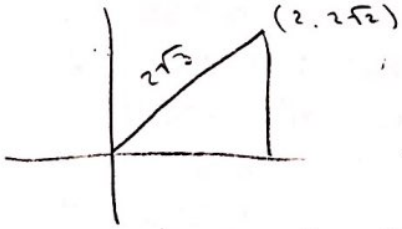
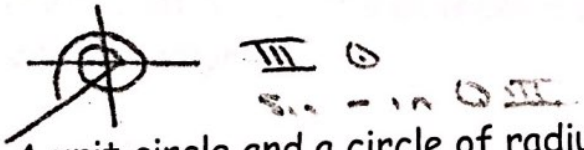
Name: _____ Unit Circle

1. An arc length 6.5 begins at the point (3,0) on the circle $x^2+y^2=9$. What are the possible coordinates for the endpoint of the arc?

2. Suppose $\angle T$, which has its vertex at the origin and one leg along the positive x-axis, intersects the circe $x^2+y^2=12$ at the point $(2,2\sqrt{2})$. Find the measure of $\angle T$.



3. Make a sketch to illustrate the fact that sin10=-0.5440. Make a different sketch to illustrate the fact that sin10° = 0.1736.



4. A unit circle and a circle of radius $\sqrt{5}$ are drawn on the same axes. $\angle T$ intersects the larger circle at approximately (1.208, 1.882). What are the coordinates of the points where $\angle T$ intersects the unit circle? Find the measure of $\angle T$.

5. Find the measure of the angle that subtends an arc of length 8 cm in a circle of radius 5 cm.

6. Suppose an ant starts at (1,0) and walks in a counterclockwise direction 4 units along the circumference of a unit circle. In what quadrant does the ant stop? What are the coordinates of the point where the ant stops?

III

$(-.653, -.756)$

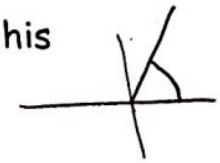
$s = r\theta$

$4 = 1\theta$

$4 = \theta$

7. The Unit Circle Race is to be run on a circular track of radius 1 mile. The race will begin and end at the point (1,0) and will be run in the counterclockwise direction.

a.) Clark has traveled 1.2 miles. Sketch a unit circle and label his location on the circle. What are his x and y coordinates?



$(\cos 1.2, \sin 1.2)$ $(.3624, .9320)$

b.) Jose has the same y-coordinate as Clark, but she is in a different location. Label her possible locations on the circle. At each location how many miles has she run?

$(-.3624, .9320)$

$\pi - 1.2$ miles $= 1.94$ mi

c.) If a runner could run around the track an unlimited number of times, what are all the possible distances they could run and end up at Jose's location?

$(\pi - 1.2) + 2\pi k \quad k \in Z$

or $1.94 + 6.28k$

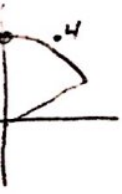
d.) Crystal runs d miles and is still in the first quadrant. Her x-coordinate is .2 miles. Label her location on the circle. Find her y-coordinate without finding d.

$.2^2 + y^2 = 1$

$y = .9798$

$\sin d = .9798$

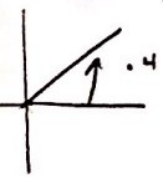
e.) Mike is a judge for the race. He is standing at the point (0,1) on the circles circumference. He walks 0.4 miles in a clockwise direction along the track back toward the race's starting place. How far along the track is he from the starting place?



$\frac{\pi}{2} - .4$

$1.5707 - .4 = 1.17$ mi

f.) Maggie walks 0.4 miles from the starting place in a counterclockwise direction. How do her x and y coordinates compare to Mike's?



$\cos .4 \quad \sin .4$

$(.9211, .3859)$

Mike: $\cos 1.17 \quad \sin 1.17$ $(.39 \quad .92)$