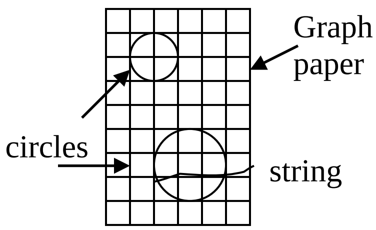
Chris Lange
Group 8 members:
John Doe
Jane Doe

Circle Lab

Purpose: To determine the relationship between the area of a circle and its radius, and the circumference of a circle and its radius.

Apparatus : Graph paper, pencils, compass or circular lids, string, metric ruler



Procedure:

1. Mark a series of circles onto graph paper and paper.
2. Measure the radius of these circles with a metric ruler.
3. Determine the area of the circles on the graph paper.
   a. Count up the number of complete square cm
   b. Count up the number of smaller squares and divide by 25 to convert to square cm.
4. Convert cm^2 to m^2.
5. Take string and determine the circumference of the circles on plain paper.
   a. Wrap the string around the perimeter of the circle
   b. Measure length of string
6. Plot graph of area vs. radius and circumference vs. radius
7. Analyze graphs to determine the relationship between the variables.

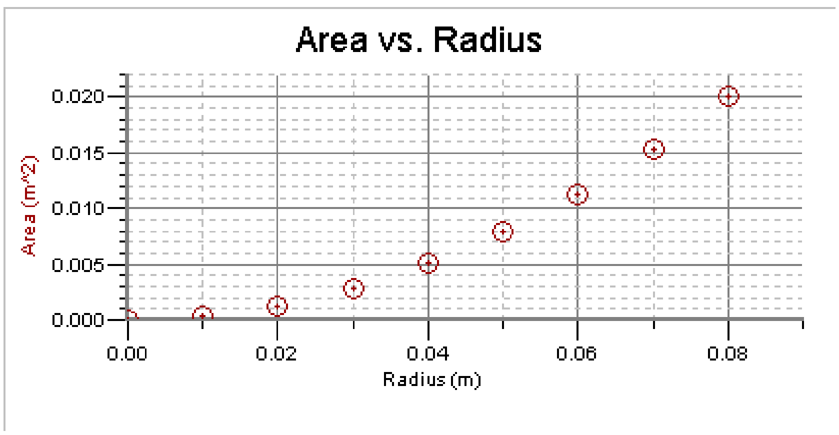
Data:

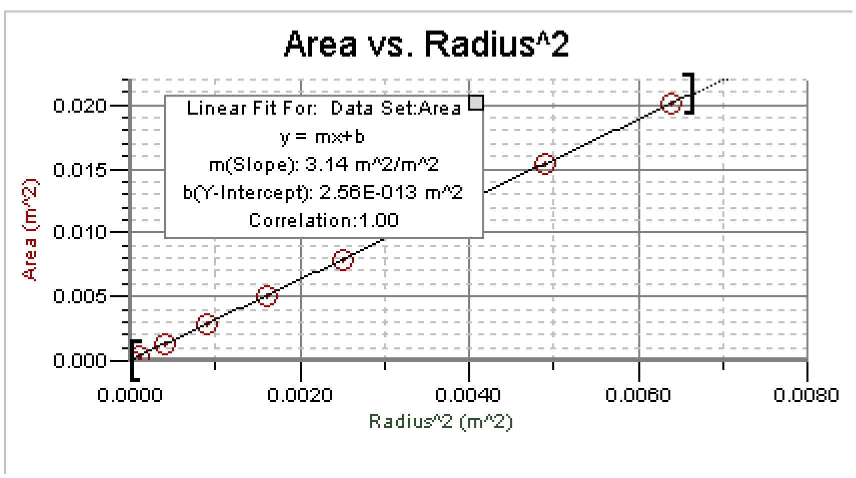
	Data Set	
	Radius (m)	Area (m^2)
1	0.00	0.000000000
2	0.01	0.000314159
3	0.02	0.001256637
4	0.03	0.002827433
5	0.04	0.005026548
6	0.05	0.007853982
7	0.06	0.011309734
8	0.07	0.015393804
9	0.08	0.020106193

	Data Set	
	Radius (m)	Circumference (m)
1	0.00	0.000000000
2	0.01	0.062800000
3	0.02	0.125600000
4	0.03	0.188400000
5	0.04	0.251200000
6	0.05	0.314000000
7	0.06	0.376800000
8	0.07	0.439600000
9	0.08	0.502400000
10		

Evaluation of Data:

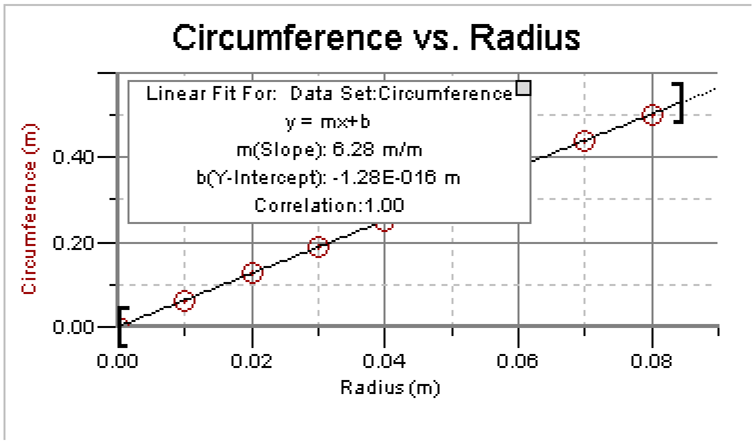
	Radius^2 (m^2)
1	0.000
2	0.000
3	0.000
4	0.001
5	0.002
6	0.003
7	0.004
8	0.005
9	0.006
10	
11	





$$A = 3.14\ (m^2/m^2)R^{\wedge 2}$$

$$1.28 \times 10^{-9}\ \% = \left| 2.56 \times 10^{-13}/.020 * 100 \right|$$



C = 6.28 (m/m)R

$2.56 \times 10^{-14}\% = |-1.28 \times 10^{-16}/.5 * 100|$

<u>Conclusion:</u>

<u>Part 1:</u>

In conclusion of this laboratory activity it can be said that the relationship of the area and radius for a circle can be expressed as the following: *The area of a circle is proportional to the square of its radius.* From the mathematical model, a general equation can be determined. The general equation is: $A = \pi r^2$ where A is the area of a circle, π is the slope of the graph, and r is the radius of the circle. The slope found was the change in the area divided by the change in the radius squared. The slope was a constant value of approximately 3.14. The slope represents a constant called *pi*. Therefore, the slope can be written as $\pi = 3.14$. The y-intercept is defined as the area when the radius squared is equal to zero. This means that the area of a circle is zero if it has no radius.

<u>Part 2:</u>

It can also be concluded that the relationship of the circumference and radius of a circle can be expressed as the following: *The circumference of a circle is proportional to its radius.* The second general equation that we came up with is: $C = 2\pi r$, where C is the circumference of a circle, 2π is two times *pi*, and r is the radius of the circle. The slope is defined as the change in the circumference divided by the change in the radius. The slope was a constant with a value of 6.28 or 2 times 3.14 or the value of π. The π in this case is called *pi*. Therefore, the slope can be written as: $6.28 = 2\pi$. The y intercept is defined are the circumference of the circle when the radius is zero. The y-intercept means that the circumference of a circle will be zero if a circle has no radius.

There are no new terms for this lab.

A source of error in the lab can be attributed to inaccuracies in measurement of the radius or circumference lengths. In addition, error can be found in approximating the area of a circle by determining portions of solid squares.