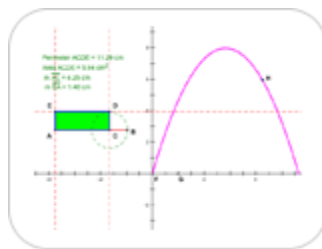


A Rectangle with Maximum Area

Curator: Emily Beski



Students explore areas of rectangles whose perimeter is fixed. They make a conjecture about what type of rectangle has the most area for a given perimeter and check their conjecture by plotting the side length and area of the rectangle on the coordinate plane.

By plotting the side length and area of a rectangle with a given (dynamic) perimeter on the coordinate plane, students can discover what type of rectangle has the most area for any given perimeter.

Grade Level: 9-10

PSSM Content Standard: Algebra

CCSSM Content Standard: [High School: Algebra; Arithmetic with Polynomials & Rational Expressions](#)

Math Content: perimeter, area, rectangles, triangles, graphing parabolas

Evaluation

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

Students are learning about how a rectangle's perimeter can affect its area. The focus of the technology is to show how graphs can help determine a maximum area. Students go through multiple steps to make sure that they understand the process involved and are not just graphing parabolas. The learning emphasized is instrumental. Taken from the overview, "Students explore areas of rectangles whose perimeter is fixed. They make a conjecture about what type of rectangle has the most area for a given perimeter and check their conjecture by plotting the side length and area of the rectangle on the coordinate plane. "

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

Learning takes place by student discovery. They start by looking at different examples and making conjectures then they are able to check their conjectures by plotting different

quadratics. Before students begin they should have a basic understanding of perimeter, area, rectangles, and triangles.

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 allows the students to see their results immediately. They can see the relationship between the area and perimeter of a rectangle and the graph of a parabola with certain set parameters. Taken from the overview, "By plotting the side length and area of a rectangle with a given (dynamic) perimeter on the coordinate plane, students can discover what type of rectangle has the most area for any given perimeter." The advantage of using technology is that students can start to make conjectures more quickly because they can view the area of the rectangle growing or shrinking while they are looking at points moving on a parabola. It is also more interesting for students to be able to work with this activity while learning about optimization.

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 activity will supplement and enhance the learning of maximizing rectangles. It could also be used to introduce the concept when teaching calculus.

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?)

This activity is pretty basic so I would suggest doing it on the smartboard with the whole class. I think it would be a good start to a group discussion and help students to actually see the rectangle's side lengths and area change and how that looks when you graph it as a parabola.

How are important differences among learners taken into account?

This activity is helping visual learners.

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)?

This activity is very easy to run. All you have to do is move the slider left and right to make different side lengths.