Lesson 5 Teaching Portal Materials

Episode Supports

Episode 6: Exploring

Episode Description

Sasha and Keoni use the Pythagorean theorem to derive the equation for a parabola with the vertex at (0,0) and a focus p units above the vertex.

Focus Questions

For use in a classroom, pause the video and ask these questions:

1. [Pause the video at **2:25**]. What are the lengths of the vertical lines that Sasha and Keoni just drew?

2. [Pause the video at **6:09**]. Finish writing the equation and then solve for y. [Then start the video again and stop at **7:58**]. How did your solution method compare with Sasha and Keoni's?

Supporting Dialogue

Provide opportunities for all your students to express their ideas verbally, by asking them to talk with a partner.

1. [Pause the video at **3:58**]. Talk with your neighbor. Where does the term $y - p$ come from and what does it mean?

2. [Pause the video at **7:58**]. Talk with your neighbor. Where does the equation y = $\frac{x^2}{4p}$ come from? Where does the 4*p* come from?

Math Extensions

1. Examine the parabola with a vertex at the origin and a focus at (0, -2). A general point on the parabola is labeled (x, y). A right triangle was formed so that the hypotenuse connects the (x, y) and the focus. The lengths of the three sides of the right triangle are *x*, *-y + 2*, and *-y – 2*. Explain why:

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a. the distance from (x, y) to the *x*-axis is *-y*.

b. the length of the vertical side of the right triangle is *-y – 2.*

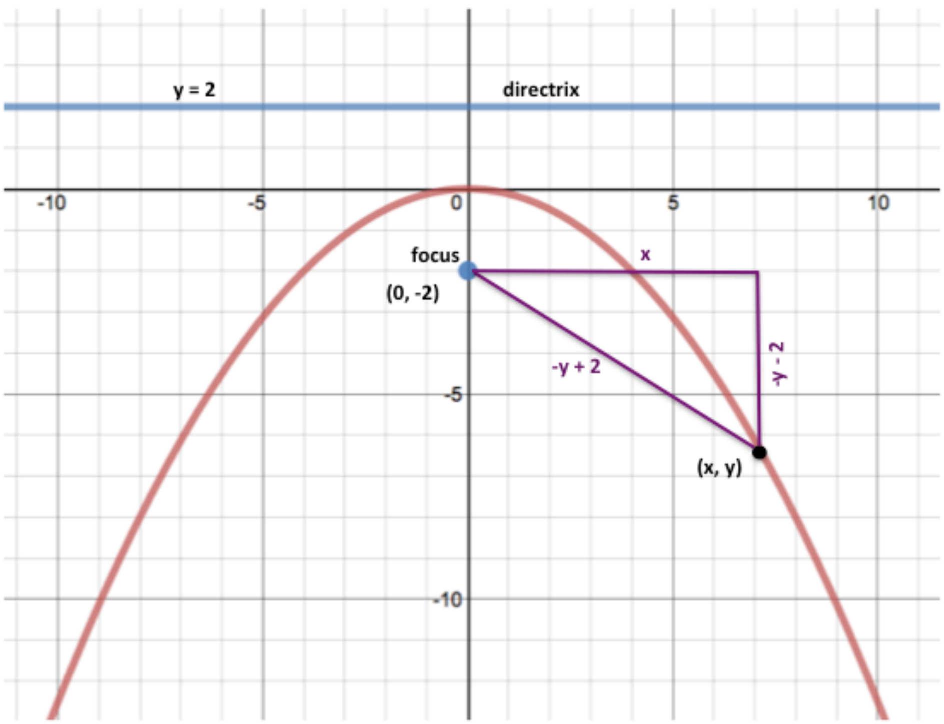
c. the length of the hypotenuse of the right triangle is *-y + 2*.

d. the length of the horizontal side of the right triangle is *x*.

2.

a. Using the Pythagorean Theorem and the definition of a parabola, derive the equation of the parabola with a vertex at the origin and a focus at (0, -2).

b. Compare your equation with the equation that Keoni and Sasha derived for a parabola with a vertex at the origin and a focus at (0, 2). What do you notice?



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