**MASSACHUSETTS MATHEMATICS LEAGUE**
**CONTEST 1 - OCTOBER 2013 SOLUTION KEY**

**Round 4**

A) $\frac{4}{6}+3\left(\frac{1}{x}+\frac{1}{2x}\right)=1 \Rightarrow \frac{9}{2x}=\frac{1}{3} \Rightarrow 2x = 27 \Rightarrow C\,(2x)$: **<u>27</u>** days

B) At 45 miles per hour, in 54 minutes I would travel $45\cdot\frac{54}{60}=\frac{3\cdot 27}{2}=40.5$ miles.

Since $R\cdot T = D$, to travel 40.5 miles in 50 minutes, I would have to travel at $\frac{40.5}{\frac{5}{6}}=\frac{81}{2}\cdot\frac{6}{5}=$ **<u>48.6</u>** mph (or equivalent).

C) $4AB-3XA+4XB-3AXB=12AB \Leftrightarrow 8AB+3XA+3XAB=4XB$

Factoring the left hand side of the equation and solving for *A*, we have $A=\frac{4XB}{8B+3X+3XB}$.

*A* is undefined, if the denominator is zero.

$8B+3X+3XB=0 \Rightarrow X\left(3B+3\right)=-8B \Rightarrow X = -\frac{\mathbf{8B}}{\mathbf{3B+3}}$ (or equivalent)