MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 4 - JANUARY 2008 SOLUTION KEY

Round 6

		Now	Then(13yrs ago)	
A)	Earl	x	x-13	$\rightarrow x - 13 = 2(x - 18) = 2x - 36 \rightarrow x =$ **<u>23</u>**
	Cousin	$x-5$	x-18	

B) The equation of L_1 is 2x – 5y = 10. The point of L_1 closest to P(-1, 15) is the foot of the perpendicular drawn from P to L_1. Since perpendicular lines have negative reciprocal slopes, the equation of a perpendicular line to L_1 is of the form $5x + 2y = c$. Substituting x = -1 and y = 15, we can determine the value of c for which the perpendicular passes through point P. Thus, c = 25. The solution of the system $\begin{cases} 2x-5y=10 \\ 5x+2y=25 \end{cases}$ is **<u>(5, 0)</u>**.

C) Alcohol: $\frac{3}{4}x+\frac{2}{3}y=\frac{5}{7}(x+y)$ and $x + y \geq 24$

Clearing fractions (LCM = 84), $63x + 56y = 60x + 60y \rightarrow 3x = 4y$ or $y = \frac{3}{4}x$

$x + \frac{3}{4}x \geq 24 \rightarrow 7x \geq 96 \rightarrow x > 13 \rightarrow x = 16 \rightarrow$ **<u>(16, 12)</u>**