**MASSACHUSETTS MATHEMATICS LEAGUE**
**CONTEST 6 - MARCH 2016**
**ROUND 7 TEAM QUESTIONS**
**ANSWERS**

A) (_____ , _____ , _____ ) D) _____ $mm^2$

B) _____ E) _____

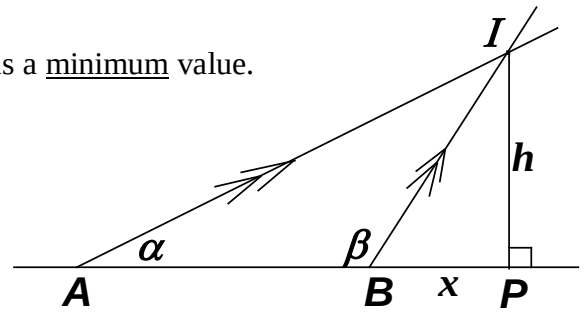
C) ( _____ , _____ ) F) _____

A) Given: $\begin{cases} x+y+z=n \\ 2x-y-z=n+1 \\ x+2y-2z=n+2 \end{cases}$, where *x*, *y*, *z* and *n* are positive integers.

If $x+y>100$, compute $(x,y,n)$ for which $x+y+n$ has a minimum value.

B) Given: $\begin{cases} x=t+t^{-1} \\ y=t-t^{-1} \end{cases}$

Compute all possible real values of *y*, if $x=\frac{1}{2}\sqrt{17}$.

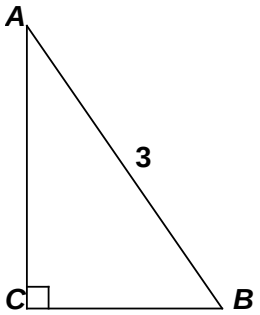



C) A missile fired from point *A* is intercepted at point *I* by a missile fired from point *B*.

If $AB=500, \beta=2\alpha, \tan\alpha=\frac{2\sqrt{3}}{3}$ and $\beta$ is obtuse, compute the ordered pair $(x,h)$.

D) The Lady Bird Johnson Souvenir Sheet contains 6 stamps. The dimensions of the sheet are *L* mm by $(L+12)$ mm, where *L* is an integer. Consider each stamp a rectangle whose dimensions (in mm) are integers in an 8 : 5 ratio. The area of the 6 stamps (in $mm^2$) equals 25% the area of the sheet plus 260 $mm^2$. Compute the minimum area of the sheet for which this is true.


E) Given: Right $\Delta ABC$ with hypotenuse *AB* = 3
An arc is drawn with radius *AC* and center *A* intersecting $\overline{AB}$ at point *E*.
An arc is drawn with radius *BC* and center *B* intersecting $\overline{AB}$ at point *D*.
If *DE* = 1.2, compute the area of $\Delta ABC$.




F) Solve for *x* over the reals. $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^4=20.25$