

WORKSHEET

9

If the equation represents

Unit #1

a circle, find the center and radius.

In Exercises 13 and 14, find an equation of the given line.

13. The line is the perpendicular bisector of the line segment joining (2, 8) and (-4, 6).
14. The line is the perpendicular bisector of the line segment joining (5, -1) and (4, 8).
15. Find the point on the line $4x - 2y + 3 = 0$ that is equidistant from (3, 3) and (7, -3). [Hint: First find an equation of the line that is the perpendicular bisector of the line segment joining (3, 3) and (7, -3).]
16. Find the distance from the point (3, -2) to the line
(a) $y = 4$ (b) $x = -1$.
17. Find the distance from the point (2, 1) to the line $4x - 3y + 10 = 0$. [Hint: Find the foot of the perpendicular dropped from the point to the line.]
18. Find the distance from the point (8, 4) to the line $5x + 12y - 36 = 0$. [Hint: See the hint in Exercise 17.]
19. Use the method described in Exercise 17 to prove that the distance d from (x_0, y_0) to the line $Ax + By + C = 0$ is

$$d = \frac{|Ax_0 + By_0 + C|}{\sqrt{A^2 + B^2}}$$

20. Use the formula in Exercise 19 to solve Exercise 17.
21. Use the formula in Exercise 19 to solve Exercise 18.
22. Prove: For any triangle, the perpendicular bisectors of the sides meet at a point. [Hint: Position the triangle with one vertex on the y-axis and the opposite side on the x-axis, so that the vertices are (0, a), (b, 0), and (c, 0).]

In Exercises 23 and 24, find the center and radius of each circle.

23. (a) $x^2 + y^2 = 25$
(b) $(x - 1)^2 + (y - 4)^2 = 16$
(c) $(x + 1)^2 + (y + 3)^2 = 5$
(d) $x^2 + (y + 2)^2 = 1$
24. (a) $x^2 + y^2 = 9$
(b) $(x - 3)^2 + (y - 5)^2 = 36$
(c) $(x + 4)^2 + (y + 1)^2 = 8$
(d) $(x + 1)^2 + y^2 = 1$

In Exercises 25-32, find the standard equation of the circle satisfying the given conditions.

25. Center (3, -2); radius = 4.
26. Center (1, 0); diameter = $\sqrt{8}$.
27. Center (-4, 8); circle is tangent to the x-axis.
28. Center (5, 8); circle is tangent to the y-axis.
29. Center (-3, -4); circle passes through the origin.
30. Center (4, -5); circle passes through (1, 3).
31. A diameter has endpoints (2, 0) and (0, 2).
32. A diameter has endpoints (6, 1) and (-2, 3).

33. $x^2 + y^2 - 2x - 4y - 11 = 0$.
34. $x^2 + y^2 + 8x + 8 = 0$.
35. $2x^2 + 2y^2 + 4x - 4y = 0$.
36. $6x^2 + 6y^2 - 6x + 6y = 3$.
37. $x^2 + y^2 + 2x + 2y + 2 = 0$.
38. $x^2 + y^2 - 4x - 6y + 13 = 0$.
39. $9x^2 + 9y^2 = 1$.
40. $x^2/4 + y^2/4 = 1$.
41. $x^2 + y^2 + 10y + 26 = 0$.
42. $x^2 + y^2 - 10x - 2y + 29 = 0$.
43. $16x^2 + 16y^2 + 40x + 16y - 7 = 0$.
44. $4x^2 + 4y^2 - 16x - 24y = 9$.

45. Find an equation of
(a) the bottom half of the circle $x^2 + y^2 = 16$
(b) the top half of the circle $x^2 + y^2 + 2x - 4y + 1 = 0$.
46. Find an equation of
(a) the right half of the circle $x^2 + y^2 = 9$
(b) the left half of the circle $x^2 + y^2 - 4x + 3 = 0$.
47. Graph
(a) $y = \sqrt{25 - x^2}$
(b) $y = \sqrt{5 + 4x - x^2}$.

In Exercises 57-70, graph the parabola and label the coordinates of the vertex and the intersections with the coordinate axes.

57. $y = x^2 + 2$. 58. $y = x^2 - 3$.
59. $y = x^2 + 2x - 3$. 60. $y = x^2 - 3x - 4$.
61. $y = -x^2 + 4x + 5$. 62. $y = -x^2 + x$.
63. $y = (x - 2)^2$. 64. $y = (3 + x)^2$.
65. $x^2 - 2x + y = 0$. 66. $x^2 + 8x + 8y = 0$.
67. $y = 3x^2 - 2x + 1$. 68. $y = x^2 + x + 2$.
69. $x = -y^2 + 2y + 2$. 70. $x = y^2 - 4y + 5$.

71. Find an equation of
(a) the right half of the parabola $y = 3 - x^2$
(b) the left half of the parabola $y = x^2 - 2x$.
72. Find an equation of
(a) the upper half of the parabola $x = y^2 - 5$
(b) the lower half of the parabola $x = y^2 - y - 2$.

73. Graph
(a) $y = \sqrt{x + 5}$ (b) $x = -\sqrt{4 - y}$.

74. Graph
(a) $y = 1 + \sqrt{4 - x}$ (b) $x = 3 + \sqrt{y}$.

75. If a ball is thrown straight up with an initial velocity of 32 ft/sec, then after t seconds the distance s above its starting height, in feet, is given by $s = 32t - 16t^2$.
- (a) Graph this equation in a ts -coordinate system (t -axis horizontal).
- (b) At what time t will the ball be at its highest point, and how high will it rise?