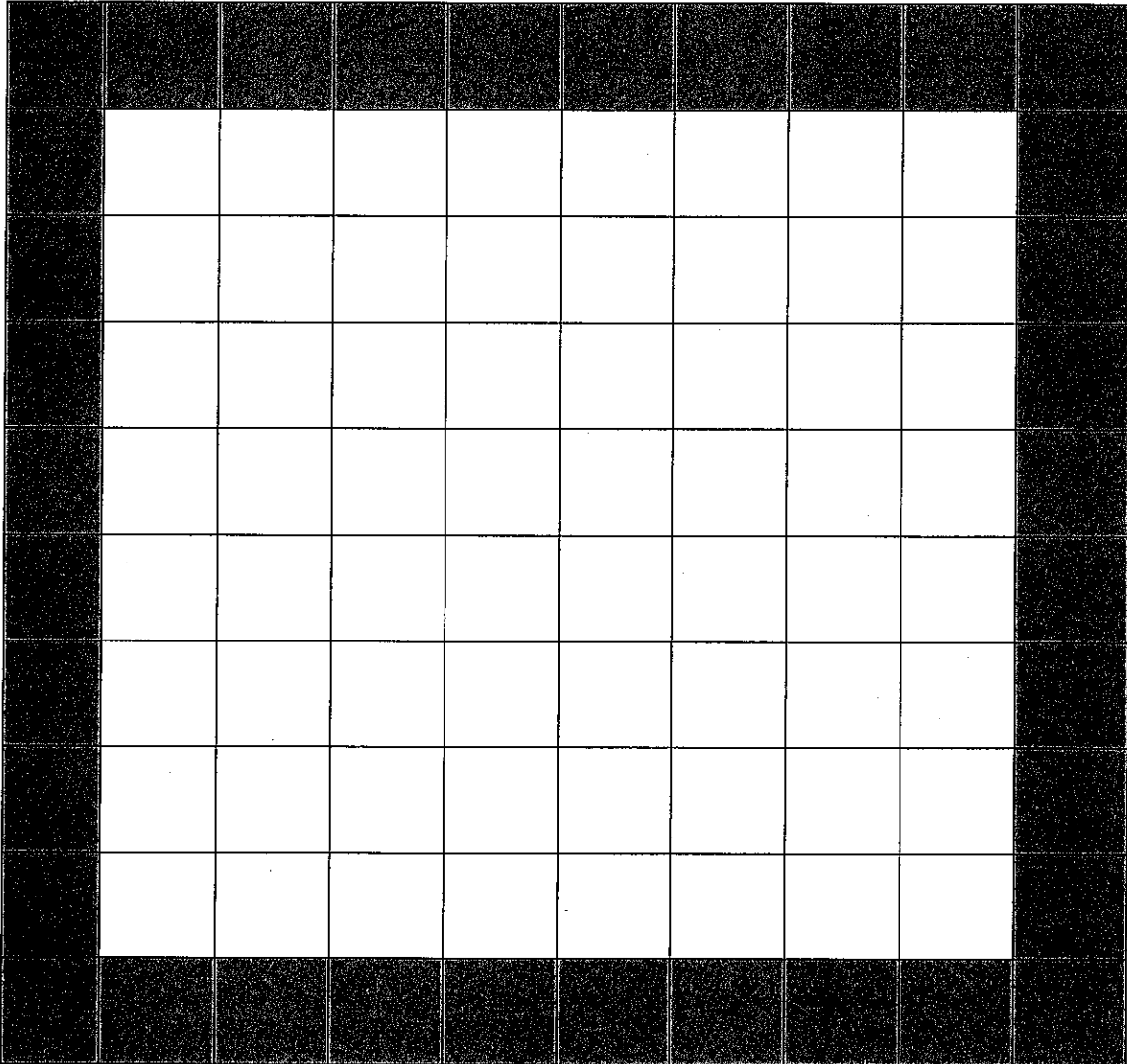




The Secondary Series

The Border Problem¹



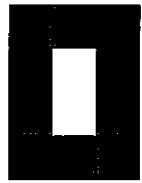
Without counting every tile, how can you determine how many squares are on the outside border of this 10-by-10 figure?

Share your solution with a neighbor, then we will compare strategies as a whole group.

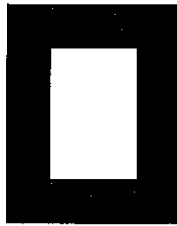
¹ Adapted from the *Connecting Mathematical Ideas: Middle School Video Cases to Support Teaching and Learning* materials, developed by Jo Boaler and Cathy Humphries, distributed by Heinemann.

1. Use two strategies different than your own to find out how many tiles would be on the border of a 6 x 6 grid. How about a 50 x 50 grid? An $n \times n$ grid?
2. Come up with several ways to figure out the number of tiles in a border, when given the number of tiles on the side of any square. Write an expression for each of the approaches you came up with.
3. In what ways can you show that each of these expressions is equivalent?
4. What methods can be employed to determine whether the rule always works?

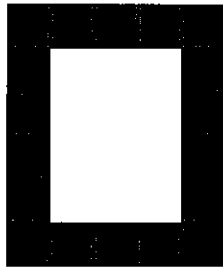
THE BORDER PROBLEM - CONTINUED



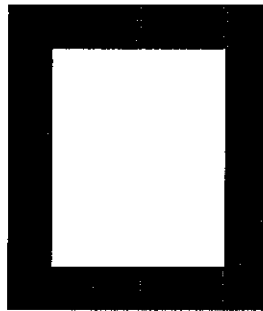
Stage 1



Stage 2



Stage 3



Stage 4

- A. HOW MANY TILES ARE NEEDED FOR A MODEL AT DESIGN 5? 11?
- B. EXPLAIN HOW YOU DETERMINED THE NUMBER NEEDED FOR DESIGN 11.
- C. DETERMINE AN EXPRESSION FOR THE NUMBER OF TILES IN A MODEL OF ANY DESIGN, n .

Name _____

Date _____ Block _____

TASK REFLECTION SHEET

Task Name _____ Task Date _____

Level of Challenge (1=super easy, 10=impossible) _____

Statement	Agree			Disagree		
	Strongly agree	Agree	Mostly agree	Strongly disagree	Disagree	Mostly disagree
1) I was able to find more than one solution or method for this problem						
2) This task challenged me.						
3) This task felt approachable to me.						
4) This task helped me learn something new or apply an old idea in a new way.						
5) Using visuals or drawings helped me be more successful with this task.						
6) I was able to easily find a solution for this task.						
7) I had to work hard to find a solution and understand this task, but I was able to do so by the end.						
8) Listening to others' solutions made me notice something new about the problem or think about it in a new way.						

Below, write a paragraph describing the task and reflecting on how this task affected your understanding of your ability in mathematics.