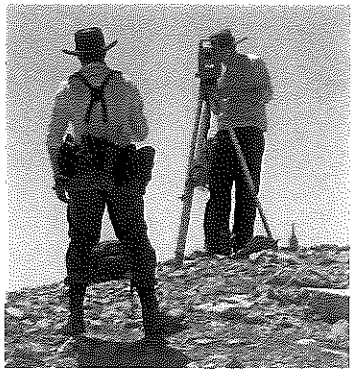


6.7 Staking It

A Solidify Understanding Task

After considering different plans for laying out the archeological site described in *Diggin' It,* Alyce, Javier and Veronica have decided to make concentric circles at 10-meter intervals from the central tower. They have also decided to use 16 stakes per circle, in order to have a few more points of reference. Using ropes of different lengths to keep the radius constant, they have traced out these circles in the sand. Because they know the circles will soon be worn away by the wind and by people's footprints, they feel a sense of urgency to locate the positions of the 16 stakes that will mark each circle. The team wants to be efficient and make as few measurements as possible.

Part 1

Veronica suggests they should locate the stakes around one circle and use those positions to mark where the stakes will go on all of the other circles.

1. What do you think about Veronica's idea? How will marking stake positions on one circle help them locate the positions of the stakes on all of the other circles?

Veronica has decided they should stake out the circle with a radius of 50 meters first. She is standing at the point (50,0) and knows she needs to move 22 ½° around the circle to place her next stake. But, she wonders, "How far is that?"

- Veronica decides she will find the distance by setting up a proportion using degree measurements.
- Alyce thinks they should find the distance by taking $^1/_{16}$ of the circumference.
- Javier thinks they should use radian measurement in their calculation.

2. Show how each team member will calculate this distance.

Veronica's Strategy

Alyce's Strategy

Javier's Strategy

Part 2

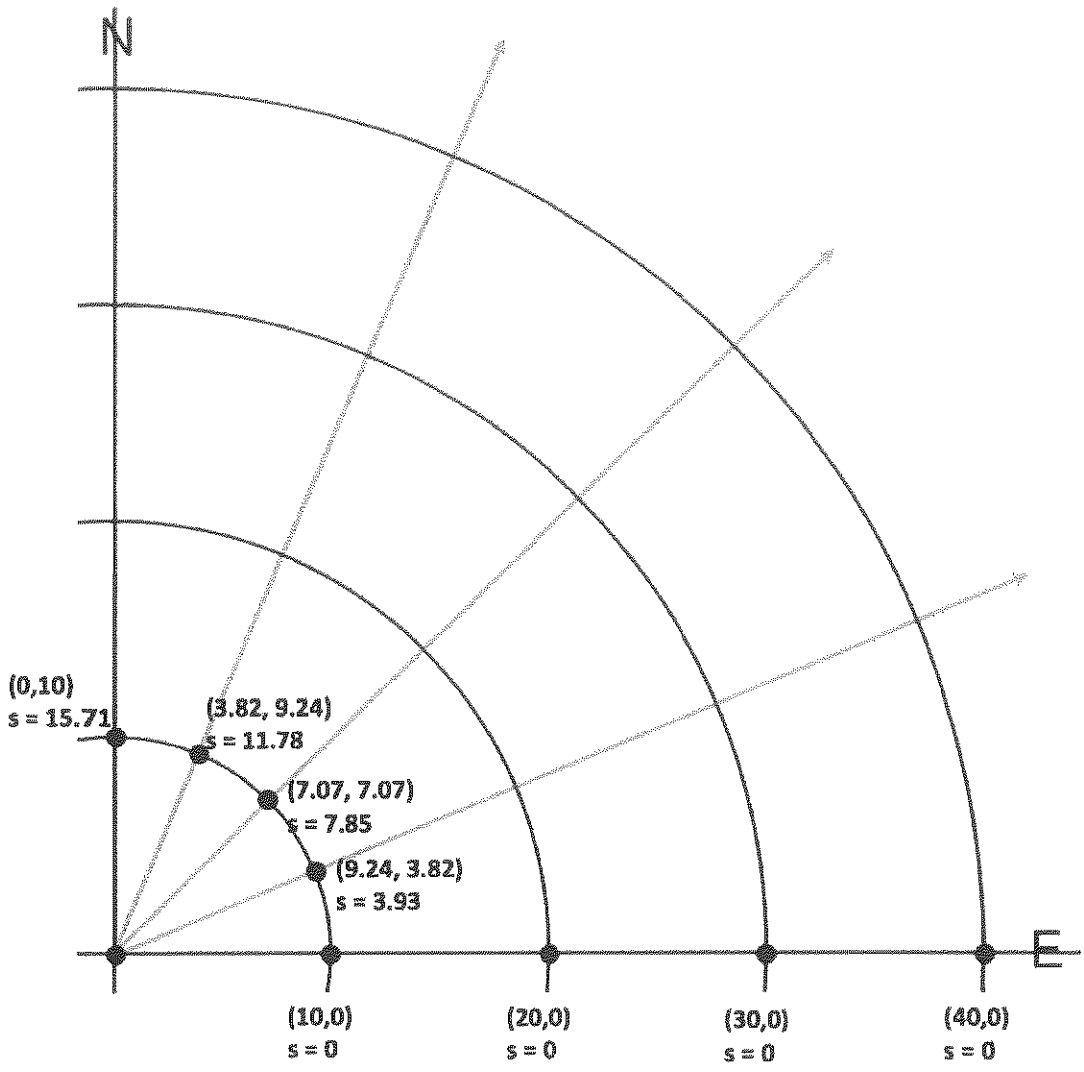
Javier has a different idea. He suggests they should figure out the locations of all of the stakes in quadrant I first, and then it would be easy to find the locations of the stakes in all the other quadrants by using the quadrant I locations.

3. What do you think about Javier's suggestion? How will marking the location of stakes in quadrant I help them figure out the location of the stakes in other quadrants?

Javier has already started working on his strategy and has completed the calculations for the 10-meter circle. (see Javier's diagram).

4. Develop a strategy to locate all of the other stakes in the first quadrant for these additional circles. Find the coordinates and arc lengths for each. Describe the strategy you used to make the fewest calculations for finding the coordinates and arc lengths for these additional stakes.

Javier's Diagram



READY, SET, GO! Name Period Date

READY

Topic: Finding the coordinates of points on a circle

Given the equation of a circle centered at (0,0), find one point in each quadrant that lies on the given circle.

1. $x^2 + y^2 = 25$ quadrant I _____ quadrant II _____
   quadrant III _____ quadrant IV _____

2. $x^2 + y^2 = 4$ quadrant I _____ quadrant II _____
   quadrant III _____ quadrant IV _____

3. $x^2 + y^2 = 36$ quadrant I _____ quadrant II _____
   quadrant III _____ quadrant IV _____

4. $x^2 + y^2 = 1$ quadrant I _____ quadrant II _____
   quadrant III _____ quadrant IV _____

5. $x^2 + y^2 = 9$ quadrant I _____ quadrant II _____
   quadrant III _____ quadrant IV _____

SET

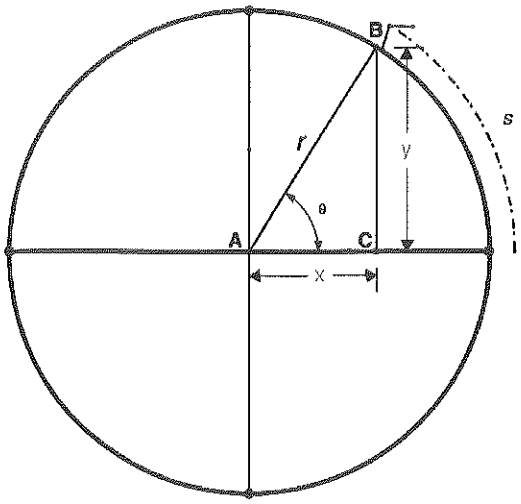
Topic: Locating points in terms of rectangular coordinates, arc length, reference angle, and radius

In the diagram triangle ABC is a right triangle.

Point B lies on the circle and is described by the rectangular coordinates (x, y).

s is the length of the arc subtended by angle θ.

r is the radius of circle A.



Use the given information to answer the following questions.

6. B has the rectangular coordinates (5, 12).

a. Find r.

b. Find θ to the nearest tenth of a degree.

c. Find s by using the formula $s = \frac{\theta}{360°}(d\pi)$.

d. Describe point B using the coordinates (r, θ).

e. Describe point B using the radius and arc length (r, s).

7. B has the rectangular coordinates (33, 56).

a. Find r.

b. Find θ to the nearest tenth of a degree.

c. Find s by using the formula $s = \frac{\theta}{360°}(d\pi)$.

d. Describe point B using the coordinates (r, θ).

e. Describe point B using the radius and arc length (r, s).

8. B is described by (r, θ)

$where\ \theta \approx 58.11°\ and\ r = 53.$

a. Find (x, y) to the nearest whole number.

b. Find s by using the formula $s = \frac{\theta}{360°}(d\pi)$.

c. Describe point B using the radius and arc length (r, s).

9. B is described by (r, θ)

$where\ \theta \approx 25.01°\ and\ r = 85.$

a. Find (x, y) to the nearest whole number.

b. Find s by using the formula $s = \frac{\theta}{360°}(d\pi)$.

c. Describe point B using the radius and arc length (r, s).

10. B is described by (r, s)

$where\ s \approx 46\ and\ r = 37.$

a. Find (x, y) to the nearest whole number.

b. Find θ by using the formula $s = \frac{\theta}{360°}(d\pi)$.

c. Describe point B using (r, θ)

11. B is described by (r, s)

$where\ s \approx 62.26\ and\ r = 73.$

a. Find (x, y) to the nearest whole number.

b. Find θ by using the formula $s = \frac{\theta}{360°}(2\pi r)$.

c. Describe point B using (r, θ)

GO

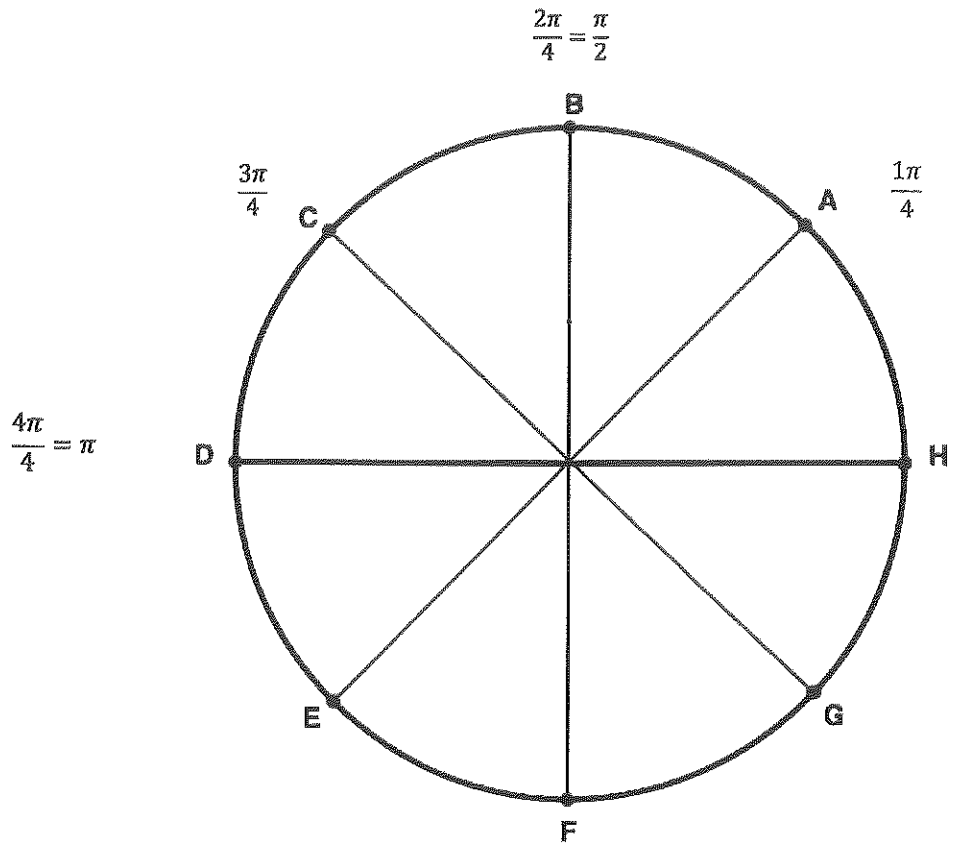
Topic: Making sense of radian measure

Label each point on the circle with the measure of the angle of rotation. Angle measures should be in radians. (Recall a full rotation around the circle would be 2π radians.)

Example: The circle has been divided equally into 8 parts. Each part is equal to $\frac{2\pi}{8}$ *or* $\frac{\pi}{4}$ radians.

Indicate how many parts of $\frac{\pi}{4}$ radians there are at each position around the circle.

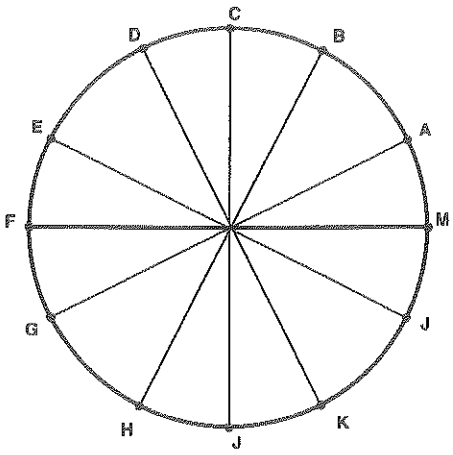
Finish the example by writing the angle measures for points E, F, G, and H.



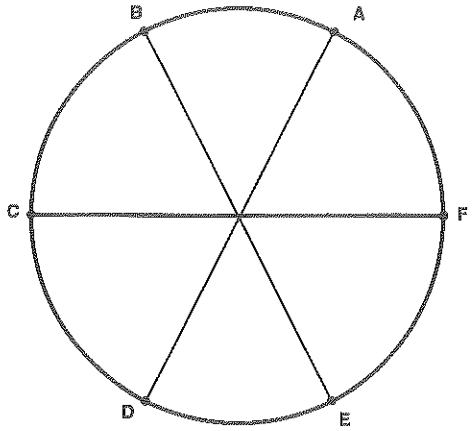
Need help? Visit **www.rsgsupport.org**

Label the figures below using a similar approach as the example.

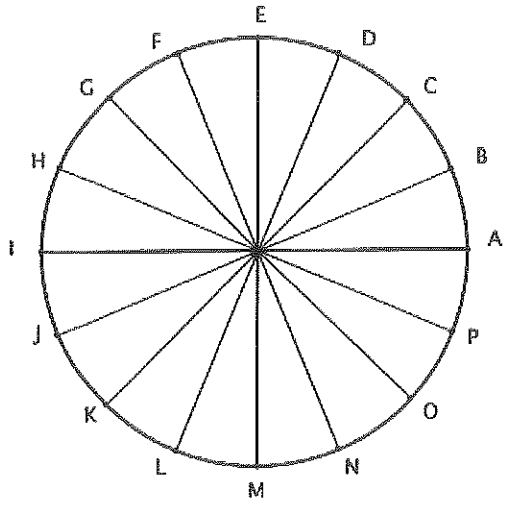
12.



13.



14.



15.