

| 3 Forms of Quadratic Equations | | |
|--------------------------------|---------------------------|----------------------|
| Standard | Factored | Vertex |
| $y = ax^2 + bx + c$ | $y = a(x - r_1)(x - r_2)$ | $y = a(x - h)^2 + k$ |

Write each quadratic equation in the requested form.

1. Write in vertex form: $y = x^2 + 10x + 27$

ETS

$$\begin{array}{r}
 x + 5 \\
 x \begin{array}{|c|c|} \hline x^2 & 5x \\ \hline \end{array} \\
 + \\
 5 \begin{array}{|c|c|} \hline 5x & 25 \\ \hline \end{array}
 \end{array}
 + 2 = (x + 5)^2 + 2$$

2. Write in standard form: $y = 2(x + 3)^2 - 5$

$$\begin{aligned}
 & 2(x + 3)(x + 3) - 5 \\
 & 2(x^2 + 3x + 3x + 9) - 5 \\
 & 2(x^2 + 6x + 9) - 5 = 2x^2 + 12x + 18 - 5 \\
 & \qquad\qquad\qquad \boxed{2x^2 + 12x + 13}
 \end{aligned}$$

3. Write in factored form: $y = 6x^2 + 9x - 27$

$$\begin{aligned}
 & y = 3(2x^2 + 3x - 9) \\
 & \qquad 3 \left(\begin{array}{r} 2x - 3 \\ \begin{array}{|c|c|} \hline x & 2x^2 & 3x \\ \hline \end{array} \\ \hline \end{array} \right) \\
 & \qquad\qquad\qquad 3(x + 3)(2x - 3)
 \end{aligned}$$

4. Write in factored form: $y = (x - 1)^2 - 4$

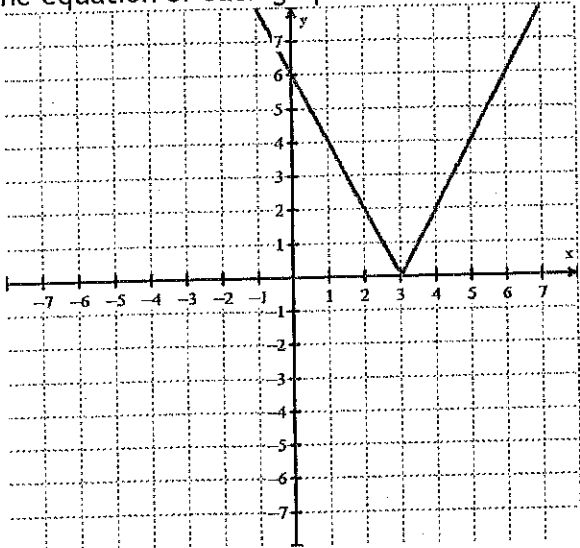
$$\begin{aligned}
 & (x - 1)(x - 1) - 4 \\
 & x^2 - 1x - 1x + 1 - 4 \\
 & x^2 - 2x - 3 \longrightarrow \begin{array}{r} x - 3 \\ \begin{array}{|c|c|} \hline x & x^2 & 3x \\ \hline \end{array} \\ \hline \end{array} \\
 & \qquad\qquad\qquad (x - 3)(x + 1)
 \end{aligned}$$

5. Write in vertex form: $y = 2x^2 + 12x - 4$

$$\begin{aligned}
 & y = 2(x^2 + 6x - 2) \\
 & \qquad = 2 \left(\begin{array}{r} x + 3 \\ \begin{array}{|c|c|} \hline x & x^2 & 3x \\ \hline \end{array} \\ \hline \end{array} - 11 \right) \\
 & \qquad\qquad\qquad 2((x + 3)^2 - 11) = 2(x + 3)^2 - 22
 \end{aligned}$$

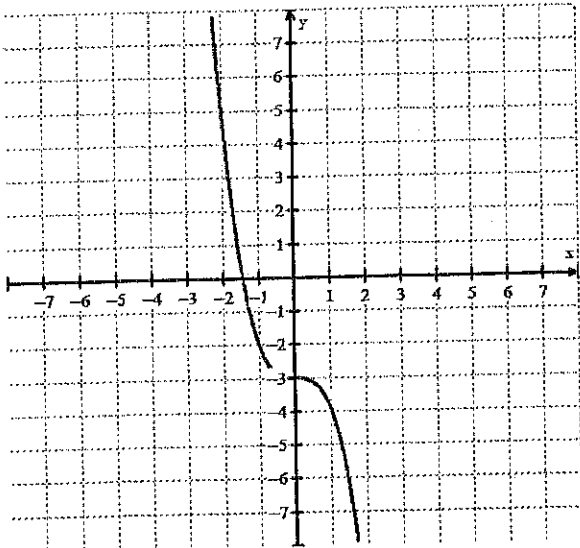


Write the equation of each graph.



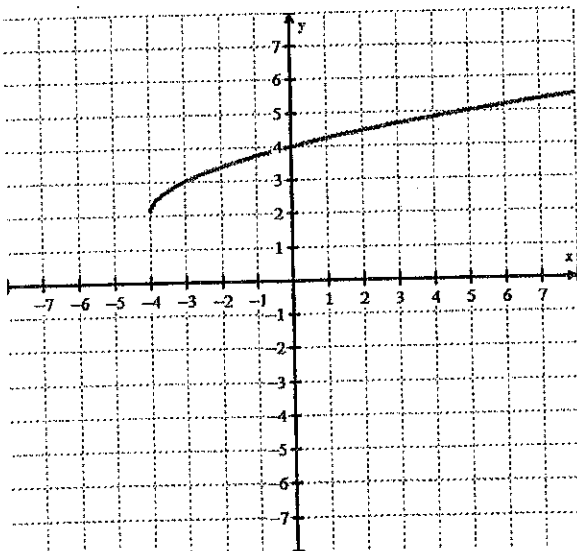
$$y = 2|x - 3|$$

6.



$$y = -x^3 - 3$$

7.



$$y = \sqrt{x + 4} + 2$$

8.