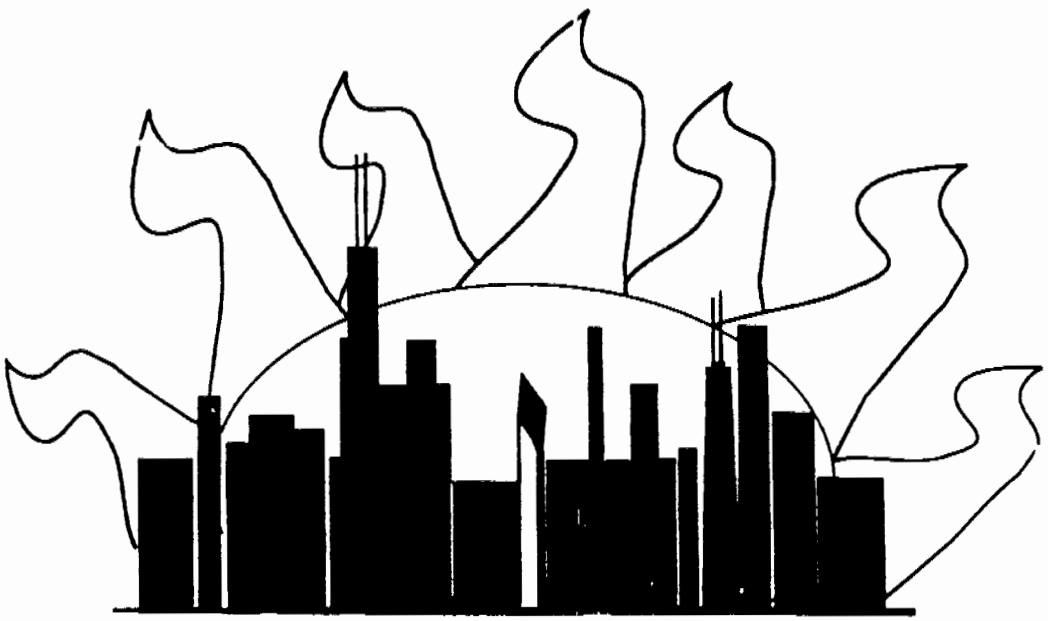
Theta Division **Topic Test 3**

Circles



Mu Alpha Theta National Convention
Chicago 1998

Level - Theta

General Instructions:

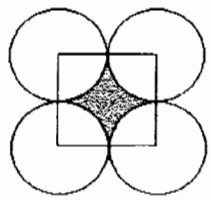
Unless otherwise stated all answers should be written as decimals.
If you are asked to give your answer as a fraction, please give your answer in a/b form where a and b are relatively prime.

Questions

1. If the radius of a circle is increased 100%, by what percent is the area increased?

2. What is the area, in square units, of the smallest square that will contain a circle of radius 5?

3. Four circles, each tangent to two other circles, of radius 5 are arranged as shown so that their centers are the vertices of a square. What is the area, in square units, of the shaded region? Round your answer to the nearest hundredth.

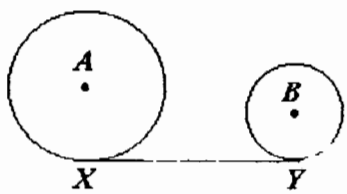


4. To the nearest hundredth cm, how long is the arc of a circle with radius of 8 cm if the arc measure is 58° 12' 35"?

5. The figure to the right is made of 3 semi-circles with $AB = 8$ cm and $BC = 10$ cm. Find the perimeter of the figure to the nearest hundred cm. Give an exact answer.

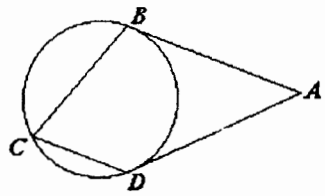
6. A bicycle wheel with a 15 inch radius rolls in a linear path for one mile (5280 feet). To the nearest whole number, how many revolutions will it make?

7. The radius of circle A is 12 cm and the radius of circle B is 5 cm. $\overline{XY}$ is a common tangent and is 20 cm in length. Find AB, the distance between the centers. Give an exact answer.



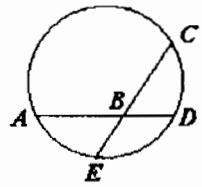
8. From a point 3 cm outside a circle, a tangent to the circle is drawn. If the tangent is 10 cm in length, what is the radius of the circle? Give your answer as a reduced fraction.

9. Given: $\overline{AB}$ and $\overline{AD}$ are tangents
$m\angle DCB = 70°$ Find $m\angle BAD$ in degrees.



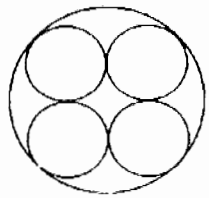
10. In a circle with radius 10 cm, how much longer is a chord 6 cm. From the center than a chord that is 7 cm. from the center?

11. Given: $AB = 10$, $BD = 3$, $BC = 5$. Find the length of BE.

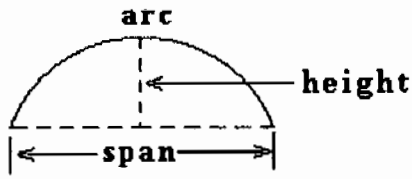


12. What is the radius of the circle which contains the points A (3, 15), B (11, 3), and C (3, −9)?

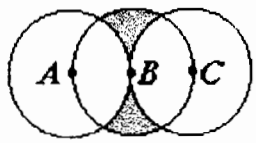
13. Each of the small circles has a radius of 10 cm. Assuming the circles are tangent as shown in the drawing, what is the radius of the largest circle to the nearest hundredth cm?



14. There are five measurements associated with a circular arc: length, radius, central angle, height, and span. Find the height of an arc to the nearest hundredth cm if the central angle is 90° and the span is 10 cm.

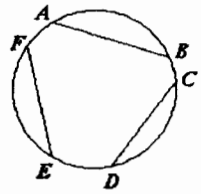


15. Circles A, B, and C each have a radius of 10 cm. Find the area, in square cm, of the shaded region.

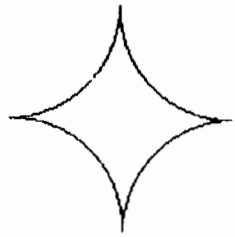


16. Given: $\overline{AB}$, $\overline{CD}$ and $\overline{EF}$ are equal chords of length 50 cm.

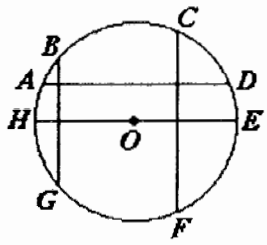
If the measures of arcs AF, BC and $ED = 30°$, find the radius of the circle to the nearest hundredth cm.



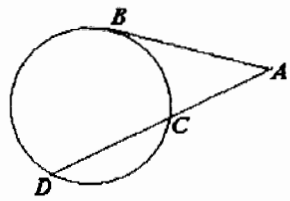
17. Find the area, in square cm, of this shape if each side is a 90° arc from a circle with radius 10 cm. Give your answer to the nearest hundredth cm.



18. In circle O, $\overline{BG} \parallel \overline{CF}$ and $\overline{AD} \parallel \overline{HE}$. $\overline{HE} \perp \overline{BG}$. The measure of arc $CD = 50°$, the measure of arc $BC = 90°$ and the measure of arc $DE = 10°$. Find the measure of arc HG in degrees.



19. Given: $\overline{AB}$ is a tangent to the circle. $AC = 4$, $CD = 5$. Find the length of $\overline{AB}$.



20. Using the radius of the earth as 4000 miles, what is the distance around the world along the 45th latitude? Give your answer to the nearest mile.