

▶ ACTIVITY 5.5

Using Technology

Graphing Calculator Activity for use with Lesson 5.5

Finding Maximums and Minimums

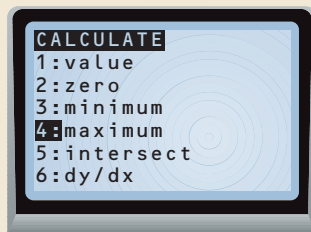
You can use a graphing calculator to find maximum or minimum values of quadratic functions.

▶ EXAMPLE

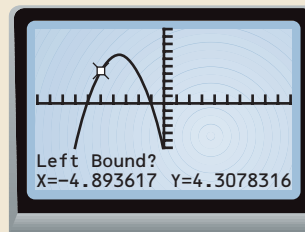
Find the maximum value of $y = -x^2 - 7x - 6$ and the value of x where it occurs.

▶ SOLUTION

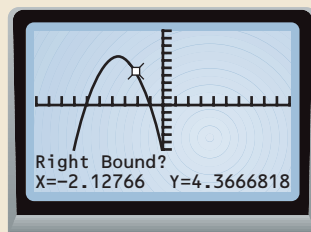
- 1 Graph the given function and select the *Maximum* feature.



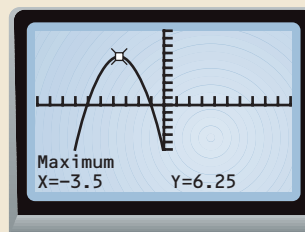
- 2 Move the cursor to the left of the maximum point. Press **ENTER**.



- 3 Move the cursor to the right of the maximum point. Press **ENTER**.



- 4 Put the cursor approximately on the maximum point. Press **ENTER**.



- ▶ The maximum value of the function is $y = 6.25$ and occurs at $x = -3.5$.

▶ EXERCISES

Tell whether the function has a maximum value or a minimum value. Then find the maximum or minimum value and the value of x where it occurs.

- | | | |
|--------------------------|---|--|
| 1. $y = x^2 - 5x + 2$ | 2. $y = -x^2 + 8x - 11$ | 3. $y = x^2 + 6x + 13$ |
| 4. $y = 3x^2 + 24x + 43$ | 5. $y = -2x^2 - 3x + 7$ | 6. $y = -1.2x^2 - 9x - 19$ |
| 7. $y = 0.4x^2 - 3x + 8$ | 8. $y = \frac{1}{2}x^2 + x - \frac{7}{2}$ | 9. $y = -\frac{8}{5}x^2 + \frac{22}{3}x + \frac{1}{4}$ |

10. **TRAFFIC FLOW** On a typical single-lane highway, the traffic flow F (in cars per hour) can be modeled by $F = -0.313C^2 + 50C$ where C is the traffic concentration (in cars per mile). For what traffic concentration is traffic flow maximized? What is the maximum traffic flow?

▶ Source: *Towing Icebergs, Falling Dominoes, and Other Adventures in Applied Mathematics*

STUDENT HELP



See keystrokes for several models of calculators at www.mcdougallittell.com

STUDENT HELP

▶ Study Tip

To find the minimum value of a function, select the *Minimum* feature instead of the *Maximum* feature from the menu in **Step 1**.