Using Symmetry to Find the Vertex of a Parabola TEACHER NOTES

Activity Overview

In this activity, students graph a quadratic function and investigate its symmetry by choosing pairs of points with the same *y*-value. They then calculate the average of the *x*-values of these points and discover that not only do all the points have the same *x*-value, but the average is equal to the *x*-value of the vertex.

NORMAL FLOAT AUTO REAL DEGREE MP

Y1=2X²+X-15

X= -.25█

Topic: Quadratic Functions

- Trace along the graph of a quadratic function to approximate its vertex, real zeros, extreme and axis of symmetry
- Graph a quadratic function $y = ax^2 + bx + c$ and display a table of integral values of the variable

This activity utilizes MathPrint™ functionality and includes screen captures taken from the TI-84 Plus C Silver Edition. It is also appropriate for use with the TI-83 Plus, TI-84 Plus, and TI-84 Plus Silver Edition but slight variances may be found within the directions.
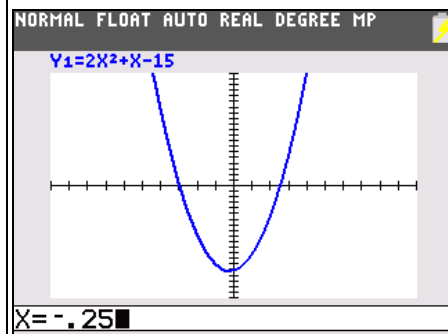
Teacher Preparation and Notes

- Prior to beginning this activity, students should have seen the graph of a quadratic function and be familiar with the term "vertex." There is an option to incorporate solving quadratic functions by factoring or using the quadratic formula.

- **To download the the student worksheet, go to education.ti.com/exchange and enter "8199" in the keyword search box.**

Compatible Devices:
- TI-84 Plus Family
- TI-84 Plus C Silver Edition

Associated Materials:
- VertexParabola_Student.pdf
- VertexParabola_Student.doc

Click HERE for Graphing Calculator Tutorials.

Suggested Related Activities

To download any activity listed, go to education.ti.com/exchange and enter the number in the keyword search box.

- Key Features of a Parabola (TI-Nspire technology) — 9145

- Introducing the Parabola (TI-84 Plus family) — 8197

- NUMB3RS – Season 1 – "Structural Corruption" – Exploring Parabolas (TI-84 Plus family) — 7721

To begin the activity, students are prompted to graph the equation $y = 2x^2 + x - 15$. They should adjust the window to bring the vertex of the parabola into view. Examining the graph, students should notice that it appears symmetric.
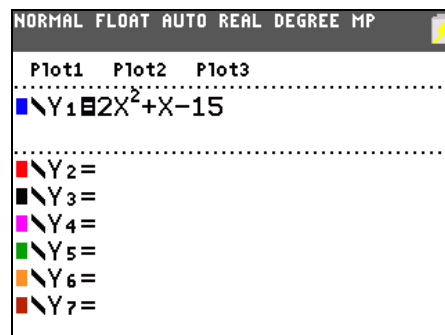
Next, students will use the table to try finding two *x*-values that produce the same *y*-value.
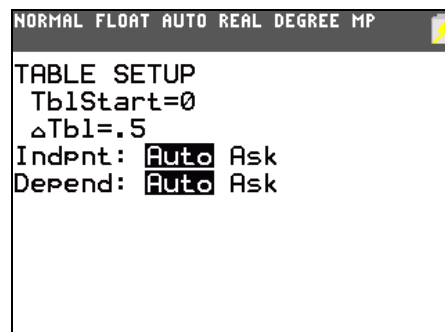
Students will find the average value of the pair of *x*-values from the table. They should do this for several pairs of values. They should notice that the average value is always –0.25. Students should notice that this average value is the *x*-value of the vertex of the parabola.
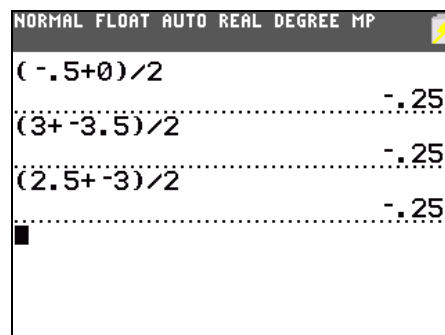
Using factoring or the quadratic formula, students should be able to find two *x*-values that have the *y*-value of zero for many parabolas. Choose the two *x*-values that represent the zeros of this parabola using the table or another method.