

**MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 4 - JANUARY 2014 SOLUTION KEY**

Round 6

A) $x^2 = 4(x+3) \Leftrightarrow x^2 - 4x - 12 = (x-6)(x+2) = 0 \Rightarrow x = 6$

Therefore, $ABCD$ is 4 by 9 has a perimeter of 26.

B) A mile is equivalent to $\frac{5280}{300} = \frac{528}{30} = \frac{176}{10} = 17.6$ '100 yard dashes'.

I must finish the mile in 4 minutes (240 seconds) or less. Therefore,

$$17.6N < 240 \Rightarrow N < \frac{240}{17.6} = \frac{2400}{176} = \frac{600}{44} = \frac{150}{11} = 13^+$$

Thus, N must be 13.

Check: $13(17.6) = 228.8 < 240$ seconds and $14(17.6) = 246.4 > 240$ seconds

C) Dividing through by c , the equation is in intercept-intercept form $\frac{x}{3c} + \frac{y}{4c} = 1$.

Let X and Y denote the points on the axes corresponding to the x -intercept and the y -intercept.

Let O denote the origin.

The intercepts are at $(3c, 0)$ and $(0, 4c)$ and the sides of right triangle XOY form a 3-4-5 right triangle. Thus, $5c = 7.2 \Rightarrow c = 1.44$ and Y is farthest from the origin \Rightarrow (0, 5.76).