

Graph the equation. Identify the important characteristics of the graph.

1. $x^2 + (y - 3)^2 = 9$
3. $(x - 3)^2 = 8(y + 4)$
5. $\frac{(x + 3)^2}{32} + \frac{(y - 4)^2}{36} = 1$
7. $(x - 6)^2 + (y - 2)^2 = 4$
9. $(y - 4)^2 = 3(x + 2)$
11. $(x + 7)^2 + (y - 1)^2 = 1$
1. $(y + 4)^2 = -16(x - 5)$
3. $(x - 3)^2 + (y + 4)^2 = 18$
5. $\frac{(x + 6)^2}{11} + \frac{(y + 5)^2}{27} = 1$
7. $\frac{(x - 5)^2}{100} + \frac{(y + 1)^2}{9} = 1$
2. $\frac{(x - 2)^2}{(y + 5)^2} + \frac{20}{9} = 1$
4. $\frac{(y + 7)^2}{(x - 4)^2} - \frac{26}{12} = 1$
6. $(x - 8)^2 = 6(y + 3)$
8. $(x + 2)^2 + (y - 2)^2 = 28$
4. $\frac{(y + 2)^2}{(x + 1)^2} - \frac{18}{25} = 1$
2. $\frac{(x - 4)^2}{(y - 2)^2} + \frac{16}{4} = 1$
8. $\frac{(y - 8)^2}{(x + 3)^2} - \frac{16}{4} = 1$
10. $\frac{(x + 1)^2}{(y + 3)^2} + \frac{16}{4} = 1$
12. $(x + 7)^2 = 12(y - 3)$

Classify the conic section and write its equation in standard form. Then graph the equation.

23. $x^2 - 14x - 9y + 22 = 0$
25. $18x^2 + 10y^2 - 108x - 100y + 232 = 0$
27. $4x^2 + 14y^2 + 8x + 56y + 4 = 0$
23. $2x^2 + 5x + y + 14 = 0$
25. $5x^2 - 5y^2 + 4x - 3y + 4 = 0$
27. $9x^2 + 4y^2 + 36x - 24y + 36 = 0$
29. $4x^2 - 9y^2 + 18y + 3x = 0$
31. $62x^2 + 81y^2 - 868x - 1984 = 0$
33. $x^2 + y^2 + 14x - 2y + 49 = 0$
35. $y^2 + 8x - 2y - 15 = 0$
37. $x^2 - 9y^2 + 54y - 90 = 0$
39. $x^2 + 10x - 6y + 7 = 0$
41. $y^2 - 12y + 4x + 4 = 0$
43. $9x^2 - y^2 - 72x + 8y + 119 = 0$
24. $x^2 + y^2 + 10x - 12y + 40 = 0$
26. $8x^2 - 25y^2 + 32x + 150y - 393 = 0$
28. $-32x^2 + 20y^2 + 256x - 280y - 172 = 0$
24. $4x^2 + 4y^2 - 6x + 8y - 10 = 0$
26. $x^2 + 4y^2 - 8x - 12y - 2 = 0$
28. $x^2 - 4y^2 + 3x - 26y - 30 = 0$
30. $x^2 + y^2 - 10x - 2y - 10 = 0$
32. $y^2 - 6x - 16y + 52 = 0$
34. $4x^2 - 25y^2 - 32x - 150y - 261 = 0$
36. $x^2 + y^2 - 12x + 2y + 15 = 0$
38. $9x^2 + 36y^2 + 54x - 144y - 99 = 0$
40. $-2x^2 + 5y^2 + 24x - 20y - 102 = 0$
42. $x^2 + y^2 - 6x - 8y + 24 = 0$
44. $4x^2 + y^2 - 48x - 4y + 48 = 0$

Write an equation of the conic section.

13. Circle with center at $(2, -6)$ and a radius of 4
 14. Parabola with vertex at $(3, 3)$ and focus at $(3, 0)$
 15. Ellipse with vertices at $(-2, -1)$ and $(-2, 7)$ and co-vertices at $(-4, 3)$ and $(0, 3)$
 16. Hyperbola with vertices at $(2, 4)$ and $(8, 4)$ and foci at $(-2, 4)$ and $(12, 4)$
 17. Ellipse with vertices at $(2, -3)$ and $(2, 6)$ and foci at $(2, 0)$ and $(2, 3)$
 18. Parabola with vertex at $(-8, 1)$ and focus at $(-8, 3)$
 19. Circle with center at $(3, -4)$ and radius of $4\sqrt{3}$
 20. Hyperbola with vertices at $(0, -2\sqrt{6})$ and $(0, 2\sqrt{6})$ and foci at $(0, -5)$ and $(0, 5)$
 21. Parabola with vertex at $(6, 2)$ and directrix $x = 2$
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9. Ellipse with foci at $(3, -4)$ and $(5, -4)$ and vertices at $(-1, -4)$ and $(9, -4)$
 10. Parabola with vertex at $(3, -2)$ and focus at $(3, -4)$
 11. Circle with center at $(-3, -7)$ and radius of $\sqrt{7}$
 12. Parabola with vertex at $(2, 6)$ and directrix $y = 8$
 13. Ellipse with vertices at $(2, -1)$ and $(10, -1)$ and foci at $(6 - \sqrt{3}, -1)$ and $(6 + \sqrt{3}, -1)$
 14. Hyperbola with vertices at $(-3, 0)$ and $(-3, 4)$ and foci at $(-3, 2 - \sqrt{7})$ and $(-3, 2 + \sqrt{7})$
 15. Circle with center at $(-\frac{1}{2}, \frac{3}{4})$ and radius of $\frac{2}{3}$
 16. Hyperbola with vertices at $(-\frac{5}{6}, -1\frac{1}{3})$ and $(-\frac{5}{6}, 2\frac{2}{3})$ and foci at $(-\frac{5}{6}, \frac{2}{3} - \sqrt{13})$ and $(-\frac{5}{6}, \frac{2}{3} + \sqrt{13})$