

```

1: /* SSS_Basic.cpp
2:
3:     This program solves the side-side-side ( SSS ) problem in trigonometry.
4:
5:     More specifically, if the lengths of three sides of a triangle are known,
6:     this program will solve for the three angles.
7:
8:     Units: The units of input for the three side lengths is actually
9:     unimportant, so long as all three sides are given in the same units.
10:    This program reports results in both radians and degrees.
11:
12:    Written August 2011 by John Bell, as a sample solution to HW1 for CS 109
13:
14:    This version fulfills the basic assignment, without any optional
15:    enhancements.
16:
17: */
18:
19: #include <iostream>           // For input and output
20: #include <cmath>             // For sines and cosines, etc.
21:
22: using namespace std;        // For easy use of cin and cout
23:
24: int main( void ) {
25:
26:     // First to declare necessary variables.
27:
28:     double sideA, sideB, sideC;           // 3 sides, any dimensions
29:     double angleA, angleB, angleC;       // in radians
30:     double angleA_deg, angleB_deg, angleC_deg; // in degrees
31:     double numerator, denominator;       // For use in cosine law
32:
33:     // Next to explain the program to the user
34:
35:     cout << "\nWelcome to program SSS_Basic.\n\n";
36:     cout << "Written August 2011 by John Bell, jbell, for CS 109.\n\n";
37:     cout << "This program will find the three angles of a triangle,\n";
38:     cout << "given the lengths of the three sides.\n\n";
39:     cout << "Input can be given in any consistent units.\n";
40:     cout << "Results are reported in both radians and degrees.\n\n";
41:
42:     // Now get input from the user. No error checking in this version.
43:
44:     cout << "Please enter the length of the longest side: ";
45:     cin >> sideC;
46:     cout << "Now please enter the length of the second side: ";
47:     cin >> sideA;
48:     cout << "And finally, please enter the length of the third side: ";
49:     cin >> sideB;
50:
51:     // First calculate angle C using the cosine law
52:
53:     numerator = sideA * sideA + sideB * sideB - sideC * sideC;
54:     denominator = 2.0 * sideA * sideB;
55:     angleC = acos( numerator / denominator );
56:
57:     // Next calculate angles A and B using the sine law

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58:
59:   angleA = asin( sideA / sideC * sin( angleC ) );
60:   angleB = asin( sideB / sideC * sin( angleC ) );
61:
62:   // Convert angles from radians to degrees
63:
64:   angleA_deg = angleA * 180.0 / M_PI; // M_PI defined in <cmath>
65:   angleB_deg = angleB * 180.0 / M_PI;
66:   angleC_deg = angleC * 180.0 / M_PI;
67:
68:   // And finally, echo input and report results.
69:   // No formatting in this version.
70:
71:   cout << "\n\nHere are your results:\n\n";
72:   cout << " Side                Opposing Angle\n";
73:   cout << "Length                ( radians )        ( degrees )\n";
74:   cout << " " << sideC << "\t\t" << angleC << "\t\t" << angleC_deg << endl;
75:   cout << " " << sideA << "\t\t" << angleA << "\t\t" << angleA_deg << endl;
76:   cout << " " << sideB << "\t\t" << angleB << "\t\t" << angleB_deg << endl;
77:       << endl;
78:
79:   // Tha tha tha that's all folks !
80:
81:   system( "PAUSE" ); // Only needed for Dev C++
82:
83:   return 0;
84:
85: } // main
86:

```