MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2012
ROUND 2 PYTHAGOREAN RELATIONS IN RECTILINEAR FIGURES

ANSWERS

A) _____ units

B) _____ units^2

C) (_____ , _____)

A) If the legs of a right triangle were 8 and 9, the hypotenuse would have a length of $\sqrt{145}$.
Since 145 is not a perfect square, this length is irrational.
However, if the short leg is reduced by the same integer amount as that by which the long leg is increased, the hypotenuse has an integer length. This is true for exactly one integer value *x*.
For this value of *x*, what is the length of the hypotenuse?

B) In square *ABCD*, *E* and *F* are midpoints of $\overline{BC}$ and $\overline{CD}$, respectively, and the area of ΔAEF is *R* square units. Find the area of square *ABCD* as a simplified expression in terms of *R*.

C) Mitt and Barack start from the same point. Mitt travels north on a plane for 3 hours.
Barack leaves one hour later and travels west on a bus for 2 hours.
At the end of this time interval Mitt and Barack are 500 miles apart.
If the plane covers a distance of 340 miles more than the bus, compute the rates of the plane (*P*) and the bus (*B*) in miles per hour. Express your answer as an ordered pair (*P*, *B*).