MASSACHUSETTS MATHEMATICS LEAGUE
FEBRUARY 2004
ROUND 5: GEOMETRY CIRCLES
NON-CALCULATOR

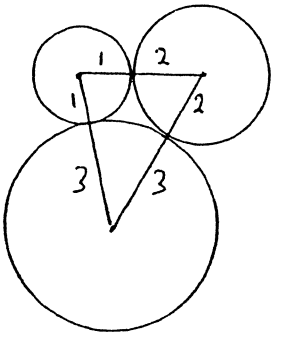
ANSWERS

A) 6

B) $\sqrt{6}/2$

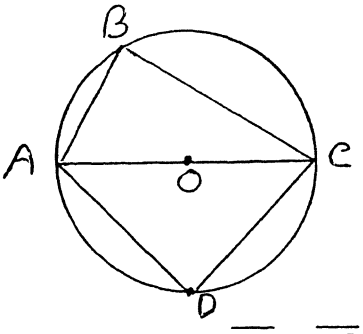
C) 85

A) Three circles of areas π, 4π, *and* 9π are drawn tangent to each other. Calculate the area of the triangle formed by connecting the centers of the three circles.



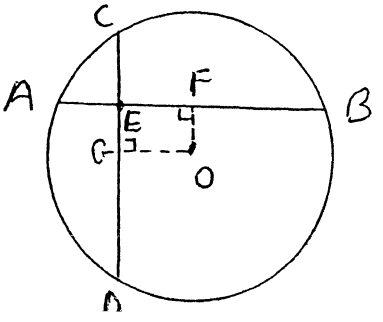
3, 4, 5 $\triangle$, area $= \frac{1}{2} \cdot 3 \cdot 4 = 6$

B) In the figure, $\overline{AC}$ is a diameter of circle O, $\overset{\frown}{AB} = \frac{1}{2}\overset{\frown}{BC}$, D is the midpoint of $\overset{\frown}{AC}$. Find the ratio of BC to AD in simplified radical form.



Let $OA = OC = 1$, Then $AB = 1$, $BC = \sqrt{3}$,
$AD = \sqrt{2}$. $BC/AD = \sqrt{3}/\sqrt{2} = \sqrt{6}/2$

C) In circle O, $\overline{CD} \perp \overline{AB}$, CE = 5, CD = 14, and the ratio of AE to AB is 1 to 6. The area of circle O is $k\pi$. What is the value of k?



$GE = 2$, $AE = x$, $EB = 5x$, $5x^2 = 45$, $x = 3$,
$EB = 15$, $EF = 6$, $FB = 9$, $OF = GE = 2$,
$OB^2 = 2^2 + 9^2 = 85 = k$