Visualizing Patterns – The Border Tiles Problem

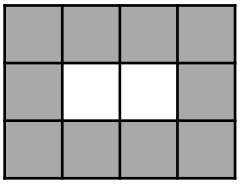

Fig. 1

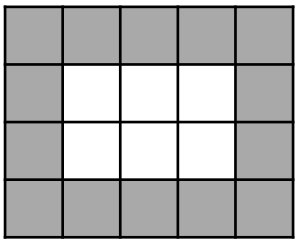

Fig. 2

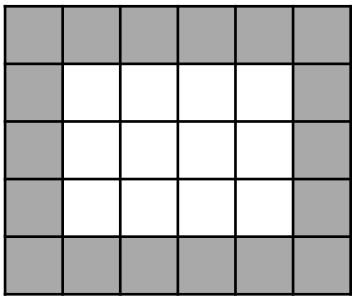

Fig. 3

1. Assuming the pattern continues, describe how you would build the next two figures.

2. Complete the table, showing your calculations.

Figure #	Border Tiles (grey)	Centre Tiles (white)	Total Tiles
1			
2			
3			
4			
5			
10			

3. Write the number of **border** tiles as a function of the figure number, and explain the meaning of the terms in the context of the tiling pattern. (More than 1 way?)

4. Write the number of **centre** tiles as a function of the figure number, and explain the meaning of the terms in the context of the tiling pattern. (More than 1 way?)

5. Write the **total** number of tiles as a function of the figure number, and explain the meaning of the terms in the context of the tiling pattern. (More than 1 way?)

Extension Ideas

For which figure does the number of centre tiles exceed the number of border tiles?

Design a tile pattern to match the function: $f(n) = n^2 + 2n + 1$

- Draw the first three figures of your pattern.
- Show how your pattern matches the function.

Generalize the border tile problem. In the given problem, Figure 1 has a 1x2 centre.
Consider an *a* x *b* centre for Figure 1, and then built on as before (an additional row and column each time)? How many **total** tiles would be in Figure *n*?