Templates

```
// C++ program to demonstrate the use of class templates

#include <iostream>
using namespace std;

// Class template
template <class T>
class Number {
   private:
    // Variable of type T
    T num;

   public:
    Number(T n) : num(n) {}   // constructor

    T getNum() {
        return num;
    }
};

int main() {

    // create object with int type
    Number<int> numberInt(7);

    // create object with double type
    Number<double> numberDouble(7.7);

    cout << "int Number = " << numberInt.getNum() << endl;
    cout << "double Number = " << numberDouble.getNum() << endl;

    return 0;
}
```

Output:

```
int Number = 7
double Number = 7.7
```

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

template <class T>
class Calculator {
   private:
    T num1, num2;

   public:
    Calculator(T n1, T n2) {
        num1 = n1;
        num2 = n2;
    }

    void displayResult() {
        cout << "Numbers: " << num1 << " and " << num2 << "." << endl;
        cout << num1 << " + " << num2 << " = " << add() << endl;
        cout << num1 << " - " << num2 << " = " << subtract() << endl;
        cout << num1 << " * " << num2 << " = " << multiply() << endl;
        cout << num1 << " / " << num2 << " = " << divide() << endl;
    }

    T add() { return num1 + num2; }
    T subtract() { return num1 - num2; }
    T multiply() { return num1 * num2; }
    T divide() { return num1 / num2; }
};

int main() {
    Calculator<int> intCalc(2, 1);
    Calculator<float> floatCalc(2.4, 1.2);

    cout << "Int results:" << endl;
    intCalc.displayResult();

    cout << endl
         << "Float results:" << endl;
    floatCalc.displayResult();

    return 0;
}
```

Output

```
Int results:
Numbers: 2 and 1.
2 + 1 = 3
2 - 1 = 1
2 * 1 = 2
2 / 1 = 2

Float results:
Numbers: 2.4 and 1.2.
2.4 + 1.2 = 3.6
2.4 - 1.2 = 1.2
2.4 * 1.2 = 2.88
2.4 / 1.2 = 2
```

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

// Class template with multiple and default parameters
template <class T, class U, class V = char>
class ClassTemplate {
   private:
    T var1;
    U var2;
    V var3;

   public:
    ClassTemplate(T v1, U v2, V v3) : var1(v1), var2(v2), var3(v3) {}  // constructor

    void printVar() {
        cout << "var1 = " << var1 << endl;
        cout << "var2 = " << var2 << endl;
        cout << "var3 = " << var3 << endl;
    }
};

int main() {
    // create object with int, double and char types
    ClassTemplate<int, double> obj1(7, 7.7, 'c');
    cout << "obj1 values: " << endl;
    obj1.printVar();

    // create object with int, double and bool types
    ClassTemplate<double, char, bool> obj2(8.8, 'a', false);
    cout << "\nobj2 values: " << endl;
    obj2.printVar();

    return 0;
}
```

Output

```
obj1 values:
var1 = 7
var2 = 7.7
var3 = c

obj2 values:
var1 = 8.8
var2 = a
var3 = 0
```