

MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2006
ROUND 6 PLANE GEOMETRY: POLYGONS (no areas)

ANSWERS

A) _____ : _____

B) _____

C) _____

A) In rhombus $ABCD$, $BD = 40$ and $AC = 42$ and E is the point of intersection of the diagonals. Determine the ratio of the numerical value of the area of $\triangle DEC$ to the numerical value of the perimeter of $ABCD$.

B) In a regular polygon with k sides and consecutive vertices A_1, A_2, \dots, A_k , for some value of i , $\overline{A_i A_{i+3}} \parallel \overline{A_{i+1} A_{i+2}}$ forming an isosceles trapezoid with a pair of 18° base angles. Determine the value of k .

C) A regular octagon is formed by cutting off the corners of a square whose sides have length k . Determine the exact positive difference between the perimeter of the square and the perimeter of the regular octagon in terms of k , expressed as a simplified radical expression.