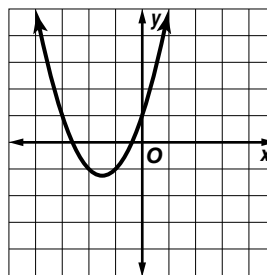


8-6 Conic Sections

Page 450 Check for Understanding

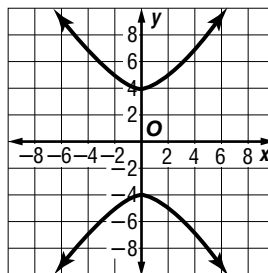
$$\begin{aligned}
 4. \quad & y = x^2 + 3x + 1 \\
 & y - 1 = x^2 + 3x \\
 & y - 1 + \frac{9}{4} = x^2 + 3x + \frac{9}{4} \\
 & y - 1 + \frac{9}{4} = \left(x + \frac{3}{2}\right)^2 \\
 & y = \left(x + \frac{3}{2}\right)^2 - \frac{5}{4}
 \end{aligned}$$

The equation is of the form $y = a(x - h)^2 + k$, so the graph is a parabola with its vertex at $\left(-\frac{3}{2}, -\frac{5}{4}\right)$.



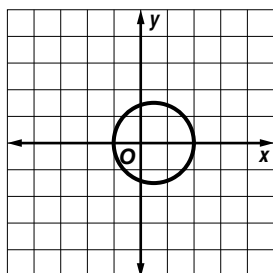
$$\begin{aligned}
 5. \quad & y^2 - 2x^2 - 16 = 0 \\
 & y^2 - 2x^2 = 16 \\
 & \frac{y^2}{16} - \frac{2x^2}{16} = 1 \\
 & \frac{y^2}{16} - \frac{x^2}{8} = 1
 \end{aligned}$$

The equation is of the form $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$, so the graph is a hyperbola.



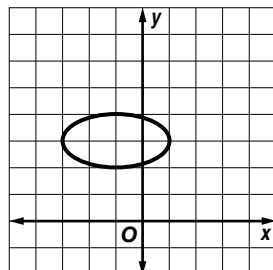
6. $x^2 + y^2 = x + 2$
 $(x^2 - x + \frac{1}{4}) + y^2 = 2 + \frac{1}{4}$
 $(x - \frac{1}{2})^2 + y^2 = \frac{9}{4}$

The equation is of the form $(x - h)^2 + (y - k)^2 = r^2$,
 so the graph is a circle with its center at $(\frac{1}{2}, 0)$
 and a radius of $\frac{3}{2}$ units.



7. $x^2 + 4y^2 + 2x - 24y + 33 = 0$
 $(x^2 + 2x + 1) + 4(y^2 - 6y + 9) = -33 + 1 + 4(9)$
 $(x + 1)^2 - 4(y - 3)^2 = 4$
 $\frac{(x + 1)^2}{4} - \frac{4(y - 3)^2}{4} = 1$
 $\frac{(x + 1)^2}{4} - \frac{(y - 3)^2}{1} = 1$

The equation is of the form $\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$, so
 the graph is an ellipse with its center at $(-1, 3)$.



8. The equation is of the form $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$, where $A = 0$, $B = 0$, $C = 1$, $D = -1$, $E = -10$, and $F = 34$. Since $A = 0$ and $C \neq 0$, the graph of the equation is a parabola.
9. The equation is of the form $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ where $A = 3$, $B = 0$, $C = 2$, $D = 12$, $E = -28$, and $F = 104$. Since A and C have the same sign and $A \neq C$, the graph of the equation is an ellipse.