

Graphing Quadratics: Discussion Topics

Sketch the graph of a parabola that contains the following four points:

$(3, 12)$, $(-3, 6)$, $(5, 30)$, $(9, 90)$

Topic A: Chrissy’s Question: Is the graph a parabola?

Central Issues

What concern does Chrissy raise about her graph?

Chrissy claims that the equation describes a quadratic function, yet she connects the points with linear segments. What issues is she struggling with as she tries to connect the equation to the graph?

How do other students respond to Chrissy’s graph?

Additional Issues

What does Chrissy mean by, “Maybe you have to move it over more?” on Line 9?

What procedures did Chrissy likely use to sketch her graph?

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Relevant quotes include

Lines 1-2

Chrissy: And then this was my graph. And I don't know, I think it was supposed to be a parabola, but I didn't exactly know how to make it a parabola.

Lines 7-9

Chrissy: I don't know why. 'Cause usually when there is like a parabola, it like goes on this side and then like you can do the same thing on the other side. But it doesn't really match up. You know. Maybe you have to move it over more.

Line 11

Katherine: Um, well, I think that it's cause like, you connected them, like the one from 3 to -3.

Line 13

Katherine: Yeah, it would usually go down to like zero.

Line 43-44

Alessandra: Like, the whole thing, if you cut it in half and you flip it over it would look the same.

Topic B: Reasoning About the Vertex of a Parabola

Central Issues

How do different students talk about the vertex of the parabola?

How do different students reason about where the vertex (or “the bounce”) should be on the graph?

Additional Issues

What does Alessandra mean when she says “but -3 and 3 aren’t the same. It’s supposed to balance out” on Line 40?

Which properties of parabolas are Alessandra and Monique likely using to reason about where the vertex should be located?

Which properties of quadratics seem most relevant to students when reasoning about the graph?

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Relevant quotes include

Line 39

Maddie: Wouldn't it [bounce] at zero, because zero squared plus zero is zero?

Line 41

Alessandra: Yeah, but, that's true but -3 and 3 aren't the same. It's supposed to balance out.

Lines 48-51

Nico: Um, so it's a parabola so that means, um, on both sides, on the negative side and the positive side, the, the y coordinate numbers should be the same for reverse, like, -3 and 3 should both be 12, but since -3 is 6 that means it doesn't balance, so it bounces lower.

Lines 80-81

Monique: Well because, since it crosses the x-axis at both -1 and 0, that means the dip is somewhere in between there, below zero on the y-axis. [motions a dip]