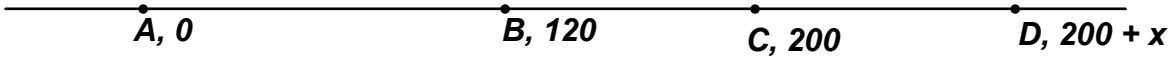
MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 4 - JANUARY 2010 SOLUTION KEY

Team Round - continued

F) Assign coordinates to the 4 points.



(1) → start at 0, end at 100 (1/2 between 0 and 200)

(2) → start at 100, end at $\frac{400+x}{3}$ (1/3 of the way to 200 + x)

$100+\frac{1}{3}\left((200+x)-100\right)=\frac{400+x}{3}$ or by weighted average $\frac{100(\mathbf{2})+(200+x)(\mathbf{1})}{1+2}$

(3) → start at $\frac{400+x}{3}$, end at $\frac{520+x}{4}$ (1/4 of the way to 120)

$$\frac{400+x}{3}-\frac{1}{4}\left(\frac{400+x}{3}-120\right)=\frac{400+x}{3}-\frac{1}{4}\left(\frac{40+x}{3}\right)=\frac{1600+4x-40-x}{12}=\frac{1560+3x}{12}=\frac{520+x}{4}$$

By weighted average $\frac{120(\mathbf{1})+\left(\frac{400+x}{3}\right)(\mathbf{3})}{1+3}=\frac{520+x}{4}$

Midway between A and D → $\frac{520+x}{4}=\frac{\mathbf{200+x}}{\mathbf{2}}$ → $520 + x = 400 + 2x$ → $x = 120$

→ $BD = 320 - 120 =$ **<u>200</u>** yards