MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 - FEBRUARY 2015
ROUND 7 TEAM QUESTIONS

ANSWERS

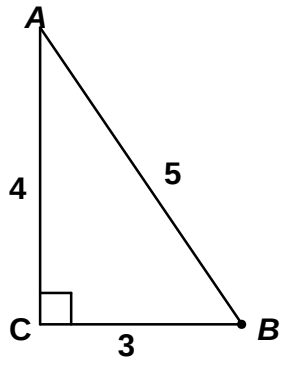
A) _____ D) _____

B) _____ E) _____

C) _____ F) _____

A) Given: $f(2x) = 2ax^2 + 6bx + c$, where a, b and c are integers, $c > 0$ and $a \geq -\frac{3b}{4}$.
If $f(1) = 15$ and $f(8) = 36$, find the minimum value of $a + b + c$.

B) Consider 3-digit numbers of the form $A8B$ and $B8A$, where $A > B$.
Find all possible ordered pairs (A, B) for which both of these 3-digit numbers are prime.



C) ΔABC is a 3-4-5 triangle. It is rotated clockwise about point B until C' (the image of C) lies between A and B. Compute $(A'C)^2$.

D) In baseball, three computations give a good indication of a player's offensive production.
They are slugging percentage (*SLG*), on-base percentage (*OBP*) and batting average (*BA*):

$$SLG = \frac{(1B) + 2(2B) + 3(3B) + 4(HR)}{AB} \qquad OBP = \frac{H + BB + HBP}{AB + BB + HBP + SF} \qquad BA = \frac{H}{AB}$$

The 4 possible hits (H) in baseball are 1B (single), 2B (double), 3B (triple) and HR (homerun).
AB - at-bats BB - base on balls (walks) HBP - hit by pitch SF – sacrifice fly

My last year in the majors was my best: 104 singles, 18 doubles, 2 triples and 6 homeruns in 400 at bats. My *OBP* was the average of my batting average and my slugging percentage. Thankfully, I was not a favorite target of opposing pitchers and my BB : HBP ratio was 10 : 1. How many times was I hit by a pitch, if I had fewer than 100 sacrifice flies.
Give all possible answers.