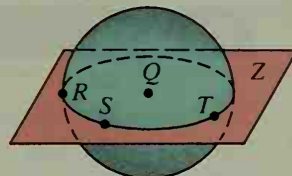**4.** Plane Z passes through the center of sphere Q.
   a. Explain why $QR = QS = QT$.
   b. Explain why the intersection of the plane and the sphere is a circle. (The intersection of a sphere with any plane passing through the center of the sphere is called a **great circle** of the sphere.)

5. The radii of two concentric circles are 15 cm and 7 cm. A diameter $\overline{AB}$ of the larger circle intersects the smaller circle at C and D. Find two possible values for AC.

For each exercise draw a circle and inscribe the polygon in the circle.

6. A rectangle

7. A trapezoid

8. An obtuse triangle

9. A parallelogram

10. An acute isosceles triangle

11. A quadrilateral $PQRS$, with $\overline{PR}$ a diameter

For each exercise draw $\odot O$ with radius 12. Then draw radii $\overline{OA}$ and $\overline{OB}$ to form an angle with the measure named. Find the length of $\overline{AB}$.

B

12. $m \angle AOB = 90$

13. $m \angle AOB = 180$

14. $m \angle AOB = 60$

**15.** $m \angle AOB = 120$

16. Draw two points A and B and several circles that pass through A and B. Locate the centers of these circles. On the basis of your experiment, complete the following statement:
The centers of all circles passing through A and B lie on ___?___.
Write an argument to support your statement.

17. $\odot Q$ and $\odot R$ are congruent circles that intersect at C and D. $\overline{CD}$ is called the *common chord* of the circles.
   a. What kind of quadrilateral is $QDRC$? Why?
   b. $\overline{CD}$ must be the perpendicular bisector of $\overline{QR}$. Why?
   c. If $QC = 17$ and $QR = 30$, find CD.
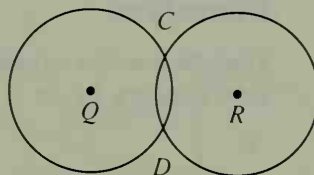
18. Draw two congruent circles with radii 6 each passing through the center of the other. Find the length of their common chord.

C

19. $\odot P$ and $\odot Q$ have radii 5 and 7 and $PQ = 6$. Find the length of the common chord $\overline{AB}$. (*Hint: APBQ* is a kite and $\overline{PQ}$ is the perpendicular bisector of $\overline{AB}$. See Exercise 28, page 193. Let N be the intersection of $\overline{PQ}$ and $\overline{AB}$, and let $PN = x$ and $AN = y$. Write two equations in terms of x and y.)
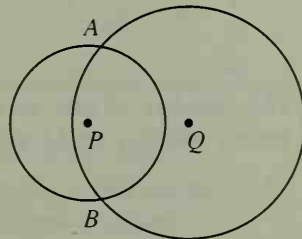
20. Draw a diagram similar to the one shown, but much larger. Carefully draw the perpendicular bisectors of $\overline{AB}$ and $\overline{BC}$.
   a. The perpendicular bisectors intersect in a point. Where does that point appear to be?
   b. Write an argument that justifies your answer to part (a).