

Teacher Supporting Materials for Lesson 2 Episode 2: Exploring

Episode Description

Sasha and Keoni use the Pythagorean theorem to justify why $(4,4)$ is a point on the parabola.

Students' Conceptual Challenges

1. Students may be confused about what measuring system to use with a coordinate grid, especially after having used a ruler to measure similar distances in Lesson 1 [1:14].
 - ➔ Sasha wants to use a ruler to measure the distance from a point to the focus, but Keoni convinces her that it is not needed.
2. Sasha and Keoni are stumped by how to measure the distance of a diagonal line segment from $(4,4)$ to the focus [1:46].
 - ➔ Taking stock of everything they know and identifying what they were trying to find prepares Sasha and Keoni to be able to use the Pythagorean Theorem as a tool after the teacher suggests its use [1:56 and 2:52].

Focus Questions

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

1. [Pause video at 0:54]. How does Sasha know that the distance from $(4, 4)$ to the focus is 5 units?
2. [Pause video at 2:51]. What are Sasha and Keoni trying to figure out? What have they figured out so far? Does anyone have any ideas of what might help them solve their problem?

Supporting Dialogue

Invite students to reflect on measuring between points by asking them these questions:

- How can you measure the distance between a point on a parabola and the directrix?

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- How can you measure the distance between a point on the parabola and a point on the focus? How is this measurement different from finding the distance from a point to the directrix?

Math Extensions

1. Pythagorean Triples are the positive integers that satisfy the Pythagorean theorem. Which of the following are Pythagorean Triples? Can you find three triples add to the list?

8, 15, 17

11, 60, 62

28, 45, 53

24, 143, 145

36, 77, 85

2. The Pythagorean theorem is a famous and useful result from mathematics. How do we know it is true? There are many different mathematical demonstrations that show why the Pythagorean theorem works. Even President Garfield created his own unique argument of why it works. Use the internet to locate proofs of the Pythagorean theorem. Which one makes the most sense to you?

