

**MASSACHUSETTS MATHEMATICS LEAGUE**  
**CONTEST 3 - DECEMBER 2015**  
**ROUND 1 TRIG: RIGHT ANGLE PROBLEMS, LAWS OF SINES AND COSINES**

**ANSWERS**

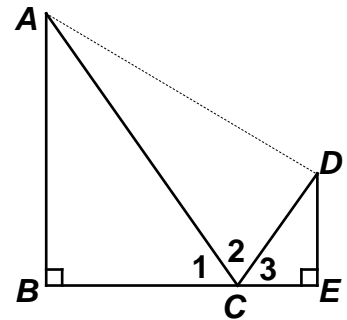
A) ( \_\_\_\_\_ , \_\_\_\_\_ )

B) \_\_\_\_\_

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

- A) Right triangle  $ABC$  has sides of length  $(141, b, c)$ , where 141 is the length of the short leg and  $b$  is the length of the long leg. If  $ABC$  is similar to  $\triangle DEF$ , whose sides have integer lengths and whose perimeter is 12. Determine the ordered pair  $(b, c)$ .

- B)  $\triangle ABC$  and  $\triangle CDE$  are right triangles, where  $B, C$  and  $E$  are collinear,  
 $BE = 9$  and  $BC = CE + 4$ .  
 If  $m\angle 1 = m\angle 2 = m\angle 3$ , compute  $AD$ .



- C) In  $\triangle ABC$ ,  $AC = 20$ ,  $\sin C = \frac{\sqrt{7}}{4}$ ,  $m\angle A = 2 \cdot m\angle C$ , and  $\cos B = \cos^2 C$ .

The area of  $\triangle ABC$  in simplest form is  $K\sqrt{L}$ .

Determine the ordered pair  $(K, L)$ .