MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2015 SOLUTION KEY

Round 6

A) The name of the polygon must begin with A, E, I or U, i.e. 4 choices and proceed through the letters successively either clockwise or counterclockwise. Thus, $4 \cdot 2 = \underline{\mathbf{8}}$.

B) $150 + 165 + x + 2x + 4x + 8x = 180(6-2) = 720$

$\Rightarrow 15x = 720 - 315 = 405 \Rightarrow x = 27$.

The largest interior angle is $27 \cdot 8 = \underline{\mathbf{216}}$.

C) $\frac{360}{n} - \frac{360}{n+6} = 3 \Leftrightarrow \frac{120}{n} - \frac{120}{n+6} = 1 \Leftrightarrow 120n + 720 - 120n = n(n+6)$

$\Leftrightarrow n(n+6) = 720 = 72(10) = 24(30)$.

As the last factorization shows, n = 24 is the positive solution to the quadratic equation.

In a regular 24-gon, the exterior angle measures 15°; therefore, the interior angle is **<u>165</u>**°.