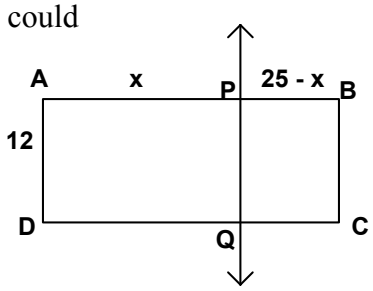
MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 4 - JANUARY 2008 SOLUTION KEY

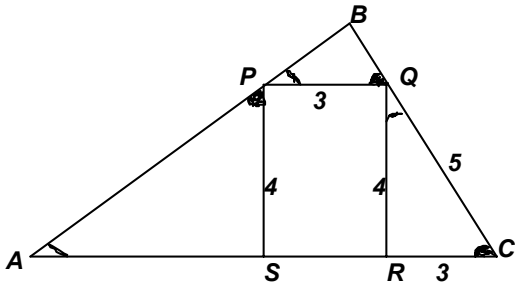
Round 5

A) $AC = 5$ → the scale factor is 6/5, the legs of ΔDEF are slightly longer than the legs in ΔABC.
Specifically, $\frac{6}{5}(3,4) = \left(\frac{\mathbf{18}}{\mathbf{5}}, \frac{\mathbf{24}}{\mathbf{5}}\right)$

B) If you don't want to experiment with various subdivisions of 25, you could approach the problem algebraically. Suppose the side of length 25 is divided into lengths of x and $(25 - x)$.
Then the ratio of corresponding sides (short to long) is:
$\frac{12}{x} = \frac{25-x}{12}$ → $x^2 - 25x + 144 = (x - 9)(x - 16) = 0$
→ $x = 9$ or 16 (Since x must be greater than 12, 9 is rejected.)
$x = 16$ → area = 16(12) = **192**.



C) QRC is a 3-4-5 right triangle.
$\Delta PBQ \sim \Delta QRC$ and the scale factor is $\frac{3}{5}$
→ $BQ = \frac{3}{5}(3) = \frac{9}{5}$ and $BP = \frac{3}{5}(4) = \frac{12}{5}$
$\Delta ASP \sim \Delta QRC$ and the scale factor is $\frac{4}{3}$
→ $AS = \frac{4}{3}(4) = \frac{16}{5}$ and $AP = \frac{4}{3}(5) = \frac{20}{3}$



Thus, the perimeter of ΔABC is $8 + \frac{21}{5} + \frac{36}{3} + 3 = 23 + 4.2 =$ **27.2**