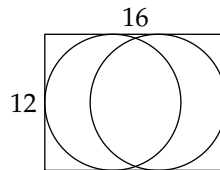




Try these problems before watching the lesson.

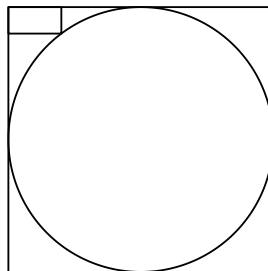
1. In  $\triangle XYZ$ , we have  $\angle X = 30^\circ$ ,  $\angle Y = 90^\circ$ , and  $YZ = 6$ . Find  $XY$  and  $XZ$ .
2. In the diagram below, the rectangle has length 16 and width 12. Each circle is tangent to three sides of the rectangle. What is the distance between the centers of the circles?



3. Point  $A$  is on circle  $C$  and point  $P$  is outside the circle such that  $AP = 12$  and  $\overline{AP}$  is tangent to the circle. If the circle has area  $256\pi$  square units, then how far is  $P$  from the center of the circle?



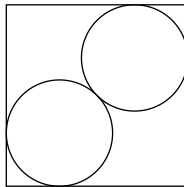
**First Problem:** In the figure shown, the side lengths of the small rectangle are 5 cm and 10 cm and the lower right vertex of the rectangle is on the circle. What is the radius of the circle?



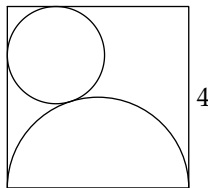
**Second Problem:** In pentagon  $ABCDE$ ,  $\angle E$  and  $\angle C$  are right angles and  $\angle D = 120^\circ$ . If  $AB = 12$ ,  $AE = BC = 18$  and  $ED = DC$ , what is  $ED$ ?

 Follow-up Problems

4. In the diagram below, two congruent circles are tangent to each other, and each circle is tangent to two sides of the square. If the side length of the square is 4 units, then what is the radius of each circle?

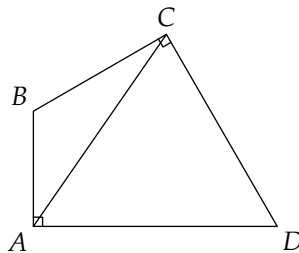


5. Two circles with radii 16 and 9 are tangent to each other, and are tangent to line  $\ell$  at distinct points  $P$  and  $Q$ . Find the length of  $\overline{PQ}$ .
6. A semicircle and a circle are placed inside a square with sides of length 4 cm, as shown. The circle is tangent to two adjacent sides of the square and to the semicircle. The diameter of the semicircle is a side of the square. In centimeters, what is the radius of the circle?



7. Two angles of a triangle measure 45 and 105 degrees. If the side of the triangle opposite the 45-degree angle measures 8 units, what is the sum of the lengths of the two remaining sides?

8. In triangle  $ABC$ ,  $m\angle ABC = 120^\circ$ ,  $AB = 3$  and  $BC = 4$ . If lines perpendicular to  $\overline{AB}$  at point  $A$  and to  $\overline{BC}$  at point  $C$  meet at point  $D$ , then find  $CD$ . (Source: AMC 12)



*Wow!* Share Your Thoughts

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community ([www.artofproblemsolving.com](http://www.artofproblemsolving.com)).