LESSON MAKER PRO

Quadratic Clues

Build quadratic rules from vertices, intercepts, tables, and contexts.

HIGH SCHOOL · MA.912.AR.3.4

MA.912.AR.3.4 "Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context."

NAME _____ DATE _____

CHOOSE A USEFUL FORM

When you know a vertex, start with y=a(x-h)^2+k. When you know two x-intercepts, start with y=a(x-r)(x-s). Substitute one more point or value to find a, then write the function.

WORKED EXAMPLE

A graph has vertex (6, 10) and passes through (8, -8). Write a quadratic function.

1. Start with vertex form: y=a(x-6)^2+10.
2. Substitute (8, -8): -8=a(8-6)^2+10.
3. Solve: -18=4a, so a=-9/2.

Answer: y=-9/2(x-6)^2+10

PRACTICE 6 problems

1 A graph has vertex (1, -2) and passes through (3, 2). Write a quadratic function.

ANSWER _____

2 A graph has x-intercepts -3 and 5 and passes through (0, -15). Write a quadratic function.

ANSWER _____

3 Write a quadratic function for this table: x: -2, -1, 0; y: -1, -1, 1.

ANSWER _____

4 A parabola has a maximum value of 13 at x=3 and a y-intercept of 4. Write a quadratic function.

ANSWER _____

5 Write a quadratic function for this table: x: 0, 2, 4; y: 5, 1, 5.

ANSWER _____

6 A graph has x-intercepts 2 and 7 and passes through (0, 28). Write a quadratic function.

ANSWER _____

APPLY IT Show your work

1 A basketball's height y, in feet, is 12 when x=0 seconds. It reaches a maximum height of 21 feet when x=3 seconds. Write a quadratic function for the ball's height.

WORK SPACE

ANSWER _____

2 A student music club finds that if each concert ticket costs x dollars, it expects to sell 40-2x tickets. Write a quadratic function y for the revenue.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A table shows x: 1, 2, 4 and y: 9, 4, 4. Write the function in the form y=ax^2+bx+c. Then explain how the three rows determine a, b, and c.

_____

_____

ANSWER KEY

Quadratic Clues

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A graph has vertex (1, -2) and passes through (3, 2). Write a quadratic function.	**y=(x-1)^2-2**
2	A graph has x-intercepts -3 and 5 and passes through (0, -15). Write a quadratic function.	**y=(x+3)(x-5)**
3	Write a quadratic function for this table: x: -2, -1, 0; y: -1, -1, 1.	**y=x^2+3x+1**
4	A parabola has a maximum value of 13 at x=3 and a y-intercept of 4. Write a quadratic function.	**y=-(x-3)^2+13**
5	Write a quadratic function for this table: x: 0, 2, 4; y: 5, 1, 5.	**y=(x-2)^2+1**
6	A graph has x-intercepts 2 and 7 and passes through (0, 28). Write a quadratic function.	**y=2(x-2)(x-7)**

PART 2 · APPLY IT

1. **y=-(x-3)^2+21** Use vertex form with vertex (3, 21). Substitute (0, 12): 12=9a+21, so a=-1.
2. **y=x(40-2x)=-2x^2+40x** Revenue equals ticket price times number of tickets sold. Multiply x by 40-2x, then expand if needed.

CHALLENGE

y=5/3x^2-10x+52/3. Substitution gives a+b+c=9, 4a+2b+c=4, and 16a+4b+c=4, which solve to a=5/3, b=-10, and c=52/3.

Accept equivalent quadratic forms, including expanded, factored, and vertex forms. For table problems, verify that the function matches every listed ordered pair.