths}} \div ((1 + \text{MonthlyRate})^{\text{NumberMonths}} - 1)$$

Note: The formula must be entered carefully, exactly as shown.