MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2016
ROUND 3 COORDINATE GEOMETRY OF LINES AND CIRCLES

ANSWERS

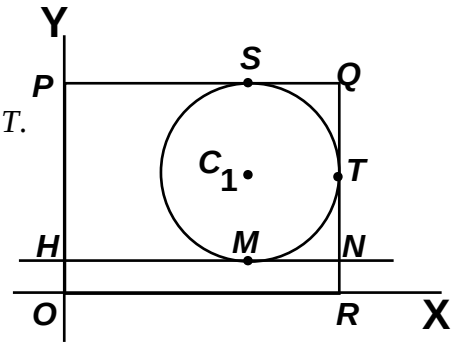
A) _____

B) (_____ , _____)

C) _____

A) The equation of circle C_1 is $(x-6)^2+(y-4)^2=5.0625$.
Two sides of rectangle *OPQR* are tangent to circle C_1 at points *S* and *T*.
$\overleftrightarrow{HN} \| \overline{OR}$ and intersects circle C_1 at point *M*.
Compute the perimeter of rectangle *HORN*.

Recall: $\frac{1}{8}=0.125$.



B) Line $\mathcal{L}$ passes through points $A(-4,1)$ and $B(17,8)$. The line perpendicular to $\mathcal{L}$ has *x*-intercept at $C(3,0)$ and intersects $\mathcal{L}$ at $D(p,q)$. Compute the ordered pair (p,q).

C) Given: Circle $C_1: x^2+y^2=676$
How many unit circles, i.e. with radius 1, are internally tangent to C_1 and have a center at a lattice point?

Note: Two circles are internally tangent if they share a common tangent line $\mathcal{T}$ and the centers of the circles are on the same side of the tangent line $\mathcal{T}$.