Answers

Understanding inverse relations

Student Activity Sheet 4; *Exploring* "The quadratic function and its inverse"

1. Study the given relationship between the height of the square array (n) and the number of painted faces (f). Then, complete the table. **[EX3, page 2]**

Height in cubes	Visual description	Written description	Process	Number of faces painted
1		A 1-by-1 array has 1 painted face.	$1 \cdot 1 = 1$ or $1^2 = 1$	1
2		A 2-by-2 array has 4 painted faces.	$2 \cdot 2 = 4$ or $2^2 = 4$	4
3		A 3-by-3 array has 9 painted faces.	$3 \cdot 3 = 9$ or $3^2 = 9$	9
4		A 4-by-4 array has 16 painted faces	$4 \cdot 4 = 16$ or $4^2 = 16$	16
5		A 5-by-5 array has 25 painted faces.	$5 \cdot 5 = 25$ or $5^2 = 25$	25
n		An n-by- n array has $n \cdot n$ painted faces.	$n \cdot n = n^2$	$f = n^2$

2. What type of function models the situation in question 1? How do you know? **[EX3, page 3]**

A quadratic function models the situation. The second differences in the **y**-values are all equal, and the first differences in the **x**-values are constant.

3. **REINFORCE** Could a quadratic function model the data in the table below? Justify your answer.

x	y
-2	5
-1	0
0	-1
1	2
2	9

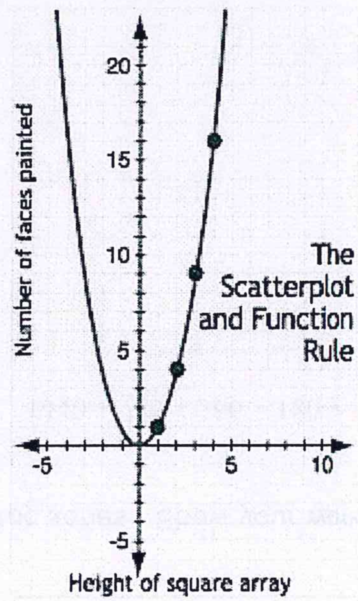
First differences: -5, -1, 3, 7; second differences: 4, 4, 4

Since a table is given, the best strategy is to find the differences in the **x**-values and in the **y**-values.

- The differences in the **x**-values are all 1.
- The first differences in the **y**-values are -5, -1, 3, 7.
- The second differences in the **y**-values are all 4.

Since the second differences in the **y**-values are equal, the data in the table can be modeled by a quadratic function.

4. Make a scatterplot that represents the data from the problem situation. Then sketch a complete graph of the function rule that models the problem situation. **[EX3, page 4]**



5. What name is given to the curve that is the graph of the function rule? **[EX3, page 4]**

The graph of the function rule is a parabola.

6. Compare the domain and range of the function rule to the domain and range of the problem situation. **[EX3, page 4]**

Function rule:

Domain: all real numbers (includes decimal values, such as 1.5)

Range: $y \geq 0$ (includes decimal values; when $x = 1.5$, $y = 2.25$)

Problem situation:

Domain: positive whole numbers (The smallest array you can build is a 1-by-1.)

Range: all values of x^2 such that x is a positive whole number (1^2, 2^2, 3^2, etc.)

7. Complete the table of the inverse relationship by treating the number of cube faces painted as the independent variable and the height of the array as the dependent variable. **[EX3, page 5]**

Number of faces painted	Height in cubes
1	1
4	2
9	3
16	4
25	5
36	6
49	7
n	$\sqrt{n}$

8. Complete the table to show the inverse of the problem situation. Then graph the inverse relationship and both function rules. **[EX3, page 6]**

x	$y = x^2$
1	1
2	4
3	9
4	16

$x = y^2$	y
1	1
4	2
9	3
16	4