

Tutorial 9 Class

1a) Download `rect.cpp`.

Define a **class** for **Rectangle**. The following **private** members should be defined:

- (i) **length**: a **float** representing the length of the rectangle
- (ii) **height**: a **float** representing the length of the rectangle
- (iii) **name**: a *character id* (e.g. 'T') of the rectangle

Write a *constructor* which initializes the **length**, **height** and **name** members accordingly. (*Question: do we still need the default constructor? Will the C++ compiler create one for us?*)

Also let's create the *setters* and *getters* functions to access the private members. (e.g. `float Rectangle::getLength()` and `void Rectangle::setLength(float)`)

Finally, define a member function to return the area of the Rectangle
`float Rectangle::getArea();`

In main function, declare a Rectangle `x`. The program should let the user input the id, length and height of `x`. The `getArea()` member function should be called to compute its area.

The program prints the name, length, height of the rectangle and its area (*to 2 decimal places*).

Sample input/output:

```
T 2.5 4
The rectangle T has length 2.50 and height 4.00
The area is 10.00
```

b) Modify the program in 1a) to define the friend function `larger()` which accepts two rectangle structures as input. The function should return a Boolean to specify whether the first Rectangle is having a **larger** area than the second one. (*Also return false if their area are identical*)

You may use the following function for testing your program

```
void testLargerRectangle() {
    Rectangle x(10,15,'X');
    Rectangle y, max;

    y.setLength(5);
    y.setHeight(1);
    y.setName('Y');

    if (larger(x,y)) max=x; else max=y;
    cout<<"The rectangle " << max.getName() << " has a larger area\n";
}
```

c) Modify the program such that the program defines an array of rectangles:

```
Rectangle rect[10];
```

The program should let the user input the name, length and height of n rectangles (where n is an integer input by the user and $0 < n \leq 10$) and store them in the array. The program should print all the rectangles and output the name, length of the rectangle with the largest area (if there are more than 1 rectangle with maximum area, print all the rectangles in the sequence the rectangles are defined).

```
Enter the number of rectangles: 3
Enter rectangle 1: A 2 3
Enter rectangle 2: B 3 3
Enter rectangle 3: C 10 5
Rectangle 1: name=A, length=2.00, height=3.00
Rectangle 2: name=B, length=3.00, height=3.00
Rectangle 3: name=C, length=10.00, height=5.00

Maximum rectangle(s):
Rectangle 3, name=C, length=10.00, height=5.00
```