How Can "Ten Minute Tasks" Change My Classroom?

Edward C. Nolan

nolanmath.com/tenminute

Montgomery County Public Schools
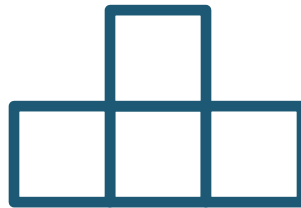
Rockville, Maryland

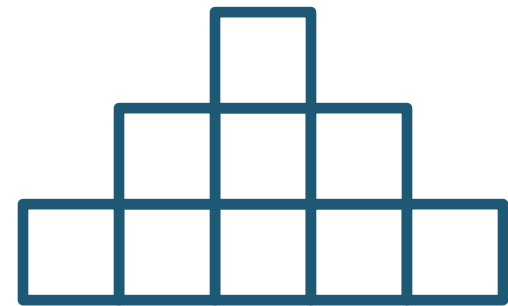# Setting the Stage

In the figure, as the step changes, _____ also changes.

Step 1   Step 2   Step 3

Peterson, Blake E. "Linear and Quadratic Change: A Problem from Japan," *Mathematics Teacher*, NCTM: Reston, VA, October 2006. Pages 206-212.

Setting the Stage Solutions

The following list gives some examples of student responses:

perimeter
height
width
size of enclosing rectangle
number of "toothpicks"
number of interior toothpicks
number of intersections
number of corners
number of convex corners
number of squares

number of nonadjacent squares
number of right angles
sum of the interior angles
number of diagonals
leftover space
number of segments
number of parallel lines
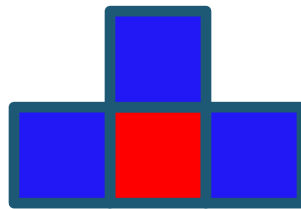length of longest line
number of rectangles

Peterson, Blake E. "Linear and Quadratic Change: A Problem from Japan," *Mathematics Teacher*, NCTM: Reston, VA, October 2006. Pages 206-212.

Setting the Stage

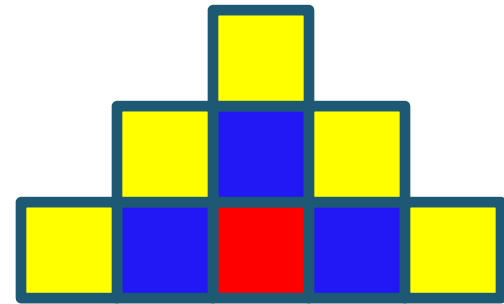In the figure, as the step changes, _____ also changes.

Step 1   Step 2   Step 3
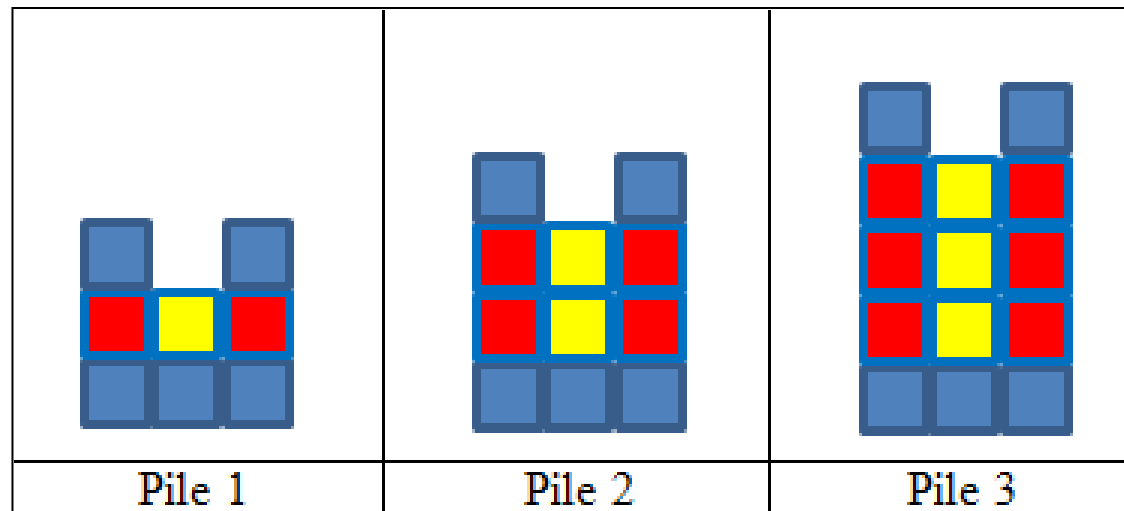
Peterson, Blake E. "Linear and Quadratic Change: A Problem from Japan," *Mathematics Teacher*, NCTM: Reston, VA, October 2006. Pages 206-212.
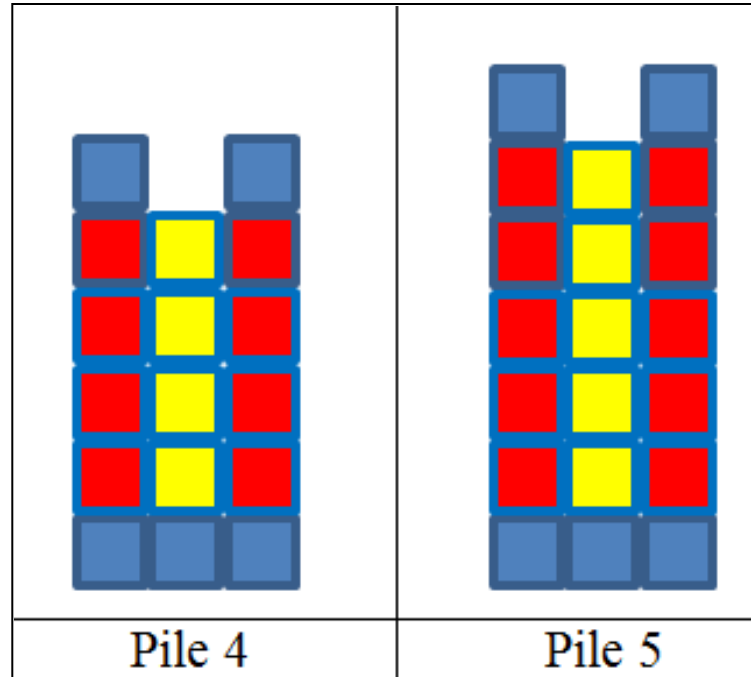
Goals

- Consider activities with multiple representations

- Use student representations and interpret student reasoning

- Match instruction with every learning type

Perimeter Piles

| Pile 1 | Pile 2 | Pile 3 |

How would you describe piles 4 and 5?

Perimeter Piles

Pile 4 | Pile 5

How would you describe piles 4 and 5?
What about pile 100?
What about pile 0?

Perimeter Piles

Pile Number	Perimeter	Area
1		
2		
3		

Perimeter Piles
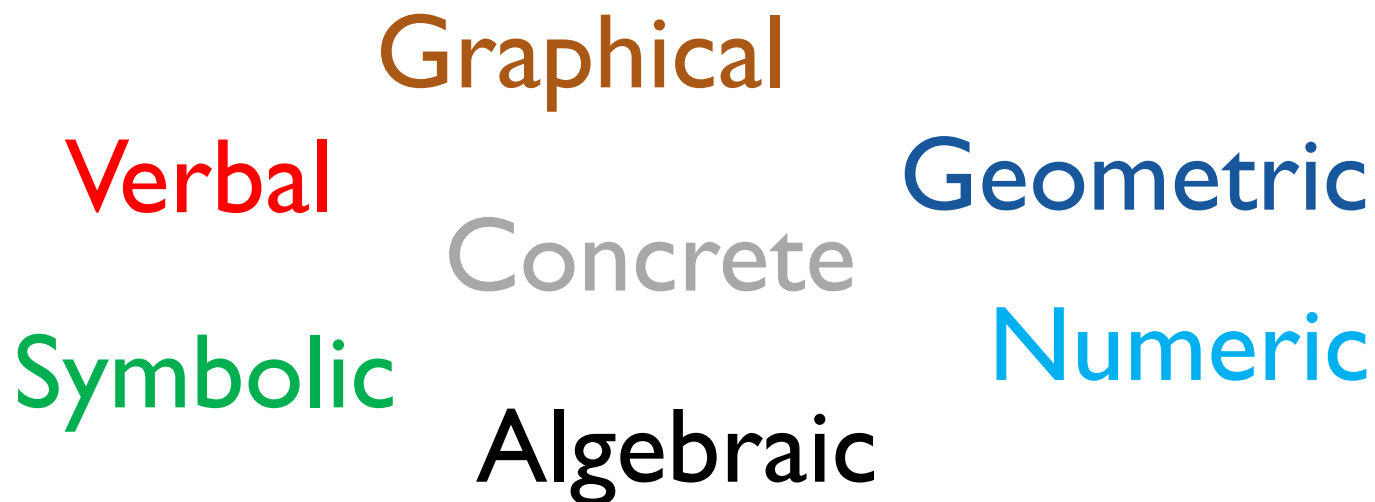
Pile Number	Perimeter	Area
1	14	8
2	16	11
3	18	14

How would you determine a rule for the perimeter of any figure? The area?

Do you see places for differentiation?

Generalizing

We need to assist our students in fluently moving among representations:

Graphical

Verbal

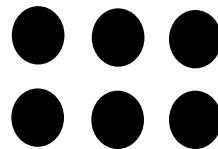Geometric

Concrete

Symbolic

Numeric

Algebraic

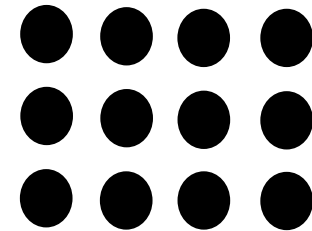to generalize strategies
and solve problems.

Patterns of Dots

A pattern of dots is shown below. At each step, more dots are added to the pattern. The number of dots added at each step is more than the number added in the previous step. The pattern continues indefinitely.

Step 1

Step 2

Step 3

Problem adapted from Marcy's Dots problem, NAEP 1992.

Patterns of Dots

How do you determine the number of dots in Step 20, but not have to draw all 20 pictures and then count the dots?

Explain or show how you could do this <u>and</u> give the answer that you get for the number of dots.

Problem adapted from Marcy's Dots problem, NAEP 1992.

Solutions?

- How did you model your solution? How does it represent your thinking?

- What other representations did you consider?

- How might your representation influence your instruction?

Now, let's examine some student work
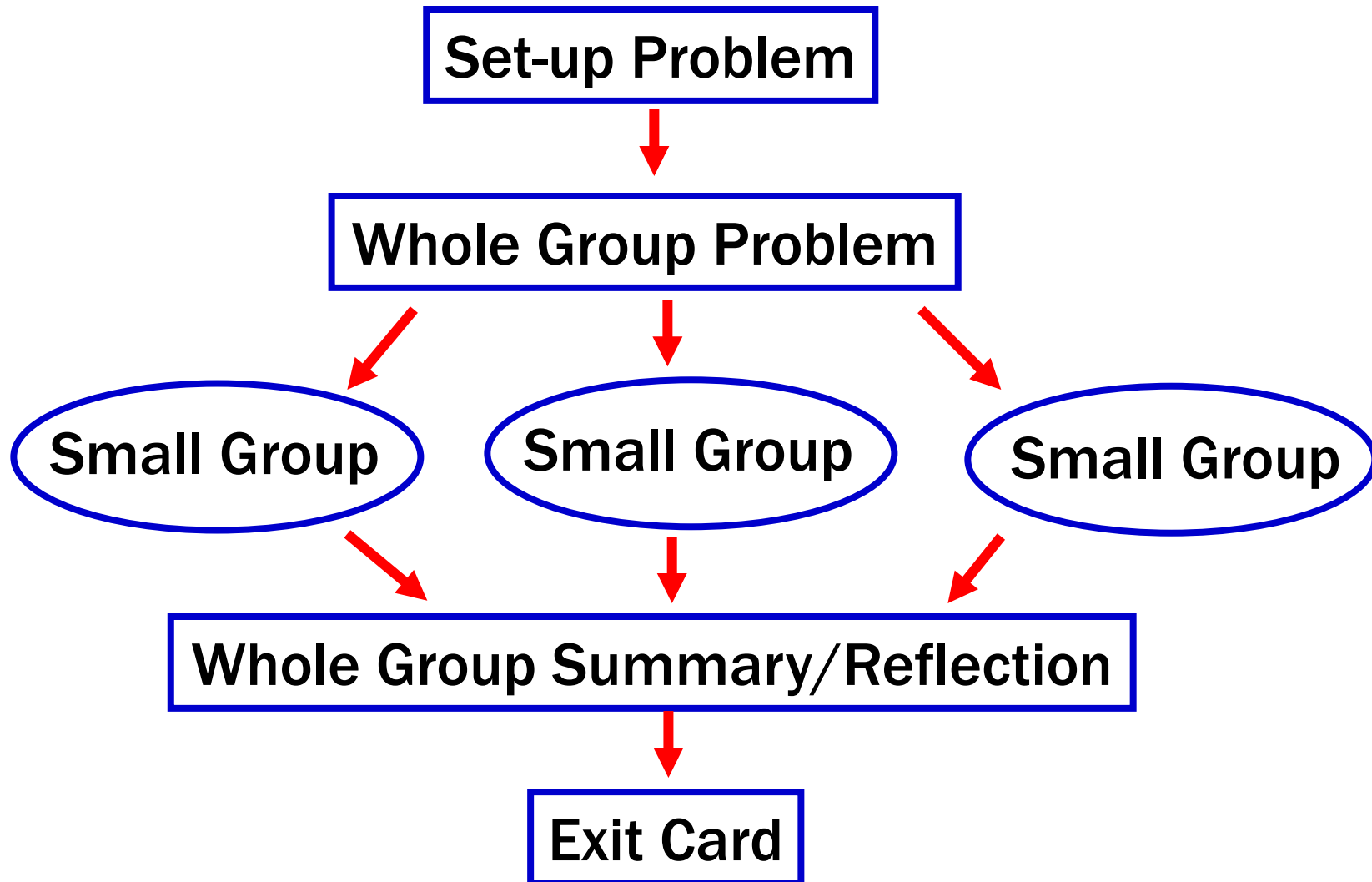
One Possible Lesson Design

Set-up Problem

↓

Whole Group Problem

Small Group   Small Group   Small Group

↓

Whole Group Summary/Reflection

↓

Exit Card

Table Tiles

Maria makes tables with square tops. She sticks tiles to the top of each table.

Maria uses three types of tiles:
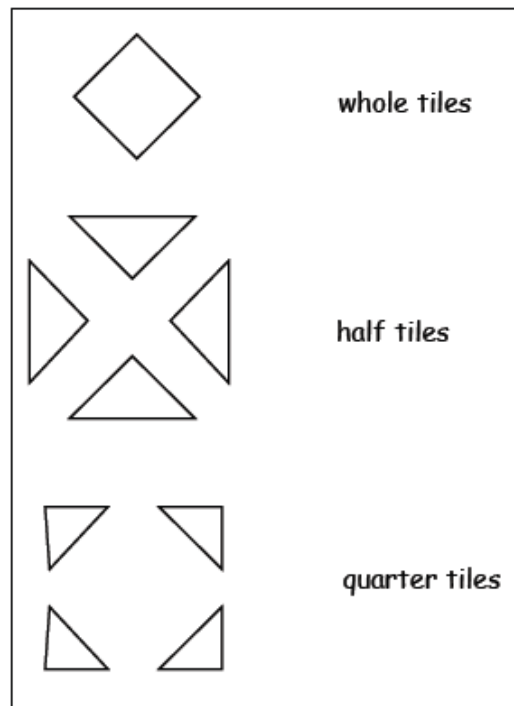

whole tiles
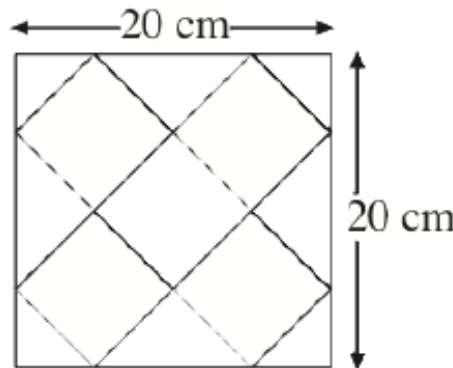
half tiles

quarter tiles

Table Tiles

- The sizes of the square tabletops are all multiples of 10 cm.
- Maria only uses quarter tiles in the corners and half tiles along the edges of the table.

Here is one tabletop:

This square tabletop uses:
5 whole tiles, 4 half tiles, 4 quarter tiles.

Table Tiles Student Sample 1
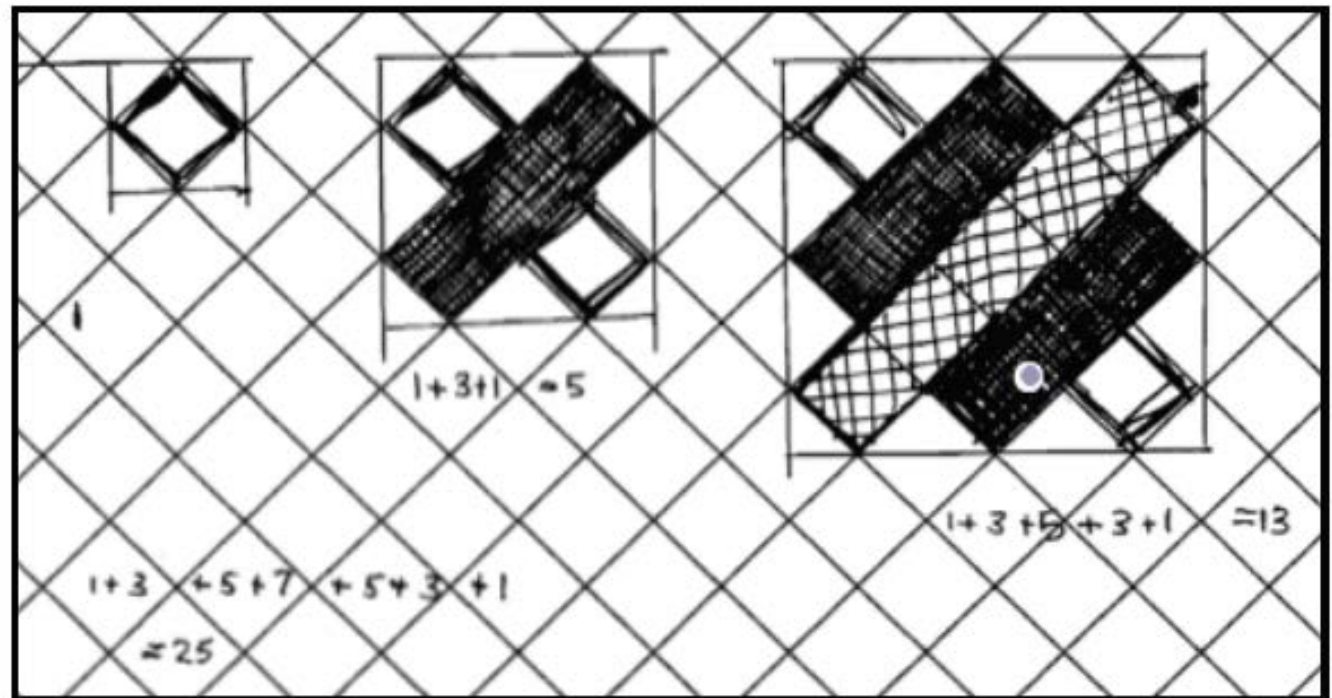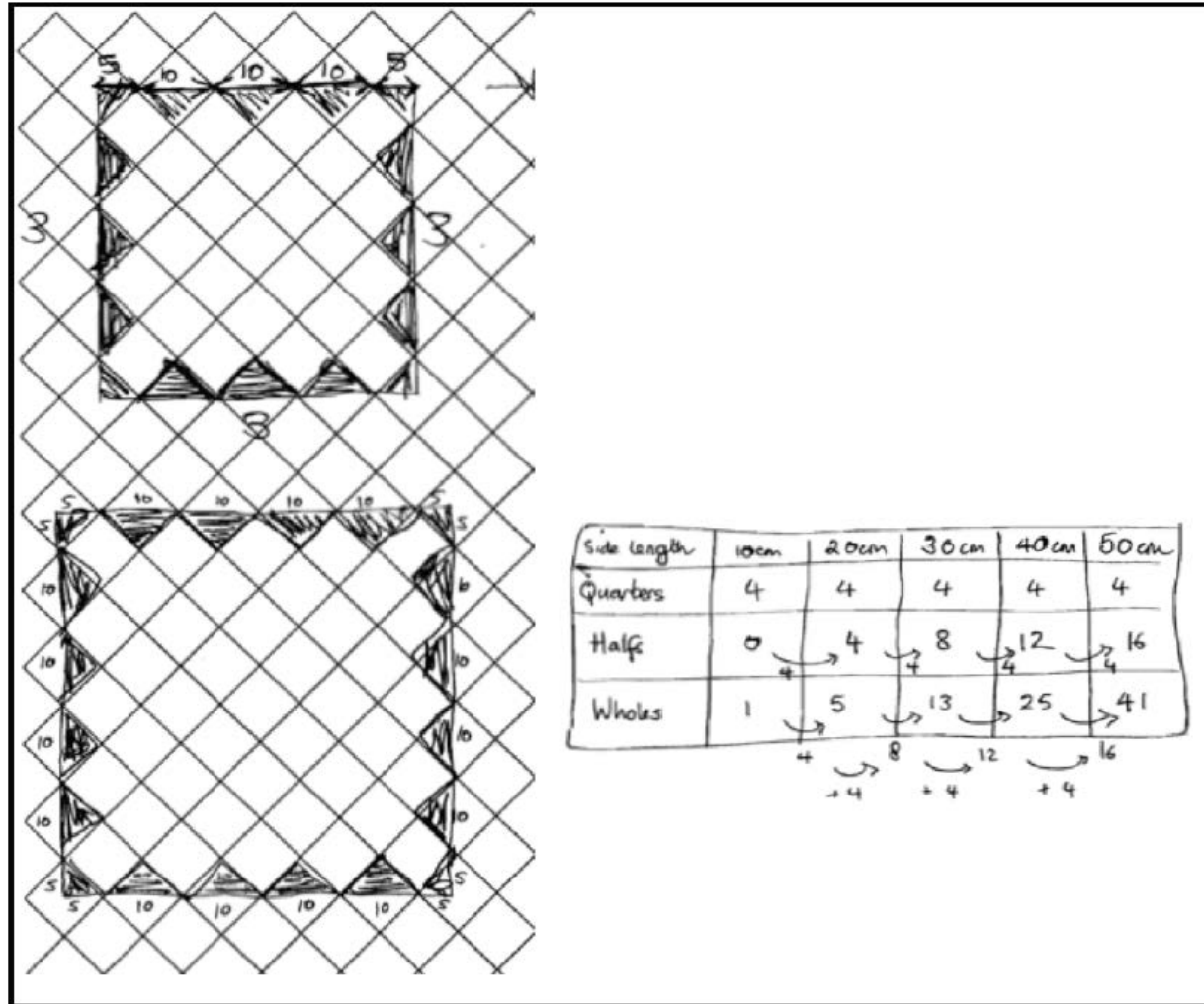
Leon's method

Table Tiles Student Sample 2

Ava's method

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