Lesson 9 Teaching Portal Materials

Episode Supports

Episode 4: Exploring

Episode Description
Sasha and Keoni extend their work from the last episode to derive the equation of a family of parabolas that have a vertex at (9, 13).

Students' Conceptual Challenges

Keoni and Sasha struggle to find the distance from the general point (x, y) to the directrix [**1:30-1:45**]. It helps them when the teacher asks them what distance they are trying to find (general point to the directrix vs. the vertex). However, they are also confused about whether to add the distance of *p* units to $y - 13$ or subtract it.

- When Sasha and Keoni look for each distance on the graph (y, 13, and p), they notice how to represent the distance of the general point to the directrix.

Focus Questions

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

1. [Pause the video at **2:20**]. Sasha and Keoni have drawn a segment from the general point down to the *x*-axis. It is divided into three parts. What are the lengths of the different parts?

2. [Pause the video at **6:28**]. Can someone draw and label the lengths of the right triangle that Keoni and Sasha are using for the Pythagorean Theorem?

Supporting Dialogue

Support the opportunity for students to notice quantities and representation. Pause the video at **4:10**.

- Can someone revoice how Sasha and Keoni found the distance of the general point to the directrix? How is their thinking represented in the expression $y - 13 + p$?

- Another set of students represented the same distance with the expression $y - (13 - p)$. Where is the length $13 - p$ in the diagram? Compare the two representations. How are they the same? How are they different?

Math Extensions

1. Consider the length of the vertical side of the right triangle. Keoni and Sasha said it was $y - 13 - p$. How is their thinking represented by their expression?

2. Another student represented the length of the vertical side of the triangle with the expression $(y - 13) - p$. How is this expression represented in the diagram? Where is $y - 13$ in the diagram? Compare $y - 13 - p$ and $(y - 13) - p$.