MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 - NOVEMBER 2008
ROUND 3 PLANE GEOMETRY: AREAS OF RECTILINEAR FIGURES

ANSWERS

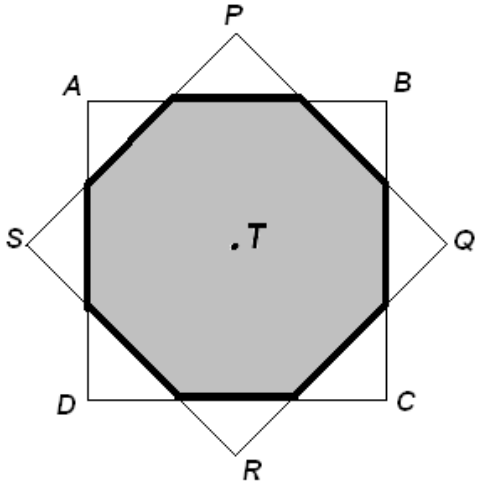
A) (_____ , _____)

B) _____

C) _____ : _____ : _____

A) The diagonal of a square has the same length as the altitude of an equilateral triangle. The simplified ratio of the area of the square to the area of the equilateral triangle may be expressed as $A : B$, where B is an integer. Determine the ordered pair (A, B).

B) If square $ABCD$ with $AB = 2$ is rotated 45° about its center T, a new square $PQRS$ is generated. Compute the area of the overlap, i.e. the area of the shaded region.



C) In rectangle $ABCD$, the diagonals intersect at point M. Points E and F lie on $\overline{BD}$ and point N lies on $\overline{AC}$ such that $DE : EB = 1 : 3$, $DF : FB = 11 : 5$ and $MN : NC = 3 : 1$. Compute the ratio of the areas of $\Delta AEF : \Delta CBF : \Delta DMN$.