**Review Questions and Exercises**
**Short Answer**

1. Assume a string object has been defined as follows:
string description;
A) Write a cin statement that reads in a one word description.
B) Write a statement that reads in a description that can contain multiple words separated by blanks.

4. Assume the following variables are defined:
int age;
double pay;
char section;
Write a single cin statement that will read input into each of these variables.

5. What header files must be included in the following program?

```
int main()
{
        double amount = 89.7;
        cout << fixed << showpoint << setprecision(1);
        cout << setw(8) << amount << endl;
        return 0;
}
```

8. Complete the following table by writing the value of each expression in the Value column.

| **Expression** | **Value** |
|---|---|
| 28 / 4 - 2 | |
| 6 + 12 * 2 - 8 | |
| 4 + 8 * 2 | |
| 6 + 17 % 3 - 2 | |
| 2 + 22 * (9 - 7) | |
| (8 + 7) * 2 | |
| (16 + 7) % 2 - 1 | |
| 12 / (10 - 6) | |
| (19 - 3) * (2 + 2) / 4 | |

9. Write C++ expressions for the following algebraic expressions:
A) $a = 12x$

B) $z = 5x + 14y + 6k$
C) $y = x^4$
D) $g = \frac{h + 12}{4k}$
E) $c = \frac{a^3}{b^2k^4}$

10. Assume a program has the following variable definitions
int units;
float mass;
double weight;
and the following statement:
weight = mass * units;
Which automatic data type conversions will take place?

11. Assume a program has the following variable definitions
int a, b = 2;
double c = 4.3;
and the following statement:
a = b * c;
What value will be stored in a?

12. Assume that qty and salesReps are both integers. Use a type cast expression to rewrite the following statement so it will no longer perform integer division.
unitsEach = qty / salesReps;

13. Rewrite the following variable definition so the variable is a named constant with the value 12.
int rate;

14. Complete the following table by writing statements with combined assignment operators
in the right-hand column. The statements should be equivalent to the statements
in the left-hand column.

| **Statements with Assignment Operator** | **Statements with Combined Assignment Operator** |
|---|---|
| x = x + 5; | |
| total = total + subtotal; | |
| dist = dist / rep; | |
| ppl = ppl * period; | |
| inv = inv - shrinkage; | |

num = num % 2;

15. Write a multiple assignment statement that can be used instead of the following group of assignment statements:
east = 1;
west = 1;
north = 1;
south = 1;

16. Replace the following statements with a single statement that initializes sum to 0 at the time it is defined.
int sum;
sum = 0;

17. Is the following code legal? Why or why not?
const int DAYS_IN_WEEK;
DAYS_IN_WEEK = 7;

18. Write a cout statement so the variable divSales is displayed in a field of eight spaces, in fixed-point notation, with a decimal point and two decimal digits.

19. Write a cout statement so the variable profit is displayed in a field of 12 spaces, in fixed-point notation, with a decimal point and four decimal digits.

20. What header file must be included
A) to perform mathematical functions like sqrt?

C) to use stream manipluators like setprecision?

**Algorithm Workbench**
21. A bowling alley is offering a prize to the bowler whose average score from bowling three games is the lowest. Write a pseudocode algorithm for a program that inputs three bowling scores and calculates and displays their average.

22. Pet World offers a 15% discount to senior citizens. Write a pseudocode algorithm for a program that inputs the amount of a sale, then calculates and displays both the amount the customer saves and the amount they must pay.

23. A retail store grants its customers a maximum amount of credit. Each customer's available credit is his or her maximum amount of credit minus the amount of credit used. Write a pseudocode algorithm for a program that asks for a customer's maximum credit and amount of credit used, then calculates and displays the customer's available credit.

24. Little Italy Pizza charges $12.00 for a 12-inch diameter sausage pizza and $14.00 for a 14-inch diameter sausage pizza. Write the pseudocode algorithm that calculates and displays how much each of these earns the establishment per square inch of pizza sold. (Hint: you will need to first calculate how many square inches there are in each pizza.)

**Predict the Output**

25. Trace the following programs and tell what each will display. (Some require a calculator.)

A) *(Assume the user enters 38711. Use a calculator.)*

```
#include <iostream>
using namespace std;

int main()
{
	double salary, monthly;
	cout << "What is your annual salary? ";
	cin >> salary;
	monthly = static_cast<int>(salary) / 12;
	cout << "Your monthly wages are " << monthly << endl;
	return 0;
}
```

B)

```
#include <iostream>
using namespace std;
int main()
{
	long x, y, z;
	x = y = z = 4;
	x += 2;
	y -= 1;
	z *= 3;
	cout << x << " " << y << " " << z << endl;
	return 0;
```

```
}
```
C)
```
#include <iostream>
using namespace std;
#define WHO "Columbus"
#define DID "sailed"
#define WHAT "the ocean blue."
int main()
{
	const int WHEN = 1492;
	cout << "In " << WHEN << " " << WHO << " "
		<< DID << " " << WHAT << endl;
	return 0;
}
```

26. A) *(Assume the user enters George Washington.)*
```
#include <iostream>
#include <iomanip>
#include <string>
using namespace std;
int main()
{
	string userInput;
	cout << "What is your name? ";
	cin >> userInput;
	cout << "Hello " << userInput << endl;
	return 0;
}
```

B) *(Assume the user enters George Washington.)*
```
#include <iostream>
#include <iomanip>
#include <string>
using namespace std;
int main()
{
	string userInput;
	cout << "What is your name? ";
	getline(cin, userInput);
	cout << "Hello " << userInput << endl;
	return 0;
}
```

**Find the Errors**

27. Each of the following programs has some errors. Locate as many as you can.

A)
```
using namespace std;
int main()
{
	double number1, number2, sum;
```

```
        Cout << "Enter a number: ";
        Cin << number1;
        Cout << "Enter another number: ";
        Cin << number2;
        number1 + number2 = sum;
        Cout "The sum of the two numbers is " << sum
        return 0;
}
```

B)

```
#include <iostream>
using namespace std;
int main()
{
        int number1, number2;
        double quotient;
        cout << "Enter two numbers and I will divide\n";
        cout << "the first by the second for you.\n";
        cin >> number1, number2;
        quotient = double<static_cast>(number1)/number2;
        cout << quotient
}
```

28. A)

```
#include <iostream>;
using namespace std;
int main()
{
        const int number1, number2, product;
        cout << "Enter two numbers and I will multiply\n";
        cout << "them for you.\n";
        cin >> number1 >> number2;
        product = number1 * number2;
        cout << product
        return 0;
}
```

B)

```
#include <iostream>;
using namespace std;
main
{
        int number1, number2;
        cout << "Enter two numbers and I will multiply\n"
        cout << "them by 50 for you.\n"
        cin >> number1 >> number2;
        number1 =* 50;
        number2 =* 50;
        return 0;
        cout << number1 << " " << number2;
}
```

29. A)

```
#include <iostream>;
using namespace std;
main
{
        double number, half;
        cout << "Enter a number and I will divide it\n"
        cout << "in half for you.\n"
        cin >> number1;
        half =/ 2;
}
```

B)

```
#include <iostream>;
using namespace std;
int main()
{
        char name, go;
        cout << "Enter your name: ";
        cin.width(20);
        cin.getline >> name;
        cout << "Hi " << name << endl;
        cout "Press the ENTER key to end this program.";
        cin >> go;
        return 0;
}
```

**Programming Challenges**

**1. Miles per Gallon**

Write a program that calculates a car's gas mileage. The program should ask the user to enter the number of gallons of gas the car can hold and the number of miles it can be driven on a full tank. It should then calculate and display the number of miles per gallon the car gets.

**2. Stadium Seating**

There are three seating categories at a stadium. For a softball game, Class A seats cost $15, Class B seats cost $12, and Class C seats cost $9. Write a program that asks how many tickets for each class of seats were sold, then displays the amount of income generated from ticket sales.

**3. Housing Costs**

Write a program that asks the user to enter their *monthly* costs for each of the following housing related expenses:

- rent or mortgage payment
- utilities
- phones
- cable

The program should then display the total monthly cost of these expenses, and the total annual cost of these expenses.

**4. How Much Insurance?**

Many financial experts advise property owners to insure their homes or buildings for at least 80 percent of the amount it would cost to replace the structure. Write a program that asks the user to enter the replacement cost of a building and then displays the minimum amount of insurance that should be purchased for the property.

**5. Batting Average**
Write a program to find a baseball player's batting average. The program should ask the user to enter the number of times the player was at bat and the number of hits he got. It should then display his batting average to 4 decimal places.

**6. Test Average**
Write a program that asks for five test scores. The program should calculate the average test score and display it. The number displayed should be formatted in fixed-point notation, with one decimal point of precision.

**7. Average Rainfall**
Write a program that calculates the average monthly rainfall for three months. The program should ask the user to enter the name of each month, such as June or July, and the amount of rain (in inches) that fell that month. The program should display a message similar to the following:

The average monthly rainfall for June, July, and August was 6.72 inches.

**8. Box Office**
A movie theater only keeps a percentage of the revenue earned from ticket sales. The remainder goes to the distibutor. Write a program that calculates a theater's gross and net box office profit for a night. The program should ask for the name of the movie, and how many adult and child tickets were sold. (The price of an adult ticket is $6.00 and a child's ticket is $3.00.) It should display a report similar to the following:

Movie Name: "Wheels of Fury"
Adult Tickets Sold: 382
Child Tickets Sold: 127
Gross Box Office Profit: $ 2673.00
Amount Paid to Distributor: – $ 2138.40
Net Box Office Profit: $ 534.60
Assume the theater keeps 20 percent of the gross box office profit.