LESSON MAKER PRO

Curve Predictions

Build a quadratic equation from a graph or points.

HIGH SCHOOL · A2S.AF.D.13

A2S.AF.D.13 "Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales and use them to make predictions. Extend to polynomial, trigonometric (sine and cosine)..."

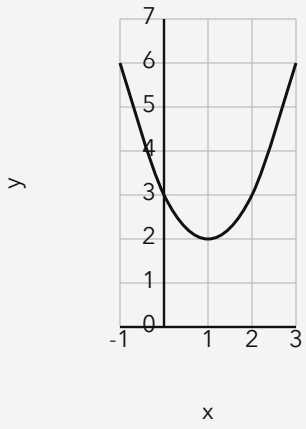
NAME _____ **DATE** _____

VERTEX TO EQUATION

A quadratic with vertex (h, k) has the form $y = a(x - h)^2 + k$. Use another point to find a. Then substitute an x-value to make a prediction.

WORKED EXAMPLE

Use the graph to write an equation for y. Predict y when x = 4.



1. The vertex is (1, 2), so $y = a(x - 1)^2 + 2$.
2. Use (0, 3): $3 = a(0 - 1)^2 + 2$, so a = 1.
3. At x = 4, $y = (4 - 1)^2 + 2 = 11$.

Answer: $y = (x - 1)^2 + 2$; when x = 4, y = 11

PRACTICE 4 problems

1 A quadratic has vertex (0, 2) and passes through (1, 4). Write its equation and find y when x = 3.

ANSWER _____

2 A quadratic has vertex (2, 0) and passes through (3, 1). Write its equation and find y when x = 0.

ANSWER _____

3 A quadratic has vertex (-1, 1) and passes through (0, 4). Write its equation and find y when x = 1.

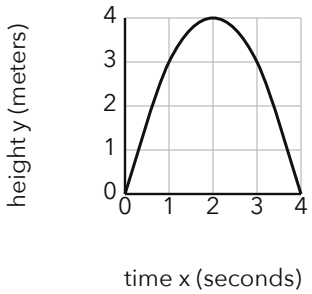
ANSWER _____

4 A quadratic has vertex (3, 2) and passes through (4, 1). Write its equation and find y when x = 1.

ANSWER _____

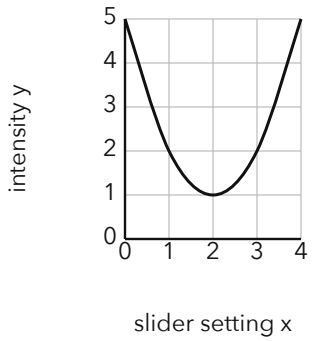
APPLY IT Show your work

1 A game designer graphs an avatar's height during a jump. Write an equation for height y at time x. Predict the height at x = 1/2 second.



ANSWER _____

2 A music app graphs a filter's intensity y against slider setting x. Write its equation. Predict the intensity at setting 5.



ANSWER _____

CHALLENGE One step up

A quadratic has vertex (1, 4) and passes through (3, 0). Write its equation. Find both x-values where y = 0, and explain why there are two.

WORK SPACE AND ANSWER

ANSWER KEY

Curve Predictions

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A quadratic has vertex (0, 2) and passes through (1, 4). Write its equation and find y when x = 3.	**$y = 2x^2 + 2$; $y = 20$**
2	A quadratic has vertex (2, 0) and passes through (3, 1). Write its equation and find y when x = 0.	**$y = (x - 2)^2$; $y = 4$**
3	A quadratic has vertex (-1, 1) and passes through (0, 4). Write its equation and find y when x = 1.	**$y = 3(x + 1)^2 + 1$; $y = 13$**
4	A quadratic has vertex (3, 2) and passes through (4, 1). Write its equation and find y when x = 1.	**$y = -(x - 3)^2 + 2$; $y = -2$**

PART 2 · APPLY IT

1. **$y = -(x - 2)^2 + 4$; at x = 1/2, y = 7/4 meters** The vertex is (2, 4). Using (0, 0) gives a = -1; substituting x = 1/2 gives y = 7/4.
2. **$y = (x - 2)^2 + 1$; at x = 5, y = 10** The vertex is (2, 1). Using (3, 2) gives a = 1; substituting x = 5 gives y = 10.

CHALLENGE

$y = -(x - 1)^2 + 4$. Setting y = 0 gives $(x - 1)^2 = 4$, so x = -1 or x = 3. Both values are 2 units from the vertex's x-value.

Accept equivalent expanded equations. Predictions must match the stated equations.