Name_____ **Section**_____

Lab partner_____ **Date**_____

PHY210 – Exp. 1: Measurement & Trigonometry

1. *Carefully* measure <u>all</u> sides and the lower-left to upper-right diagonal of the large blank sheet of paper (it's called ledger-size), and record below. Take all measurements in centimeters, *recording each one to the tenths place*. Remember, a tenth of a centimeter is the same as a millimeter.

Labels:	Left	Right	Top	Bottom	Diagonal
Length (cm):					

Draw in the diagonal on the large sheet, using the meter stick as a straightedge and being careful to draw it *exactly* from corner to corner. This diagonal forms the hypotenuse of a right triangle. Label the smallest angle in the lower left corner theta, Θ. Then, relative to theta, the bottom edge of the paper is the adjacent side (a), the right side of the paper is the opposite side (b) and the diagonal is the hypotenuse (c).

2. Test how the Pythagorean Theorem applies to your table by treating the length of side c as an unknown and calculating a value for it using your measurements for a and b. <u>Show</u> the calculation. How much does this value differ from the direct measurement made in step 1?

3. In the following calculations, use the directly measured hypotenuse from step 1. <u>Show</u> the calculation.

Calculate Sin Θ using your measurements of b and c:

Calculate Cos Θ using your measurements of a and c:

Calculate Tan Θ using your measurements of a and b:

4. Use a scientific calculator to find the angle (in degrees) whose Sine is the value found above. This is called finding the Inverse Sine or arcsin.

Now find the arccos.

Finally, find the arctan.

Should all three calculated angles be the same? If so, why? If not, why not?

5. Find the average of the three inverse trig functions found in step 4. Show the entire calculation.

6. Use a protractor to measure Θ as precisely as you can. How close is it to your average of the inverse trig functions?

7. Relative to the other internal angle of the triangle (upper-right of triangle), called the complementary angle to theta, the bottom edge of the paper is the opposite side, the right edge is the adjacent side, but the diagonal is still the hypotenuse. From your measurements of those lengths,

Calculate the sine of the complementary angle

Calculate the cosine of the complementary angle

Calculate the tangent of the complementary angle

8. Find the arcsin (in degrees) of the sine found in step 7 above.

Now find the arccos of the cosine found in step 7.

Finally, find the arctan of the tangent found in step 7.

9. Find the average of the three inverse trig functions found in step 8.

10. With the protractor, measure the complementary angle as precisely as you can.

11. Add the protractor measurements of the complementary angle and theta. How close is the sum to 90°?

12. Add the complementary angle and theta from the averages of the inverse trig functions (calculated in Steps 5 and 9). How close is the sum to 90°?