

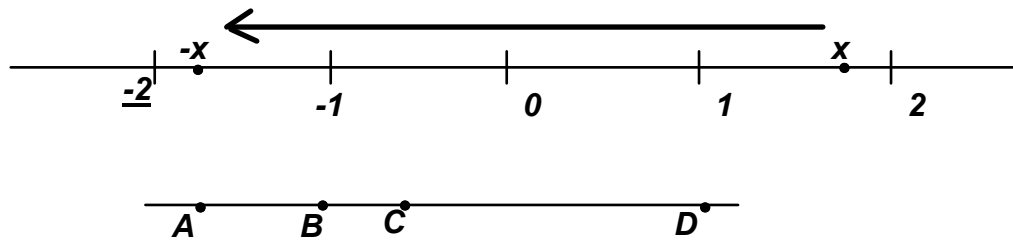
**MASSACHUSETTS MATHEMATICS LEAGUE  
CONTEST 1 - OCTOBER 2009 SOLUTION KEY**

**Round 3**

A)  $x = 1 + \frac{1}{2}(-x) \rightarrow 2x = 2 - x \rightarrow x = 2/3 \rightarrow 1/x = \underline{\underline{3/2}}$

B)  $100\left(.06x + .15(10 - x) = \frac{3x}{4}\right) \rightarrow 6x + 150 - 15x = 75x \rightarrow 84x = 150 \rightarrow x = 1.\underbrace{\clubsuit \diamondsuit \heartsuit \spadesuit \cdots}_{\text{actual digits unimportant}}$

Thus,  $[-x] = [-1.\clubsuit \diamondsuit \heartsuit \spadesuit \cdots] = \underline{\underline{-2}}$



C) Since  $\frac{AC}{BD} = \frac{4}{9}$ , let  $AC = 4x$ ,  $BD = 9x$  and the overlap  $BC = k$ . Then:

$$AB = 4x - k, CD = 9x - k \rightarrow 13x - k = 203$$

$$\frac{AB}{CD} = \frac{4x - k}{9x - k} = \frac{10}{27} \rightarrow 18x = 17k$$

Substituting for  $x$  in the first equation,  $13\left(\frac{17}{18}k\right) - k = 203 \rightarrow (13 \cdot 17 - 18)k = 18 \cdot 203$

$$\rightarrow 203k = 18 \cdot 203 \rightarrow k = \underline{\underline{18}}.$$