

Lesson 9 Teaching Portal Materials

Episode Supports

Episode 3: Making Sense

Episode Description

Keoni and Sasha use the applet to explore the graphs of parabolas with a vertex at (9, 13) and an unknown p -value. Sasha and Keoni determine how to represent the coordinates of the focus and the equation of the directrix when p can take on any value.

Students' Conceptual Challenges

Sasha and Keoni struggle with the equation for the directrix when the p -value is unknown [4:00-4:27]. Keoni thinks it's $y = p$. Both Sasha and Keoni seem unsure about how to determine the equation. Part of the difficulty is that this is first time they need to use the variable p in the equation.

- It helps them resolve the difficulty by identifying every distance that they *do* know. Adding the line $y = 13$ to the graph also supports their reasoning. Testing a conjectured equation for the directrix with a previous result helps them resolve their uncertainty [6:23].

Focus Questions

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

1. [Pause the video at 1:30]. Can the p -value be more than 6? What will happen?
2. [Pause the video at 7:43]. What is your conjecture for the coordinates of the focus?

Supporting Dialogue

Provide opportunities to revoice the mathematical ideas of others:

- Sasha and Keoni noticed that they could represent several distances. What are those distances? Come up here to show us.
- Revoice what Sasha and Keoni said about why there is a -7 in the equation instead of a $+7$. How about someone else? Revoice what Sasha and Keoni and saying.

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Math Extensions

1. Consider a parabola of any value of p with a vertex at $(-9, 13)$. Find the coordinates and the equation of the directrix for this parabola. Explain your thinking.
2. Consider a parabola of any value of p with a vertex at $(9, -13)$. Find the coordinates and the equation of the directrix for this parabola. Explain your thinking.

