

**MASSACHUSETTS MATHEMATICS LEAGUE  
CONTEST 6 - MARCH 2014  
ROUND 5 PLANE GEOMETRY: ANYTHING**

**ANSWERS**

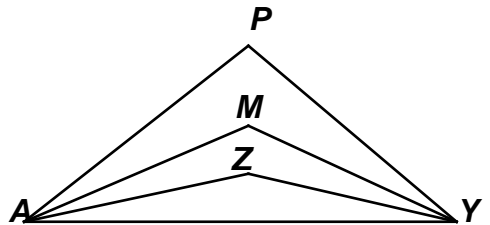
A) \_\_\_\_\_

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

C) \_\_\_\_\_

- A) In quadrilateral *MIKE*,  $\angle M$  is considered to be opposite  $\angle K$ .  
 In pentagon  $S_1US_2AN$ , there is no single angle which is considered opposite  $\angle U$ .  
 Only polygons with an even number of sides contain pairs of opposite angles.  
 Consider a 12-sided convex polygon with consecutive vertices designated  $V_1, V_2, \dots, V_{12}$ .  
 Using these designations, specify a 3-letter name for the angle opposite  $\angle V_7$ .

- B) The trisectors of the base angles of isosceles triangle *PAY* intersect at points *M* and *Z*.  
 The measures of angles *M* and *Z* differ by  $26^\circ$ .  
 Compute the degree-measure of the vertex angle in  $\triangle PAY$ .



- C) Two points *A* and *B* lie on circle *P* with radius 6.  
 Initially,  $m(\widehat{AB}) = 90^\circ$ , as shown in the diagram at the right. Points *C* and *D* are trisection points of chord  $\overline{AB}$ .  
 If points *A* and *B* simultaneously move around circle *P*, the locus of the trisection points is a new circle centered at *P*. If, on the other hand, point *B* is fixed and point *A* moves around circle *P*, the locus of the trisection points is two circles tangent at point *B*.  
 Compute the sum of the areas of these three circles.

