**MASSACHUSETTS MATHEMATICS LEAGUE**
**CONTEST 1 - OCTOBER 2012 SOLUTION KEY**

**Round 6**

A) A cubic foot is equivalent to a cube 1 foot or 12 inches on side. Therefore, 1 $ft^3$ = $12^3$ = 1728 $in^3$.

$$\frac{8\cdot 9\cdot 15}{1728}=\frac{2^3\cdot 3^3\cdot 5}{\left(2^2\cdot 3\right)^3}=\frac{5}{2^3}=\underline{\mathbf{\frac{5}{8}}}\ ft^3$$

or alternately converting each measure to a fractional number of feet, $\underset{(8")}{\frac{2}{\cancel{8}}}\cdot\underset{(9")}{\frac{\cancel{9}}{4}}\cdot\underset{(15")}{\frac{5}{4}}=\frac{10}{16}=\underline{\mathbf{\frac{5}{8}}}$

B) $\frac{\text{quarts}}{\text{persons served}}=\frac{7}{15}=\frac{x}{100}\Rightarrow\frac{7}{3}=\frac{x}{20}\Rightarrow x=\frac{140}{3}=46^{+}$

Thus, 47 quarts are required. Since the cost of 1 gallon is less than the cost of 4 quarts, we need to maximize the number of gallons purchased. We need 11 gallons and 3 quarts.
11(5.29) + 3(1.49) = **$62.66**

C) $\frac{1}{2}\nabla\frac{8}{9}=\frac{2\cdot\frac{1}{2}\cdot\frac{8}{9}}{\frac{1}{2}+\frac{8}{9}}-\sqrt{\frac{1}{2}\cdot\frac{8}{9}}=\frac{\frac{8}{9}}{\frac{1}{2}+\frac{8}{9}}-\frac{2}{3}=\frac{8}{9}\cdot\frac{18}{25}-\frac{2}{3}=\frac{16}{25}-\frac{2}{3}=\frac{48-50}{75}=\underline{\mathbf{-\frac{2}{75}}}$

Also accept $\frac{-2}{75}$, $\frac{2}{-75}$, $-0.02\overline{6}$ .