C++ Review Questions

1. Volume Conversion

Assuming there are 7.481 gallons in a cubic foot, write a program that asks the user to enter a number of gallons, and then displays the equivalent in cubic feet.

2. Temperature Conversion

You can convert temperature from degrees Celsius to degrees Fahrenheit by multiplying by $\frac{9}{5}$ and adding 32. Write a program that allows the user to enter a floating-point number representing degrees Celsius, and then displays the corresponding degrees Fahrenheit.

3. Fraction Addition

If you have two fractions, $\frac{a}{b}$ and $\frac{c}{d}$, their sum can be obtained from the formula:

$$\frac{a}{b} + \frac{c}{d} = \frac{a \cdot d + b \cdot c}{b \cdot d}$$

For example,

$$\frac{1}{4} + \frac{2}{3} = \frac{1 \times 3 + 4 \times 2}{4 \times 3} = \frac{3 + 8}{12} = \frac{11}{12}$$

Write a program that encourages the user to enter two fractions, and then displays their sum in fractional form. (You don't need to reduce it to lowest terms.) Example interaction:

```
Enter first fraction: 1/2
Enter second fraction: 2/5
Sum = 9/10
```

4. Multiplication Table

Assume that you want to generate a table of multiples of any given number. Write a program that allows the user to enter the number and then generates the table, formatting it into 10 columns and 20 lines. Example interaction:

```
Enter a number: 7
7 14 21 28 77 84 91 98 147 154
161 168 35 105 175 42 112 182 49 119
189 56 126 196 63 133 203 70 140 210
```

5. Bi-directional Temperature Conversion

Write a temperature-conversion program that gives the user the option of converting Fahrenheit to Celsius or Celsius to Fahrenheit. Example interaction:

```
Type 1 to convert Fahrenheit to Celsius, 2 to convert Celsius to Fahrenheit: 1
Enter temperature in Fahrenheit: 70
In Celsius that's 21.111111
```

6. Convert Digits to Integer

Operators such as `>>`, which read input from the keyboard, must be able to convert a series of digits into a number. Write a program that does the same thing. It should allow the user to type up to six digits and then display the resulting number as a type long integer. The digits should be read individually as characters using `getche()`. Example interaction:

```
Enter a number: 123456
Number is: 123456
```

7. Pyramid of Xs

Use `for` loops to construct a program that displays a pyramid of Xs on the screen. The pyramid should be 20 lines high, similar to the following example (5 lines shown):

```
    x
   xxx
  xxxxx
 xxxxxxx
xxxxxxxxx
```

8. Factorial Calculation

Write code to calculate the factorial of a number. The number should be entered by the user.

9. Fraction Calculator

Create a four-function calculator for fractions. The user should type the first fraction, an operator, and a second fraction. The program should then display the result and ask whether the user wants to continue.

The arithmetic operations on fractions are:

- Addition: $\frac{a}{b} + \frac{c}{d} = \frac{a \cdot d + b \cdot c}{b \cdot d}$
- Subtraction: $\frac{a}{b} - \frac{c}{d} = \frac{a \cdot d - b \cdot c}{b \cdot d}$
- Multiplication: $\frac{a}{b} \times \frac{c}{d} = \frac{a \cdot c}{b \cdot d}$
- Division: $\frac{a}{b} \div \frac{c}{d} = \frac{a \cdot d}{b \cdot c}$