Exercise 5: Inheritance

Due Date:

- **MW class:** Wednesday, September 23, at the beginning of class.
- **TTh class:** Thursday, September 24, at the beginning of class.

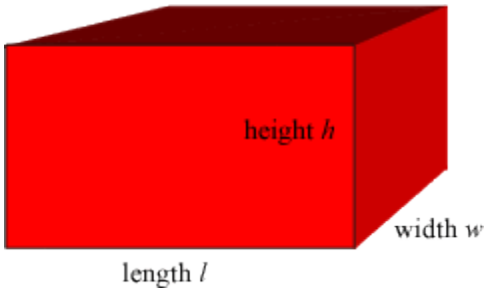
Turn in:

- A printed copy of the **Parallelepiped.cpp** file **ONLY** (include your name header)
- The cpp file named: **A250_E5_YourLastName_YourFirstName**

Cannot team up with anyone for this exercise, but you can certainly discuss it with other students.

Use the **Inheritance project** to complete the exercise. This project contains a **class Rectangle (the base class) and a class Parallelepiped (the derived class)** that need to be completed.

First of all, in case you do not know what a parallelepiped is, you can find a picture of it below.



The class **Rectangle** is the **base** class. It creates objects that define the dimensions of a rectangle, **width** and **length**. Note that the **width** is a **protected** variable and the **length** is a **private** variable—this is done on purpose to help you learn the different syntax. For this class, you need to implement the following member functions:

- **Default constructor**
  - Initializes the member variables to a default value of 0.

- **Overloaded constructor**
  - **Parameters:** Values for the width and the length of the rectangle.
  - Initializes the member variables with the values given.

- Function **getWidth**
  - Returns the width of the rectangle.

- Function **getLength**
  - Returns the length of the rectangle.

- Function **setWidth**
  - **Parameter:** A value for the width of the rectangle.
  - Re-sets the object's width to the given value.

- Function **setLength**
  - Parameter: A value for the length of the rectangle.
  - Re-sets the object's length to the given value.
  -
- Function **calculatePerimeter**
  - Returns the perimeter of the rectangle (one single statement).

- Function **calculateVolume**
  - Returns the area of the rectangle (one single statement).

- Function **print**
  - Prints the width and the length in the following format:

    Width = #.##
    Length = #.##

    Note that the decimal format is already set in the **main** function.

- **Destructor**

The class **Parallelepiped** is the **derived** class. It creates objects that define the dimensions of a parallelepiped, width, length, and height. For this class, you need to implement the following member functions:

- **Default constructor**
  - Initializes the member variable to a default value of 0.

- **Overloaded constructor**
  - **Parameters:** Values for the width, the length, and the height of the parallelepiped.
  - Initializes the class member variable with the given value and sends the other values to the parent.

- Function **getHeight**
  - Returns the height of the parallelepiped.

- Function **setHeight**
  - **Parameter:** A value for the height of the parallelepiped.
  - Re-sets the height to the given value.

- Function **setDimensions**
  - **Parameters:** Values for the width, the length, and the height of the parallelepiped.
  - Re-sets the object's member variables with the given value and sends the other values to the parent.

- Function **calculateVolume**
    - Returns the volume of the parallelepiped (one single statement).
    - Do **NOT** use the width and the length, but call instead the function **getLength** from the parent class.

- Function **print**
    - Prints the as shown on the output below.
    - To print the width and length, call the **parent's print function**.

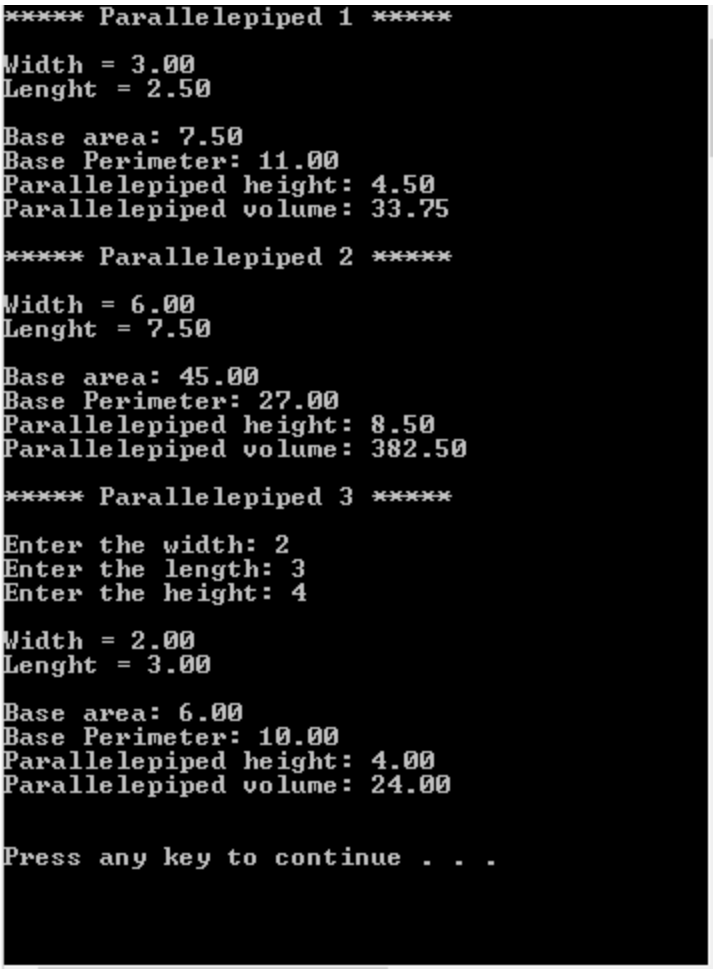
      Note that the decimal format is already set in the **main** function.

- **Destructor**

Make sure you:

- Do **NOT** modify any of the code given.
- Write code **ONLY** where indicated.

Expected Output (dimensions for Parallelepiped 3 were entered by the user)


***** Parallelepiped 1 *****
Width = 3.00
Lenght = 2.50
Base area: 7.50
Base Perimeter: 11.00
Parallelepiped height: 4.50
Parallelepiped volume: 33.75
***** Parallelepiped 2 *****
Width = 6.00
Lenght = 7.50
Base area: 45.00
Base Perimeter: 27.00
Parallelepiped height: 8.50
Parallelepiped volume: 382.50
***** Parallelepiped 3 *****
Enter the width: 2
Enter the length: 3
Enter the height: 4
Width = 2.00
Lenght = 3.00
Base area: 6.00
Base Perimeter: 10.00
Parallelepiped height: 4.00
Parallelepiped volume: 24.00
Press any key to continue . . .