

Algorithm Workbench

27. Convert the following pseudocode to C++ code. Be sure to define the appropriate variables.

Store 20 in the *speed* variable.
Store 10 in the *time* variable.
Multiply *speed* by *time* and store the result in the *distance* variable.
Display the contents of the *distance* variable.

28. Convert the following pseudocode to C++ code. Be sure to define the appropriate variables.

Store 172.5 in the *force* variable.
Store 27.5 in the *area* variable.
Divide *area* by *force* and store the result in the *pressure* variable.
Display the contents of the *pressure* variable.

Find the Error

29. There are a number of syntax errors in the following program. Locate as many as you can.

```
/* What's wrong with this program? */
#include iostream
using namespace std;
int main();
}

    int a, b, c \\ Three integers
    a = 3
    b = 4
    c = a + b
    Cout < "The value of c is %d" < C;
    return 0;
{
```

Programming Challenges

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1. Sum of Two Numbers

Write a program that stores the integers 50 and 100 in variables, and stores the sum of these two in a variable named *total*.

2. Sales Prediction

The East Coast sales division of a company generates 58 percent of total sales. Based on that percentage, write a program that will predict how much the East Coast division will generate if the company has \$8.6 million in sales this year.

3. Sales Tax

Write a program that will compute the total sales tax on a \$95 purchase. Assume the state sales tax is 4 percent and the county sales tax is 2 percent.



**Solving the
Restaurant Bill
Problem**

4. Restaurant Bill

Write a program that computes the tax and tip on a restaurant bill for a patron with a \$88.67 meal charge. The tax should be 6.75 percent of the meal cost. The tip should be 20 percent of the total after adding the tax. Display the meal cost, tax amount, tip amount, and total bill on the screen.

5. Average of Values

To get the average of a series of values, you add the values up and then divide the sum by the number of values. Write a program that stores the following values in five different variables: 28, 32, 37, 24, and 33. The program should first calculate the sum of these five variables and store the result in a separate variable named `sum`. Then, the program should divide the `sum` variable by 5 to get the average. Display the average on the screen.



TIP: Use the `double` data type for all variables in this program.

6. Annual Pay

Suppose an employee gets paid every two weeks and earns \$2,200 each pay period. In a year the employee gets paid 26 times. Write a program that defines the following variables:

<code>payAmount</code>	This variable will hold the amount of pay the employee earns each pay period. Initialize the variable with 2200.0.
<code>payPeriods</code>	This variable will hold the number of pay periods in a year. Initialize the variable with 26.
<code>annualPay</code>	This variable will hold the employee's total annual pay, which will be calculated.

The program should calculate the employee's total annual pay by multiplying the employee's pay amount by the number of pay periods in a year and store the result in the `annualPay` variable. Display the total annual pay on the screen.

7. Ocean Levels

Assuming the ocean's level is currently rising at about 1.5 millimeters per year, write a program that displays:

- The number of millimeters higher than the current level that the ocean's level will be in 5 years
- The number of millimeters higher than the current level that the ocean's level will be in 7 years
- The number of millimeters higher than the current level that the ocean's level will be in 10 years

8. Total Purchase

A customer in a store is purchasing five items. The prices of the five items are

Price of item 1 = \$15.95
 Price of item 2 = \$24.95
 Price of item 3 = \$6.95
 Price of item 4 = \$12.95
 Price of item 5 = \$3.95

Write a program that holds the prices of the five items in five variables. Display each item's price, the subtotal of the sale, the amount of sales tax, and the total. Assume the sales tax is 7%.

9. Cyborg Data Type Sizes

You have been given a job as a programmer on a Cyborg supercomputer. In order to accomplish some calculations, you need to know how many bytes the following data types use: `char`, `int`, `float`, and `double`. You do not have any manuals, so you can't look this information up. Write a C++ program that will determine the amount of memory used by these types and display the information on the screen.

10. Miles per Gallon

A car holds 15 gallons of gasoline and can travel 375 miles before refueling. Write a program that calculates the number of miles per gallon the car gets. Display the result on the screen.

Hint: Use the following formula to calculate miles per gallon (MPG):

$$\text{MPG} = \text{Miles Driven} / \text{Gallons of Gas Used}$$

11. Distance per Tank of Gas

A car with a 20-gallon gas tank averages 23.5 miles per gallon when driven in town and 28.9 miles per gallon when driven on the highway. Write a program that calculates and displays the distance the car can travel on one tank of gas when driven in town and when driven on the highway.

Hint: The following formula can be used to calculate the distance:

$$\text{Distance} = \text{Number of Gallons} \times \text{Average Miles per Gallon}$$

12. Land Calculation

One acre of land is equivalent to 43,560 square feet. Write a program that calculates the number of acres in a tract of land with 391,876 square feet.

13. Circuit Board Price

An electronics company sells circuit boards at a 35 percent profit. Write a program that will calculate the selling price of a circuit board that costs \$14.95. Display the result on the screen.

14. Personal Information

Write a program that displays the following pieces of information, each on a separate line:

Your name

Your address, with city, state, and ZIP code

Your telephone number

Your college major

Use only a single `cout` statement to display all of this information.

15. Triangle Pattern

Write a program that displays the following pattern on the screen:

```
  *
 ***
*****
*****
```

16. Diamond Pattern

Write a program that displays the following pattern:

```

      *
    * * *
  * * * * *
* * * * * * *
  * * * * *
    * * *
      *

```

17. Stock Commission

Kathryn bought 750 shares of stock at a price of \$35.00 per share. She must pay her stockbroker a 2 percent commission for the transaction. Write a program that calculates and displays the following:

- The amount paid for the stock alone (without the commission)
- The amount of the commission
- The total amount paid (for the stock plus the commission)

18. Energy Drink Consumption

A soft drink company recently surveyed 16,500 of its customers and found that approximately 15 percent of those surveyed purchase one or more energy drinks per week. Of those customers who purchase energy drinks, approximately 58 percent of them prefer citrus-flavored energy drinks. Write a program that displays the following:

- The approximate number of customers in the survey who purchase one or more energy drinks per week
- The approximate number of customers in the survey who prefer citrus-flavored energy drinks