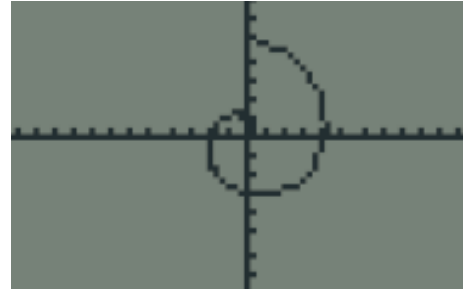


## Project 2

For this project, your solutions should be written up neatly and completely on separate sheets of paper, with this page stapled on top.

A bug is in the center of a spinning record player with a radius of 5 inches. The record spins 30 times per minute. (It's a little slower than it should be. It needs to be tuned.) The bug walks in a straight line along the record to the edge at a speed of 2 inches/second. The graph to the right will help you visualize the path of the bug as the record rotates.



*Answer the following questions:*

1. Using a time parameter  $t$  in seconds, find parametric equations  $r(t)$  and  $\theta(t)$ , where  $r$  describes the bug's radial distance (based on its linear speed) and  $\theta$  describes the bug's angle (based on the record's RPM).
2. Change your parametric equation from #1 into polar form by eliminating the parameter.
3. Using your polar equation from #2, find out what angle the bug will be at when it makes it to the end of the record. (Hint:  $r = 5$ )
4. Determine the distance the bug travels from the time it leave the center until it reaches the edge using the polar arc length formula.
5. Let's say that the bug was moving twice as fast at 4 inches/second. What effect would this have on the distance traveled? Is it just half of your answer from question 4?