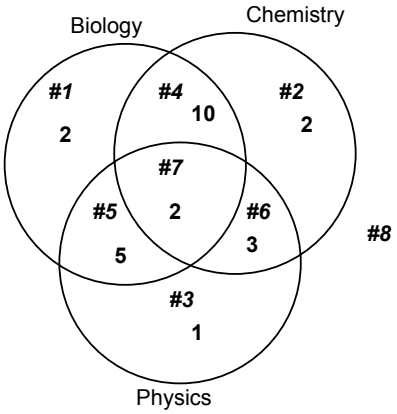
MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 – FEBRUARY 2008 SOLUTION KEY

Round 4

A) Using a Venn Diagram to separate the overlaps,



Biology	#1,4,5,7
Chemistry	#2,4,6,7
Physics	#3,5,6,7
Chemistry and Physics	#6,7
Biology and Physics	#5,7
Biology and Chemistry	#4,7
All 3 courses	#7

None = 35 – (2+10+2+5+2+3+1) = **10**

B) Let x denote the percent of the job completed. Then $\frac{3 \cdot 4}{80} = \frac{1 \cdot \frac{3}{4}}{x}$ → $12x = 60$ → $x =$ **5**

C) Let z denote the mass of each cylinder and (x, y) the distances of pans A and B from the balance point respectively.
Equating the clockwise and counterclockwise torques keeps the system in equilibrium.
Thus, $8zx = 9y$ → $y = \frac{8zx}{9}$ and $25x = 2zy$ → $y = \frac{25x}{2z}$
Equating and canceling the x's in the numerator (since $x \neq 0$)
→ $\frac{8z}{9} = \frac{25}{2z}$ → $z^2 = \frac{225}{16}$ → $z =$ **$\frac{15}{4}$ (or $3\frac{3}{4}$, 3.75)**