

MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2007
ROUND 7 TEAM QUESTIONS
ANSWERS

- A) _____ D) (_____ , _____)
 B) _____ E) _____
 C) _____ F) _____

- A) In acute $\triangle ABC$, all sides a , b and c have integer length. If $a = 7$ and $b = 13$, determine all possible values of c .
- B) The two-digit numeral ab , where $a \neq 0$, represents a prime number in base 8, 10 and 12. Find all possible ordered pairs (a, b) .
- C) Given: $A(1, 1)$ and $B(3, 6)$.
 Point P is the point on the x -axis that minimizes the sum $AP + PB$.
 Point Q is the point on the y -axis that minimizes the sum $AQ + QB$.
 Let P_x denote the x -coordinate of point P and let Q_y denote the y -coordinate of point Q .
Compute the sum $P_x + Q_y$.
- D) A student who knew nothing about logarithms volunteered to be put in this category since his team had no other mathletes who could handle this topic.
 He was supposed to evaluate an expression of the form $\frac{\log A}{\log B}$ and he simply cancelled the 'log's and arrived at an answer of $2/3$ which proved to be correct!!!
 Determine the numerical values of ordered pair (A, B) .
- E) At the end of July, the Red Sox had a record of 85 wins and 47 losses, for a winning percentage of 0.644. Later in the season, after winning W games and losing L games, their winning percentage is greater than or equal to 0.700. There are a maximum of 162 games in a season and all games need not be played. For how many ordered pairs (W, L) is this true?
 Note: The winning percentage is always rounded off to three decimal places.
- F) $ABCD$ is a rhombus with perimeter 240.
 $AC = 72$ and E is the point of intersection of the diagonals \overline{AC} and \overline{BD} .
 $\overline{EN} \perp \overline{DC}$ and $\overline{EM} \perp \overline{BC}$
Compute the perimeter of $MENC$.

