Lesson 9 Teaching Portal Materials

Episode Supports

Episode 2: Exploring

Episode Description

Keoni and Sasha use the Pythagorean Theorem and the definition of a parabola to derive an equation of parabola with a *p*-value of 5 and a vertex at (9, 13).

Students' Conceptual Challenges

At [**0:48**], Keoni is unsure whether to draw a segment from the general point to the vertex or to the focus.

- Sasha and Keoni resolve the issue by reminding themselves of the definition of a parabola. They recall how they can use the definition to represent the lengths of the sides of a right triangle.

Focus Questions

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

1. [Pause the video at **1:54**]. What is the distance *y*? How would you represent it geometrically on the coordinate grid?

2. [Pause the video at **3:46**]. What are the coordinates of the third vertex of the triangle?

Supporting Dialogue

Invite students to engage in productive disagreement:

- As Sasha and Keoni are completing their algebraic manipulations, Sasha cancels the 20 [**7:34**]. But then it shows up in the final version of the equation. What happened? Did she make a mistake?

Math Extensions

In the graph below, the base parabola with ***p* =5,** shown in **black,** is represented by the equation **y =** $\frac{x^2}{20}$. If the base parabola is translated to the right 9 units, it will be the parabola shown in **light blue**, which is represented by the equation **y =** $\frac{(x-9)^2}{20}$. If this parabola is translated up 13 units, it will be the parabola shown in **dark blue**, which is represented by the equation **y =** $\frac{(x-9)^2}{20}$ **+ 13**.

1. Use the equations to prove that each vertex is on a particular parabola; what do you notice?

2. Use the equations to find a "special point" (a point aligned horizontally with the focus) for each parabola; what do you notice?