MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2015
ROUND 7 TEAM QUESTIONS

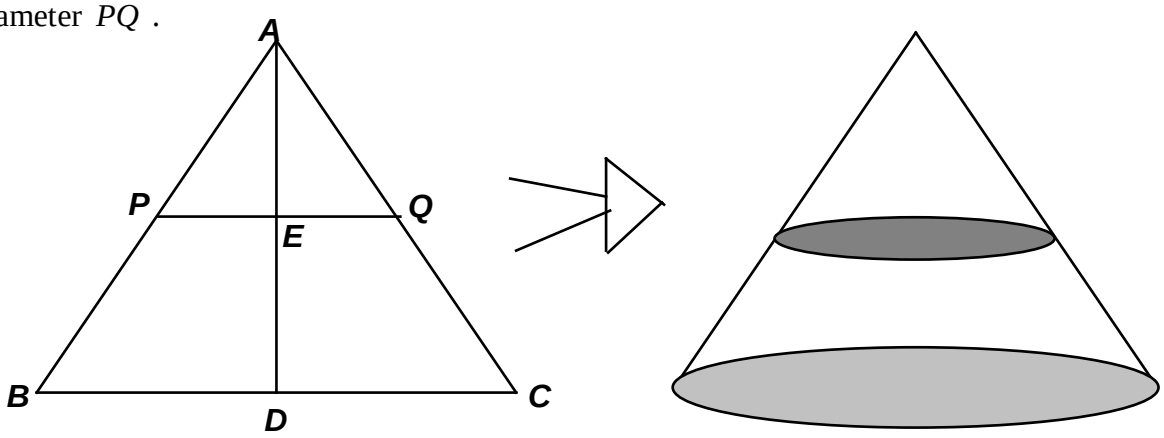
ANSWERS

A) _____ D) (_____ , _____)

B) _____ E) _____

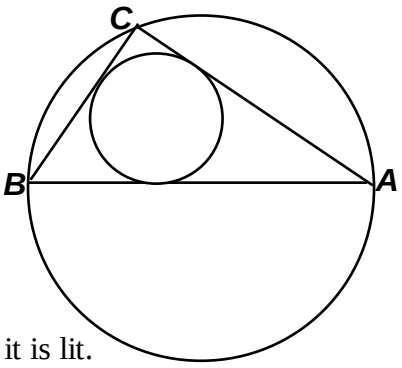
C) _____ F) _____

A) Rotating isosceles ΔABC and segment $\overline{PQ}$ about altitude $\overline{AD}$ produces a cone which is subdivided into a smaller cone and the frustum of a cone by a circular cross section with diameter $\overline{PQ}$.



If $AB = AC = 35$ and $BC = 42$, compute the length of $\overline{AE}$ for which the ratio of the volume of the small cone to the volume of frustum is $27:98$.

B) In right ΔABC, $m\angle C = 90°$, the radius of its inscribed circle is $x - y$, the diameter of its circumscribed circle is $x + 5y$, $AC = x + 3y + 1$, and $BC = 2x + y - 3$. Compute the perimeter of ΔABC .



C) Assume an inexpensive candle is 16 inches long and lasts 4 hours after it is lit. Assume an expensive candle is 12 inches long and lasts 6 hours after it is lit. Both candles are lit simultaneously. After S minutes, one candle is twice as long as the other. After T minutes, the sum of the lengths of the two candles is 10 inches. Compute $T - S$.