
This assignment will be completed individually.

In this assignment you will:


- Compile, debug, and modify a simple C++ program
- Write simple C++ programs

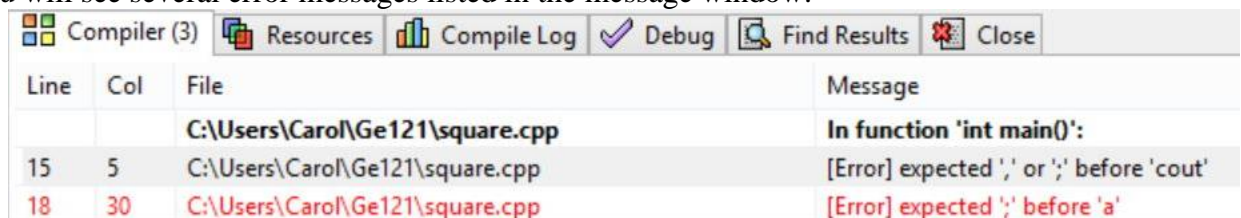
If you are working on your own computer, you will need to install a copy of the **Dev-C++** compiler before you begin. Instructions have been posted to UW-Learn.

Before you Start Programming

1. Create a **folder** on your **n:** drive called **Ge121**. **Don't put the folder in My Documents or have any spaces in the name as this causes problems for the compiler.**
2. Download the sample program file **square.cpp** and the file **header.txt** from Learn to your Ge121 folder.

Question 1

1. Start the compiler by selecting **Start/Bloodshed Dev-C++/Dev-C++**.
2. Click on **File/Open Project or File...** and browse to find the sample program file **square.cpp**. Click **Open**.
3. Click on **Execute/Compile & Run** or use either **F11** or  as a shortcut.
4. You will see several error messages listed in the message window.



Compiler (3)				Resources	Compile Log	Debug	Find Results	Close
Line	Col	File	Message					
		C:\Users\Carol\Ge121\square.cpp	In function 'int main()':					
15	5	C:\Users\Carol\Ge121\square.cpp	[Error] expected ';' or ';' before 'cout'					
18	30	C:\Users\Carol\Ge121\square.cpp	[Error] expected ';' before 'a'					

Double-click on the first message to take you to Line 15 of the code. The compiler is indicating that it expects a **;** before the **cout**. Add the missing semi-colon. (Where should the semi-colon go?)

5. Double-click on the next error message to take you to the next line of code with an error. Examine the code and fix the error.
6. Once you have gone through each error message, re-compile the program and fix any remaining errors. When your program does not have any errors, the compiler will run it.

7. Modify the program to prompt the user and input the value **a** before it is squared/cubed. Compile and run the program again.
8. To capture any console output, click the top left corner of the console window (black screen) and then click **Edit/Mark** and use the mouse to select the output. Press the **Enter** key and your output goes to the clipboard. You can now paste it at the bottom of your program using **Ctrl-V**.
9. Open the file **square.txt** that was created by the program. Copy the output to the bottom of your program.
10. Change the first line to have your name. Print the modified code including the output which was pasted to the bottom.

Question 2

1. Click **File/New/Source File** to give you a blank file. Type the code to solve the problem. You can cut and paste from your code in Question 1 if desired.
2. Write a program that prompts the user for the mass of a sphere, m , the radius of a sphere, r_2 , with a hollow cavity of radius r_1 , and outputs its moment of inertia:

$$I = \frac{2}{5} m \left[\frac{r_2^5 - r_1^5}{r_2^3 - r_1^3} \right]$$

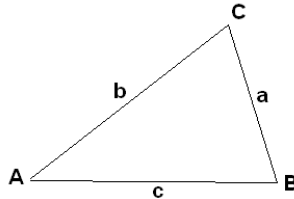
3. Test cases are used to check that all aspects of a program are working correctly. Choose two test cases and fill in a table similar to below, calculating the moment of inertia by hand.

	Test Case #1	Test Case #2
m		
r1		
r2		
MOI		

4. Copy the output for both of your test cases from 2) to the bottom of your program
5. Print the code and output and submit with your hand calculations from 3).

Question 3

1. Write a program that receives two sides, **a**, **b**, and the contained angle **C** (in degrees) of a triangle, and then calculates the remaining sides and angles. You should calculate the angles using **both** Cos Law and Sine Law. Your program should then output all of the data plus area. Angles should be output in degrees.



Before you code your program, think about the computations. Avoid repeating computations, and be aware that the trig functions take longer than simpler mathematical operations such as addition.

Useful formulae:

Cosine Law

$$c = \sqrt{a^2 + b^2 - 2ab \cos C}$$

Sine Law

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Area of a triangle

$$area = \sqrt{s(s-a)(s-b)(s-c)}, \text{ where } s = \text{perimeter} / 2$$

You can use the following triangle for testing and debugging.

Enter two side lengths and the contained angle:

4.1 4.1 60

Side Lengths (a, b, c): 4.1 4.1 4.1

Cos law angles (A, B, C): 60 60 60

Sine law angles (A, B, C): 60 60 60

Area: 7.27894

2. Compile your program and debug any errors. (Use the test case above to check that the program output matches the expected output.)
3. Submit your program with output for the test cases (30, 3, 15), (2, 20, 30), and (3, 4, 90).
4. Explain any differences between the angles calculated from Cos Law vs. Sine Law.

Finishing the Assignment

1. Edit the file **header.txt** to include your information and acknowledging any help you received. After you print the header, you **must sign it**.
2. Submit (stapled together as one bundle):
 - i. **One copy of the header** acknowledging any help you have received (not including TAs or the instructor)
 - ii. Program code for all three programs, and
 - iii. Output pasted to the bottom of each programto the appropriate box outside the WEEF lab (E2-1310).
3. Make sure you have an electronic copy of the code. You are allowed to re-use the code in future GENE 121 assignments this term provided it is acknowledged.
4. **Complete the Academic Integrity Quiz on UW-Learn.**
5. **Complete the MTE Start of Term Survey on UW-Learn.**