Parabolas in Factored Form

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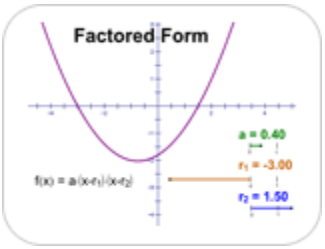

Students plot a quadratic function in factored form, investigate the relationship between the equation and its graph, and use their observations to create functions from various descriptions of their graphs.

By adjusting sliders that control three parameters and then using these parameters as a
quadratic function's roots and leading coefficient, students can quickly graph a quadratic in factored form. By changing these parameters one at a time, students can easily explore the relationship between the parameters and the function's graph.

Grade Level: 9-11
PSSM Content Standard: Algebra
CCSSM Content Standard: High School: Algebra; Seeing Structure in Expressions
Math Content: Plotting quadratics, factoring

Evaluation

What is being learned? What mathematics is the focus of the activity/technology? Is relational or instrumental understanding emphasized?

Students are learning how different equations, in factored form, look when they are grapher. The focus of this activity is for students to learn about the paraments, *a, r1,* and *r2* in the equation *y=a(x-r1)(x-r2).* The learn how changing the zeros of an equation change the zeros on the graph. They also look at different *a* values (including negative values, which reflect the graph over the x-axis) and how they affect the width of a graph. A relational understanding is emphasized.

How does learning take place? What are the underlying assumptions (explicit or implicit) about the nature of learning?

Students learn by moving sliders on a graph. When they move the sliders they can see what happens to the graph. They then have to make assumptions about what will happen to a graph. The activity has a couple different slides were students are required to answer different questions or perform different tasks. Students need to have some experience graphing quadratic equations. Taken from the overview, "In the Explore More section, students investigate the relationship between the roots and the vertex. They write an expression for each coordinate of the vertex and then use these expressions to plots the vertex. They test their construction by changing the values of the parameters and checking that the point stays at the vertex."

What role does technology play? What advantages or disadvantages does the technology hold for this role? What unique contribution does the technology make in facilitating learning?

Technology lets students see immediately the effect that the parameters have on the graph. Tale from the overview, "By adjusting sliders that control three parameters and then using these parameters as a quadratic function's roots and leading coefficient, students can quickly graph a quadratic in factored form. By changing these parameters one at a time, students can easily explore the relationship between the parameters and the function's graph." It gives the students an advantage because the feedback is immediate. They can see multiple examples in matter of seconds, whereas using a graphing calculator could eventually provide the same learning experience it would take much longer. Students would have to graph multiple equations and look at multiple graphs. This activity allows students to see instant results.

How does it fit within existing school curriculum? (e.g., is it intended to supplement or supplant existing curriculum? Is it intended to enhance the learning of something already central to the curriculum or some new set of understandings or competencies?)

This website is designed to supplement existing curriculum and enhance the learning of quadratics, parabolas, and factoring. It gives students a chance to visually see what is happening when they are trying to factor.

How does the technology fit or interact with the social context of learning? (e.g., Are computers used by individuals or groups? Does the technology/activity support collaboration or individual work? What sorts of interaction does the technology facilitate or hinder?)

I would suggest that students work on this individual or in pairs. Individually would be ideal and then have students do a think-pair-share activity with their results.

How are important differences among learners taken into account?

There aren't any modifications to be made to this assignment. It is just a supplement to learning about factored parabolas.

What do teachers and learners need to know? What demands are placed on teachers and other "users"? What knowledge is needed? What knowledge supports does the innovation provide (e.g., skills in using particular kinds of technology)?

Teachers should look at the "Factored Form Present" file before they start. It gives a good overview of the activity and teaches students and teachers what needs to be done in the activity.