Right Triangle Trigonometry Project

Part 1: **Word Problems (30 points)**

Directions: Complete the following problems. You must draw and label a sketch of the scenario for each problem. You must show your work in order to receive credit (no work – no credit!).

1) Tom wants to reach a second floor window on a house that is 20 feet above ground. If he must put the ladder at a 70° angle to the ground, how long must the ladder be?

2) Sue wants to determine the height of a tree indirectly. Its shadow is 15 feet when she is at a 48° angle of elevation with the sun that is behind the tree.

3) A pilot is beginning his descent to a nearby airport when he is 6.5 miles away. He knows he must have no more than a 3° angle of depression. How high is he above the ground?

4) A 25-foot pole is supported by a 40-ft. guy wire that is anchored to the ground a certain distance away from the pole. What angle does the guy wire make with the ground?

5) An airplane is at an elevation of 35,000 ft. when it starts its descent at a 20 degree angle of depression. What is the air distance and between the airplane and the airport in miles?

6) A lighthouse keeper has a 10° angle of depression between the horizontal light beam and the line of sight from the ship. If the keeper is 19 m above water, how far is the ship from the base of the lighthouse?

7) A surveyor wants to measure the distance from the north end (point B) to the south end (point C) of a body of water. He creates a right triangle by using point A which is 17.5 m due west of point C and at a 30 degree angle with point B. Find the distance across the lake.

8) If you want to put a 4 x 8 piece of plywood through a 3-foot square opening in your ceiling by turning it diagonally, is the opening big enough? Use a 45-45-90 triangle since it is a square.

9) Write your own real-world problem that involves a right triangle.

Part 2: Developing a Trigonometry Table (70 points)

You will create a trigonometry table for the given angle measurements. You will begin by constructing the seven right triangles noted below. You must use a ruler and a protractor to draw your right triangles. All angle measurements and side lengths must be clearly written. Complete the table using the side lengths for the acute angles. The constructions must be attached to the project.

Constructing the Angles:

A. Write down the formulas for sine, cosine, and tangent. (5 points)

B. For each of the following angle measurements (5 °, 15°, 30°, 45°, 60°, 75°, 85°) draw a right triangle with one acute angle of that measurement. Make sure to use rulers and protractors and be exact as possible in your constructions. (20 points)

C. For each triangle label the side opposite, adjacent, and the hypotenuse in relation to the acute angle (5°, 15°, 30°, 45°, 60°, 75°, 85°). (10 points)

D. Measure the length of each side and write that on your triangles. (5 points)

Completing the Table:

A. Calculate sine, cosine, and tangent for the angles 5°, 15°, 30°, 45°, 60°, 75°, 85° using the triangles and side lengths you measured. Show all your work and calculations! (20 points)

B. Present your calculations of sine, cosine, and tangent and the angles in a table. (10 points)

Angle	**Sine**	**Cosine**	**Tangent**
5°			
15°			
30°			
45°			
60°			
75°			
85°			