MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 - FEBRUARY 2009
ROUND 5 PLANE GEOMETRY: CIRCLES

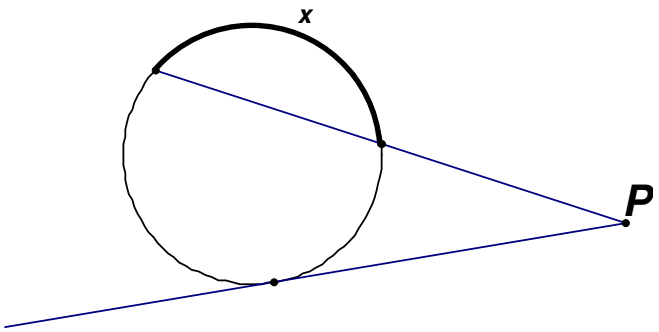
ANSWERS

A) _____ °

B) _____

C) _____

A) A secant and a tangent to circle O intersect at point P, forming a 42° angle. The two arcs intercepted by angle P have measures in a 7 : 3 ratio. Find x, the degree measure of the third arc.



B) In circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at point E, $AB = 20$ and $AE = 2$. Chord $\overline{CD}$ has integer length $k < 20$. If, additionally, $\overline{CE}$ and $\overline{DE}$ have integer lengths, determine all possible values of k.

C) Given: two concentric circles
$\overrightarrow{PA}$ is tangent to the larger circle at point A
$PA = 6\sqrt{3}$, $BD = DE = EC = CP$

Find the area of the annulus, i.e. the "ring" between the two circles.