4.1 Find Maximum and Minimum Values

TEKS *a.5, a.6*

QUESTION How can you use a graphing calculator to find the maximum or minimum value of a function?

EXAMPLE Find the maximum value of a function

Find the maximum value of $y = -2x^2 - 10x - 5$ and the value of x where it occurs.

STEP 1 *Graph function*

Graph the given function and select the *maximum* feature.

```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
```
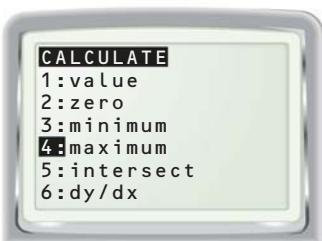
STEP 2 *Choose left bound*

Move the cursor to the left of the maximum point. Press ENTER.

```
Left Bound?
X=-3.4042  Y=5.8646
```
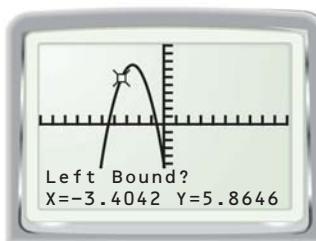
STEP 3 *Choose right bound*

Move the cursor to the right of the maximum point. Press ENTER.

```
Right Bound?
X=-1.4893  Y=5.4572
```

STEP 4 *Find maximum*

Put the cursor approximately on the maximum point. Press ENTER.

```
Maximum
X=-2.5       Y=7.5
```
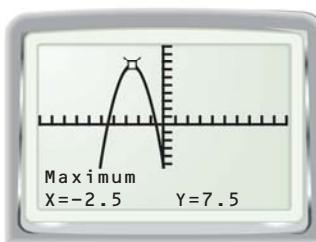
▶ The maximum value of the function is $y = 7.5$ and occurs at $x = -2.5$.

PRACTICE

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. $y = x^2 - 6x + 4$
2. $f(x) = x^2 - 3x + 3$
3. $y = -3x^2 + 9x + 2$
4. $y = 0.5x^2 + 0.8x - 2$
5. $h(x) = \frac{1}{2}x^2 - 3x + 2$
6. $y = -\frac{3}{8}x^2 + 6x - 5$