Lesson 10 Teaching Portal Materials

Episode Supports

Episode 3: Repeating Your Reasoning

Episode Description

Keoni and Sasha look for geometric information of a parabola represented by the equation $y = 2(x-3)^2 + 1$. They start by finding the vertex and the *p*-value.

Students' Conceptual Challenges

The challenge is finding the *p*-value of the parabola. The expression in the last episode was given in standard form. In this algebraic representation, the denominator is not explicit.

- It helps that the teacher asks Sasha and Keoni what they would like $y = 2(x-3)^2 + 1$ to look like and Keoni is able to say:

  $$y = \frac{(x-3)^2}{4p} + 1.$$

  His idea appears to prompt Sasha to correctly re-express the equation as
  $y = \frac{(x-3)^2}{\frac{1}{2}} + 1.$

Focus Questions

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

1. [Pause the video at **2:32**]. Explain in your own words why $2 = \frac{1}{\frac{1}{2}}$ and why $y = 2(x-3)^2 + 1$ = $y = \frac{(x-3)^2}{\frac{1}{2}} + 1$.

2. [Pause the video at **3:12**]. Is there a way to check that the equation $y = 2(x-3)^2 + 1$ is the same as the equation $y = \frac{(x-3)^2}{\frac{1}{2}} + 1$?

Supporting Dialogue

Provide opportunities to reflect on previous mathematical strategies using the strategy of revoicing. When student share their ideas with the class, ask another student to revoice the expressed ideas.

Recall the definition of a parabola:

A parabola is the set of points that are equal distance from the focus and directrix.

Discuss with your partner how you can determine the coordinates of some of the points on this parabola using the coordinates of the focus and the equation of the directrix. Prepare your answers to share with the whole class.

Another pair of students working on this problem said that the point (3.25, 1/8) was a special point for this parabola. Add this point to your graph of this parabola. What do you notice? Prepare your answer to share with the whole class.

Math Extensions

1. Compare the equation $y = (x + 3)^2 - 1$ to the equation that Sasha and Keoni worked with in this episode (namely $y = 2(x - 3)^2 + 1$). What is alike? What is different?

2. Find the *h, k*, and *p*-values for the parabola represented by $y = (x + 3)^2 - 1$.

3. Use the information from Question 2 above to graph $y = (x + 3)^2 - 1$.