Name_____
Date_____

Chapter 10
Frog Investigation
Assignment #1

Scenario: While swimming along, a frog reaches out and grabs onto the rim of a paddle wheel with radius 1m. The center of the wheel is at water level. The frog clinging tightly to the wheel is immediately lifted from the surface of the river.

SET-UP

1) The wheel spins slowly counterclockwise at a rate of one rotation every 6 minutes. Through how many degrees does the frog rotate each minute?_____

How many degrees does the frog rotate each second?_____

2) Use our circle r and central angle t diagram to develop parametric equations for y and x. Remember these equations will tell you the horizontal and vertical position of the frog for any t (angle) value. (You will need these equations for your table)
3) Create a table recording the frog's x and y positions every 15 degrees relative to the center of the wheel. Use the domain values $0<t<510$. Note that the wheel is turning through 1 degree per second, so the number of degrees equals the number of seconds. Explain any pattern that you find in your table.

4) Answer these questions by looking for pattern in your table.

a) What is the frog's location after 1215 degrees or 1215 seconds? When during the first three rotations of the wheel, is the frog at that same location?
b) When is the frog at a height of **-.5m** during the first 3 rotations?
c) What are the maximum and the minimum y values in your table?
d) Using the domain $0<t<360$ plot a graph for $x = \cos(t)$
e) Using the domain $0<t<360$ plot a graph for $y = \sin(t)$
f) How are they the same? Please write what you see
g) How are they different? Please write what you see.

T	X	y
0		
15		
30		
45		
60		
75		
90		
105		
120		
135		
150		
165		
180		
195		
210		
225		
240		
255		
270		
285		
300		
315		
330		
345		
360		
375		
390		
405		
420		
435		
465		
480		
495		
510		