

Student Name _____ **Section** _____
Instructor _____ **Due Date** _____

Thoroughly read the objectives, instructions and requirements of this special project and then use suitable electronic technology tools to solve the given project(s).

Submit both your program source code, with your name, date and course information in the heading portion of your code, as well as the required output(s).

(Using a Virtual Function) (100 Points Maximum) *your score* _____

Objective To write a program that uses a `virtual` function.

PROJECT DESCRIPTION

Write, compile and execute a complete program that uses a pure `virtual` function to convert units such as liters to gallons, kilometers to miles.

Information About This Project

A **virtual** function is a function that is declared as **virtual** in a base class and refined in one or more derived classes. For example, the function `Display()` is declared as a **virtual** function in base class X.

```
class Base {
public:
    virtual void Display()
    {
        cout << "this is the base class\n";
    }
};
```

Steps To Complete This Project

STEP 1 **Open MS Visual C++ and Write the Program Code**

Open Visual C++ and type the class code given below. This program code declares a class named `Convert` which will be used to instantiate objects which perform various units conversions.

```
#include <iostream.h>
//Base class that contains data member and accessors and pure
//virtual function that is implemented in the derived classes
class Convert {
protected:
    double val1, val2;//data members
public:
    Convert(double i)//constructor to initialize variable to convert
    { val1 = i; }
    double getconv();//accessor for converted value
    { return val2; }
    double getinit();//accessor for the initial value
    { return val1; }
    virtual void compute() = 0;//function to implement in derived classes
};
```

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Project: (Using a Virtual Function)

Derive a class called L_To_G which is to be used to convert metric liters to U.S. gallons. The class code for the derived class is given below.

```
class L_To_G : public Convert//derived class
{
public:
    L_To_G(double i) : Convert(i) { }

    void compute()//implementation of virtual function
    {
        val2 = val1 / 3.7854; //conversion assignment statement
    }
};
```

Also, derive three other classes which will convert units such as Celsius to Fahrenheit, miles to feet, etc.

Using a base class pointer and a switch statement, add program code in main() which will allow the user a menu option to select which units are to be converted. Sample output is given below.

```
Welcome to the conversion program
```

```
Please enter a number to convert:
```

```
1
```

```
Now choose what you would like to convert it to:
```

```
Type 1 to convert Liters to Gallons
```

```
Type 2 to convert Kilometers to Miles
```

```
Type 3 to convert Meters to Feet
```

```
Type 4 to convert Centigrade to Fahrenheit
```

```
2
```

```
1 converted from kilometers to miles is 0.6
```

```
Press Y to try again and N to quit
```

STEP 2 Compile and Run your Program

Build, compile and run your program. Test the operation of your program using appropriate numbers for your input variable(s).

STEP 3 Print your Program Code and your Run Time Output

When completed, print your program source code as well as the program output(s). Attach the hardcopies to your lab cover sheet for credit.