

**MASSACHUSETTS MATHEMATICS LEAGUE  
CONTEST 3 - DECEMBER 2014  
ROUND 3 COORDINATE GEOMETRY OF LINES AND CIRCLES**

**ANSWERS**

A) ( \_\_\_\_\_ , \_\_\_\_\_ )     $r =$  \_\_\_\_\_

B) ( \_\_\_\_\_ , \_\_\_\_\_ )

C) ( \_\_\_\_\_ , \_\_\_\_\_ )

- A) A student was in the middle of completing the square to determine the center and the radius of a circle when he was called to the dinner table. Complete this unfinished business, that is, give the coordinates of the center and the radius of this circle.

$$(x^2 - 16x + \_\_\_) + (y^2 + 10y + \_\_\_) = 11 + \_\_\_$$

- B) Line  $L_1$  passes through the point  $A(-3, 1)$  and has slope  $-1.5$ .

Line  $L_2$  is the perpendicular bisector of the segment whose endpoints are  $B(4, 3)$  and  $C(0, 7)$ .

$P(x, y) = L_1 \cap L_2$ . Compute the ordered pair  $(x, y)$ .

Note:  $\cap$  signifies “the intersection of”.

- C) Given:  $\triangle ABC$ , where  $A(-2, 3)$ ,  $B(6, 5)$ , and  $C(8, 1)$

$P$  is a point on the  $x$ -axis for which the sum of the squares of the distances to the vertices of  $\triangle ABC$  has a minimum value. Symbolically,  $P(x, 0)$  is the point for which

$(PA)^2 + (PB)^2 + (PC)^2$  has a minimum value of  $N$ .

Compute the ordered pair  $(x, N)$ .