Bergen County Mathematics League

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Brief Contest Solutions #3

2009-2010

3-1) Make a chart

P	P^2-P-1
2	1
3	5
5	19
7	41

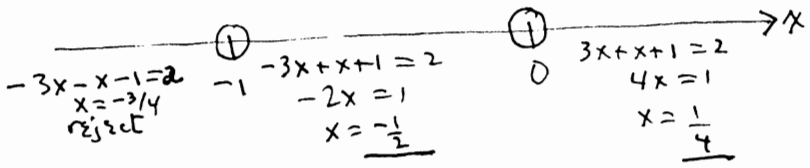
P	P^2-P-1
11	109
13	155 ← composite

3-2) Let m = the "distance" moved by minute hand.
$m/12$ = " " " " hour hand.

1) $m+15 = \frac{m}{12}+20$ $\quad m = \frac{m}{12}+20+15$

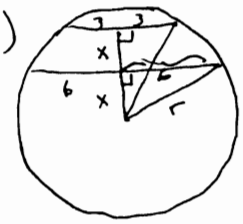
$m = 5\frac{5}{11}$ $\quad m = 38\frac{2}{11}$ $\therefore$ # minutes apart = $\boxed{32\frac{8}{11}}$

3-3) $|3x| + |x+1| = 2$



$\boxed{-\frac{1}{2}, \frac{1}{4}}$

3-4)



$r^2 = x^2+6^2 = (2x)^2+3^2$

$x^2+36 = 4x^2+9$

$3x^2 = 27$

$x^2 = 9$, so $r^2 = x^2+6^2 = 45$; and $\pi r^2 = \boxed{45\pi}$.

3-5) $x+y=5 \Rightarrow x^2+2xy+y^2 = 25$. Now,

$xy = 3 \Rightarrow x^2+6+y^2 = 25$. Thus

$x^2+y^2 = \boxed{19}$.

3-6) $4^{x+2}-4^x = 30$

$4^x(4^2-1) = 30$

$4^x = \frac{30}{15} = 2$

$x = \boxed{1/2}$.