Bergen County Mathematics League

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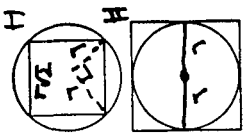
Brief Contest Solutions #1

2011-2012

1) The roots of the new equation can be found by setting
$x-2011 = -5$ or -1 or 2.
$x = -5+2011$ or $-1+2011$ or $2+2011$.
$x = 2006$ or 2010 or 2013. **2006, 2010, 2013**

2) It takes each man 15 minutes to walk the $\frac{1}{2}$-mile point at which they meet each other. The dog ran 15 minutes at 12 mph, so the distance the dog ran was **3** miles.

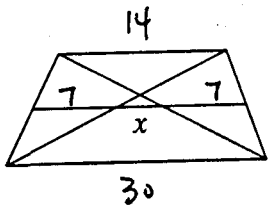
3) 

I: $\frac{Sq}{\odot} = \frac{(r\sqrt{2})^2}{\pi r^2} = \frac{2r^2}{\pi r^2} = \frac{2}{\pi}$.

II: $\frac{\odot}{Sq} = \frac{\pi r^2}{(2r)^2} = \frac{\pi r^2}{4r^2} = \frac{\pi}{4}$. Since $\frac{\pi}{4} > \frac{2}{\pi}$, ans is **B**.

Note: If $a,b,c,d > 0$, the $\frac{a}{b} > \frac{c}{d} \Leftrightarrow ad > bc$.

4) Any root of both is also a root of the sum or difference of the two equations. Subtracting the second equation from the first, $10x - 1440 = 0$, so the only possible common root is **144**. Finally this checks in both equations.

5) 

$7 + x + 7 = \frac{14+30}{2}$
$= 22$, so
$x = \boxed{8}$.

6) Any such integer exactly divides the difference $999 - 768 = 231 = 3 \cdot 7 \cdot 11$ as well as the difference $768 - 460 = 308 = 2^2 \cdot 7 \cdot 11$ as well as the difference $308 - 231 = \boxed{77}$.

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