5-3
Technology LAB

Explore Graphs and Factors

You can use graphs and linear factors to find the *x*-intercepts of a parabola.

Use with Lesson 5-3
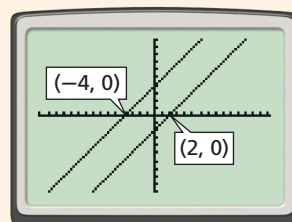
Activity

Graph the lines $y = x + 4$ and $y = x - 2$.

1. Press $\boxed{\textbf{Y=}}$, and enter **X + 4** for **Y1** and **X − 2** for **Y2**. Graph the functions in the square window by pressing $\boxed{\textbf{ZOOM}}$ and choosing **5 : ZSquare**.

2. Identify the *x*-intercept of each line. The *x*-intercepts are −4 and 2.

3. Find the *x*-value halfway between the two *x*-intercepts. This *x*-value is the average of the *x*-intercepts: $\frac{-4 + 2}{2} = -1$.

Graph the quadratic function $y = (x + 4)(x - 2)$, which is the product of the two linear factors graphed above.

4. Press $\boxed{\textbf{Y=}}$ and enter **(X + 4)(X − 2)** for **Y3**. Press $\boxed{\textbf{GRAPH}}$.

5. Identify the *x*-intercepts of the parabola. The *x*-intercepts are −4 and 2. Notice that they are the same as those of the two linear factors.

6. Examine the parabola at $x = -1$ (the *x*-value that is halfway between the *x*-intercepts). The axis of symmetry and the vertex of the parabola occur at this *x*-value.
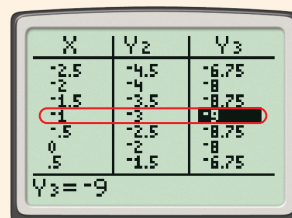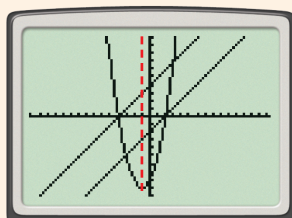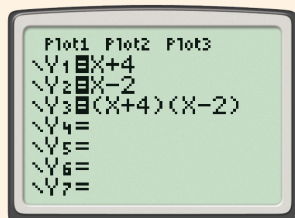
Try This

Graph each quadratic function and each of its linear factors. Then identify the *x*-intercepts and the axis of symmetry of each parabola.

1. $y = (x - 2)(x - 6)$
2. $y = (x + 3)(x - 1)$
3. $y = (x - 5)(x + 2)$
4. $y = (x + 4)(x - 4)$
5. $y = (x - 5)(x - 5)$
6. $y = (2x - 1)(2x + 3)$

7. **Critical Thinking** Use a graph to determine whether the quadratic function $y = 2x^2 + 5x - 12$ is the product of the linear factors $2x - 3$ and $x + 4$.

8. **Make a Conjecture** Make a conjecture about the linear factors, *x*-intercepts, and axis of symmetry of a quadratic function.