8th grade Task 4 Dots and Squares

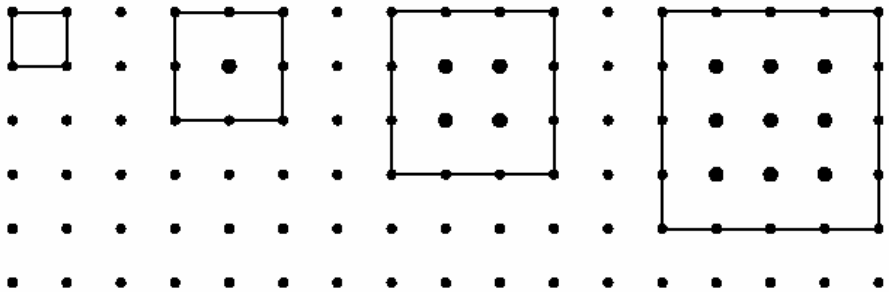
Student Task	Find and table number patterns in a geometric content. Find and use rules or formulas to answer questions.
Core Idea 3 Algebra and Functions	**Understand relations and functions, analyze mathematical situations, and use models to solve problems involving quantity and change.** • Use tables to analyze the nature of changes on quantities in linear relationships • Recognize and generate equivalent forms of simple algebraic expressions and solve linear equations. • Represent, analyze, and generalize a linear relationship (7^{th} grade) • Use symbolic algebra to represent situations to solve problems (7^{th} grade)
Core Idea 2 Mathematical Reasoning	**Employ forms of mathematical reasoning and justification appropriately to the solution of a problem.** • Use mathematical language and representations to make situations easier to understand

Eighth Grade – 2003

Dots and Squares

This problem gives you the chance to:
- tabulate and find number patterns in a geometric context
- find and use rules or formulas

Sally draws squares of different sizes and counts the dots inside each square.



Sally makes a table showing the length of one side of each square (S), the perimeter of each square (P), and the number of dots inside each square (I).

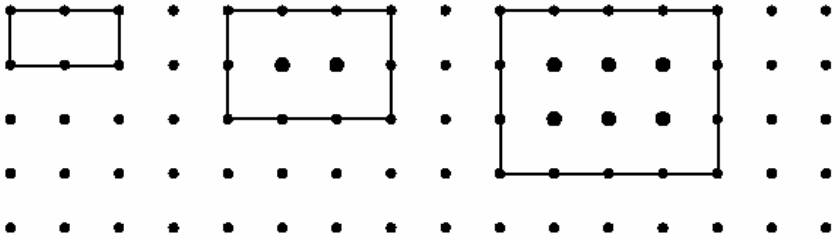
S	1	2	3	4	5	6
P	4	8	12	16		
I	0	1	4	9		

1. Fill in the empty boxes in Sally's table.

2. Write a rule or a formula for finding the number of dots inside a square when you know the length of a side of the square.

3. There are 49 dots inside a square. What is the length of one side of the square? Explain your reasoning.

Tom draws rectangles and counts the dots inside.



He makes a table showing the length of each rectangle (L), the width of each rectangle (W), and the number of dots inside (I).

L (in squares)	2	3	4	5	6
W (in squares)	1	2	3	4	5
I	0	2	6		

4. Fill in the empty boxes in the table above.

5. Write a rule or formula for finding the number of dots inside a rectangle (I) when you know the length (L) and the width (W) of the rectangle.

_____

_____

6. There are 63 dots inside a rectangle.
What is the length of the rectangle? _____

What is the width of the rectangle? _____

Dots and Squares — Test 8 Form A Rubric

The core elements of performance required by this task are:
- tabulate and find number patterns in a geometric context
- find and use rules or formulas

Based on these, credit for specific aspects of performance should be assigned as follows:

	Points	Section Points
1. Correctly completes the table: **S** 1 2 3 4 5 6 **P** 4 8 12 16 **20** **24** **I** 0 1 4 9 **16** **25** *Allow 1 point for each two correct values.*	2 × 1	2
2. Gives correct answer as: $\mathbf{I = (S - 1)^2}$ *Accept verbal equivalents.*	2	2
3. Gives correct answer such as: The length of the side of the square is **8**. Gives explanation such as: $49 = 7^2$	1 1	2
4. Correctly completes the table: **L (in squares)** 2 3 4 5 6 **W (in squares)** 1 2 3 4 5 **I** 0 2 6 **12** **20**	2 × 1	2
5. Gives correct answer as: **I = (W − 1)(L − 1)** (or equivalent) *Accept verbal equivalents.*	1	1
6. Gives correct answer as: The length of the rectangle is 10. *(accept 22 or 64)* The width of the rectangle is 8. *(accept 4 or 2)* *Accept 63 = 9 × 7 or 21 × 3 or 63 × 1.* Both answers correct.	1	1
Total Points		**10**