MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 - FEBRUARY 2015 SOLUTION KEY

Round 4

A) The customer must pay 70% of the first discounted price which is 60% of the original price.

$.7(.6x) = 63 \Rightarrow .42x = 63 \Rightarrow x = \dfrac{63}{.42} = \dfrac{6300}{42} = \dfrac{900}{6} = \underline{\mathbf{150}}$**.**

B) Applying $R \cdot T = D$ and $R = \dfrac{D}{T}$, we have $\dfrac{\text{miles}}{\text{hours}} = \dfrac{70(2) + 60(3.25)}{2 + 3.25 + \dfrac{k}{60}} = 50 \Leftrightarrow \dfrac{335}{5.25 + \dfrac{k}{60}} = 50$

$\Leftrightarrow \dfrac{134\cancel{0}}{21 + \dfrac{k}{15}} = 5\cancel{0} \Leftrightarrow 134 = 5 \cdot 21 + \dfrac{k}{3} \Leftrightarrow 29 = \dfrac{k}{3} \Leftrightarrow k = \underline{\mathbf{87}}$ minutes.

C) Let (x, y) denote cups of (41% butterfat, 5% butterfat) required by the recipe. Then:

$\begin{cases} x + y = 3 \\ .41x + .05y = .19(3) \end{cases} \Rightarrow y = 3 - x \Rightarrow 41x + 5(3 - x) = 57 \Rightarrow 36x = 42 \Rightarrow x = \underline{\mathbf{\dfrac{7}{6}}}$ cups.