

Tiling Garden Beds



Name _____

Date _____ Period _____

Below are three designs of garden beds that you will investigate. The garden beds are represented by the shaded squares, surrounded by the white border tiles. Before you go any further, write down your *conjectures* for the questions below.

As the length of the garden bed grows from figure to figure...

- Which design pattern displays the greatest rate of increase for the border tiles? _____
- Which design pattern displays the least rate of increase for the border tiles? _____

Design Pattern A

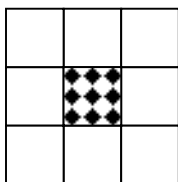


fig.1

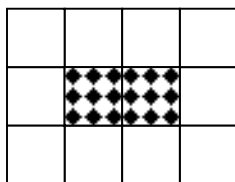


fig.2

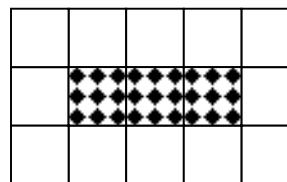


fig.3

Design Pattern B

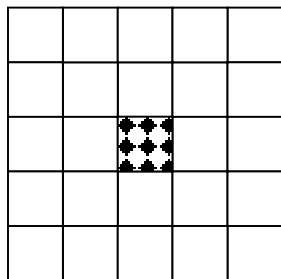


fig.1

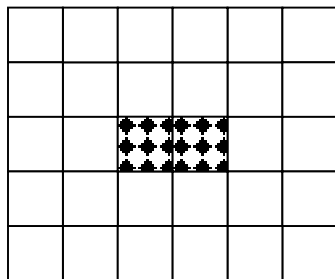


fig.2

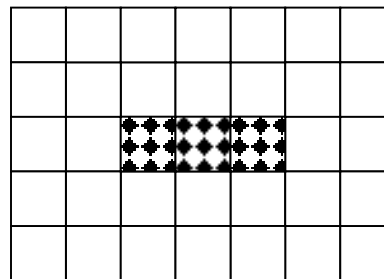


fig.3

Design Pattern C

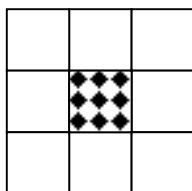


fig.1

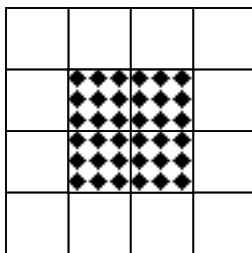


fig.2

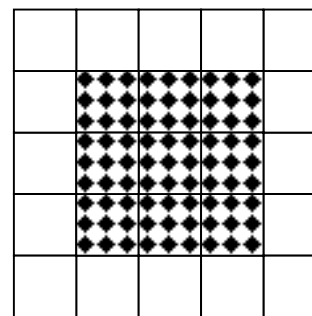


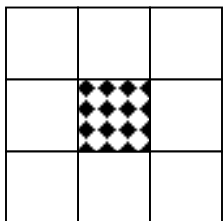
fig.3

Tiling Garden Beds

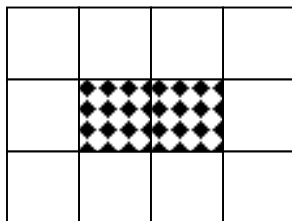


Design Pattern A

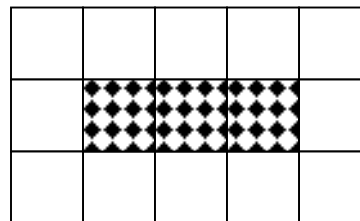
This design features gardens framed with a single row of border tiles. The first three gardens in the sequence are pictured below. The white squares represent the tiles, and the “patterned” squares represent the garden.



Garden Length = 1



Garden Length = 2



Garden Length = 3

- 1) Make a table of values for comparing garden length with the number of border tiles for gardens up to a length of 6. Include a garden length of zero (!!). Based on the pattern in this design, what would a “garden” of length zero look like?

g	0	1	2	3	4	5	6
t							

- 2) Write an algebraic equation that describes the number of tiles, t , needed to make a border around the garden, that will work for a garden of **ANY** length, g :

$$t =$$

How did you find your equation? Share with your partner. Do your equations differ? If so, are they both correct? (i.e. do they simplify to the same expression?)

What about the design pattern stays the same?

What changes?

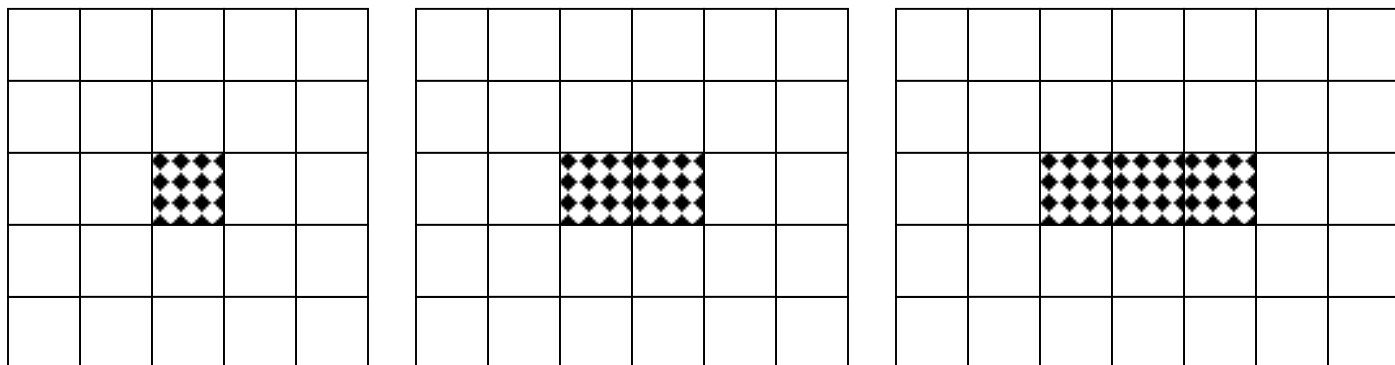
- 3) Using graph paper, graph this relationship on a coordinate plane, using just Quadrant 1 (for positive numbers only). Label the horizontal axis “Garden Length” (g) and the vertical axis “# of Border Tiles” (t).

Tiling Garden Beds



Design Pattern B

This design feature gardens framed with a **DOUBLE ROW** of border tiles. The white squares represent the tiles, and the “patterned” squares represent the garden.



- 4) Make a table of values for comparing garden length with the number of border tiles for gardens up to a length of 6. Include a garden length of zero(!). Based on the pattern in this design, what would a “garden” of length zero look like?

g	0	1	2	3	4	5	6
t							

- 5) Write an algebraic equation that describes the number of tiles, t , needed to make a border around the garden, that will work for a garden of **ANY** length, g :

$$t =$$

How did you find your equation? Share with your partner. Do your equations differ? If so, are they both correct? (i.e. do they simplify to the same expression?)

What about the design pattern stays the same?

What changes?

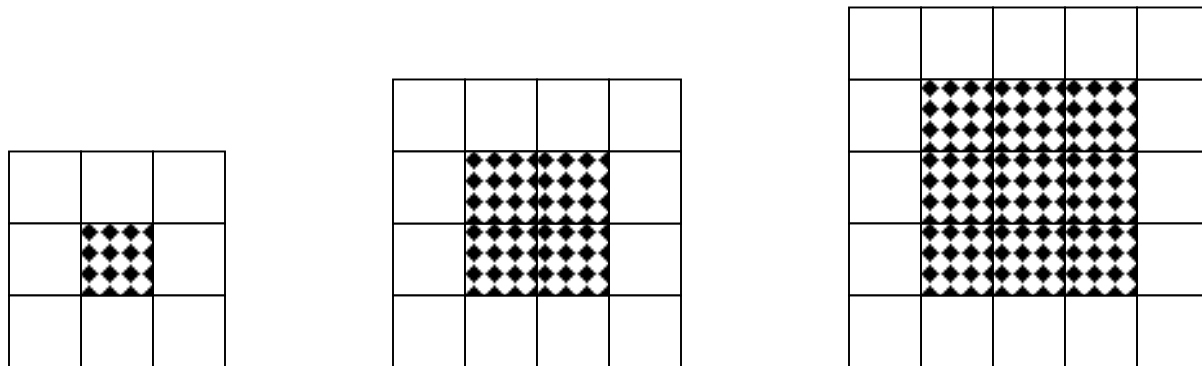
- 6) Graph this new relationship on the same coordinate plane as *Design Pattern A*. Be sure to label each line for reference.

Tiling Garden Beds



Design Pattern C

Here are three sizes of gardens framed with a single row of tiles. The white squares represent the tiles, and the “patterned” squares represent the garden. A garden with a length of g now also has a width of g .



- 7) Make a table of values for comparing garden length with the number of border tiles for gardens up to a length of 6. Include a garden length of zero (!!). Based on the pattern in this design, what would a “garden” of length zero look like?

g	0	1	2	3	4	5	6
t							

- 8) Write an algebraic equation that describes the number of tiles, t , needed to make a border around the garden, that will work for a garden of ANY length, g ::

$$t =$$

How did you find your equation? Share with your partner. Do your equations differ? If so, are they both correct? (i.e. do they simplify to the same expression?)

What about the design pattern stays the same?

What changes?

- 9) Graph this new relationship on the same coordinate plane as *Design Patterns A & B*. Be sure to label each line for reference.