51 problems: 5-10, 15, 16, 19, 20, 23-26

Written Exercises

Point W lies outside $\odot O$ and point X lies inside. In how many points does the figure named intersect the circle?

A **1.** $\overline{WX}$ **2.** $\overrightarrow{WX}$ **3.** $\overleftrightarrow{XW}$ **4.** $\overline{OX}$

Point Y lies outside sphere Q and point Z lies inside. In how many points does the figure named intersect the sphere?

5. $\overline{YZ}$ **6.** $\overrightarrow{YQ}$ **7.** $\overleftrightarrow{ZY}$ **8.** $\overline{QZ}$

The radius of sphere P is 12. Plane M cuts the sphere in a circle. Tell what you can about the center and radius of the circle if:

9. Plane M passes through P.

10. Plane M does not pass through P.

For each exercise draw a circle and inscribe the figure named in the circle. If a polygon of the type named can't be inscribed, write *not possible*.

11. A rectangle

12. A trapezoid

13. An obtuse triangle

14. A nonrectangular parallelogram

15. An acute isosceles triangle

16. 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 **17.** $m\angle AOB = 90$ **18.** $m\angle AOB = 180$ **19.** $m\angle AOB = 60$ **20.** $m\angle AOB = 120$

21. Write a definition of radius of a sphere.

22. Write a definition of congruent spheres.

23. A plane 6 units from the center of a sphere of radius 10 intersects the sphere in a circle. Find the radius of the circle.

24. A plane 15 cm from the center of a sphere cuts the sphere in a circle with a radius of 8 cm. Find the radius of the sphere.

C **25.** Two spheres with radii of 6 cm and 4 cm have centers that are 8 cm apart. Find the radius of the circle in which the spheres intersect.

26. Prove: A line intersects a circle in at most two points. (*Hint:* Write an indirect proof.)

27. Exercises 23 and 24 assume the following theorem: If a plane intersects a sphere in more than one point, the intersection is a circle. Prove this theorem. (*Hint:* The case where the plane, Z, passes through the center of the sphere, Q, is covered in Classroom Exercise 10. If Z does not pass through Q, draw a perpendicular from Q to Z, intersecting Z in point P. (You may assume that this is possible.) Let R and S be any two points on the intersection of the sphere and the plane. Show that $\overline{PR} \cong \overline{PS}$.)