1. Cin and Cout: Streams

- C++ uses *streams* to perform input and output operations.
- A stream is an entity where a program can either insert or extract characters to/from.
- Streams are a source/destination of characters
- These characters are provided/accepted sequentially

stream	description
cin	standard input stream
cout	standard output stream

Standard output (cout)

- Cout is used together with the *insertion operator*, <<.

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

int main()
{

    cout << "Hello World! ";

}
```

- The << operator inserts the data that follows it into the stream that precedes it. Multiple insertion operations (<<) may be chained in a single statement:

Standard input (cin)

- Cin is used together with the extraction operator, which is written as >>
- The extraction operation on cin uses the type of the variable to determine how it interprets the characters read from the input.

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

int main()
{
  float x,y;

  cout << "Please enter a value for x: ";
  cin >> x;
  cout << "Please enter a value for y: ";
  cin >> y;
  cout << "Values of x and y are:\n";
  cout << "\tx = " << x << " \ty = " << y << '\n';
```

```
    }
```

2. I/O Manipulators

- **Setprecision:**
  - Sets the *decimal precision* to be used to format floating-point values on output operations.
- **Fixed:**
  - Floating-point values are written using fixed-point notation
  - The value is represented with exactly as many digits in the decimal part as specified by the *precision field*
- **Showpoint:**
  - The decimal point is always written for floating point values inserted into the stream
  - Even for those whose decimal part is zero
- **Scientific:**
  - Floating-point values are written using scientific notation
  - The value is represented always with only one digit before the decimal point,
  - Decimal point is followed by as many decimal digits as the *precision field*

```cpp
#include <iostream>      // std::cout, std::fixed
#include <iomanip>       // std::setprecision

int main () {
 double f =3.14159;
 double d = 2;
 std::cout << std::setprecision(5) << f << '\n';
 std::cout << std::setprecision(9) << f << '\n';
 std::cout << std::setprecision(9) << d << '\n';
 //std::cout << std::showpoint;
 std::cout << std::showpoint << std::setprecision(5) << f << '\n';
 std::cout << std::showpoint << std::setprecision(9) << f << '\n';
 std::cout << std::showpoint << std::setprecision(9) << d << '\n';
 //std::cout << std::fixed;
 std::cout << std::fixed << std::setprecision(5) << f << '\n';
 std::cout << std::fixed << std::setprecision(9) << f << '\n';
 std::cout << std::fixed << std::setprecision(9) << d << '\n';
 std::cout << std::scientific << f << '\n';
 std::cout << std::scientific << f << '\n';
 std::cout << std::scientific << d << '\n';
 return 0;
 }
```

Output:

```
3.1416
3.14159
2

3.1416
3.14159000
```

2.00000000

3.14159
3.141590000
2.000000000

3.141590000e+00
3.141590000e+00
2.000000000e+00

3. Arithmetic Operators

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

int main()
{
  int x,y, sum, diff, product, quotient, rem;

  cout << "Please enter a value for x: ";
  cin >> x;
  cout << "Please enter a value for y: ";
  cin >> y;
  cout << "Values of x and y are:\n";
  cout << "\tx = " << x << " \ty = " << y << '\n';
  sum = x+y;
  diff = x-y;
  product = x*y;
  quotient = x/y;
  rem = x%y;
  cout << "The sum is " << sum << endl;
  cout << "The diff is " << diff << endl;
  cout << "The product is " << product << endl;
  cout << "The quotient is " << quotient << endl;
  cout << "The rem is " << rem << endl;
}
```

4. Shorthand Arithmetic Operators

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

int main()
{
  int x,y, sum, diff, product, quotient, rem;

  cout << "Please enter a value for x: ";
  cin >> x;
  cout << "Please enter a value for y: ";
  cin >> y;
  cout << "Values of x and y are:\n";
  cout << "\tx = " << x << " \ty = " << y << '\n';
  sum = x;
  sum+=y;
  diff = x;
   diff-=y;
  product = x;
```

```
 product*=y;
quotient = x;
quotient/=y;
rem = x;
rem%=y;
cout << "The sum is " << sum << endl;
cout << "The diff is " << diff << endl;
cout << "The product is " << product << endl;
cout << "The quotient is " << quotient << endl;
cout << "The rem is " << rem << endl;
}
```

6. **Recitation Quiz Question:**
   Read in 2 integers. Print the quotient when the first number is divided by the second.