

Lesson 6 Teaching Portal Materials

Episode Supports

Episode 5: Reflecting

Episode Description

Sasha and Keoni reflect on their graphs of $y = \frac{x^2}{4p}$ with p -values of $\frac{1}{4}$, $\frac{1}{2}$, and 1. They consider the effect of increasing and decreasing the p -value on the graph of the parabola.

Students' Conceptual Challenges

Seeing and expressing a general relationship for all “special points” is challenging. Initially Keoni and Sasha see halving occurring (e.g., half of 2 is 1) but struggle to use the language of x - and y -values to express this relationship [5:37].

- ➡ The teacher encourages Sasha and Keoni to also relate the special points to the p -values of their three parabolas and to try any conjectures they make. Sasha sees that the p -values and the y -values are the same for all the special points [6:30]. In the process of verifying this relationship, Sasha and Keoni also determine that the x -value is always double the y - or p -value [7:10], which they express as $(2p, p)$.

Focus Questions

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

1. [Pause the video at 0:42]. What is the evidence that supports Keoni’s claim that the graph gets wider?
2. [Pause the video at 2:40]. Sasha compares the x -values for the points on the three parabolas that all have a y -value of 4. What is happening?
3. [Pause the video at 3:52]. Keoni highlights the points on the three parabolas that all have an x -value of 2. What do you notice about the y -values for these points? How is this related to the change in the p -values?

Supporting Dialogue

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Encourage the students to reflect on the precision of language when constructing a mathematical claim.

1. Compare these statements: “When p changes, the graph gets wider” and “As p increases, the graph gets wider.” Do they mean the same thing? Why or why not?
2. Write a claim, in your own words, that describes the effect of changing the p -value on the graph of the parabola. Be sure to use precise language that accurately conveys what you mean.

Math Extension

1. Graph the parabola represented by $y = \frac{x^2}{4}$. You can use ideas from Sasha and Keoni. Plot a few more points near the vertex: Find the y -values when the x -value is 1, $-1, \frac{1}{2}, -\frac{1}{2}, 0.1,$ and -0.1 . What do you notice about the shape of the parabola near the vertex?
2. On each parabola, $y = x^2, y = \frac{x^2}{2}, y = \frac{x^2}{4}$, plot the point where the x -value is 1. Explain what happens to the y -values of these points on the three parabolas as the p -value increases.

