4.1.2 How does it grow?
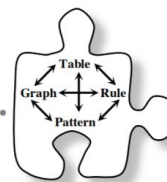...

Seeing Growth in Different Representations

Throughout this chapter, you will explore connections between and find efficient ways to move from one type of representation to another. Today, you will look for specific connections between geometric patterns and equations. As you work, keep these questions in mind:

How can you see growth in the rule?

How do you know your rule is correct?

What does the representation tell you?

*What are the connections between the representations?*
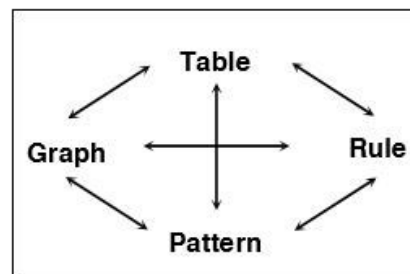
At the end of this lesson, put your work from today in a safe place. You will need to use it during Lesson 4.1.3.

4-12. Tile Pattern #1:

Examine the tile pattern shown at right.

a. What do you notice? After everyone has had a moment to examine the figures independently, discuss what you see with your team.

Figure 1   Figure 2   Figure 3
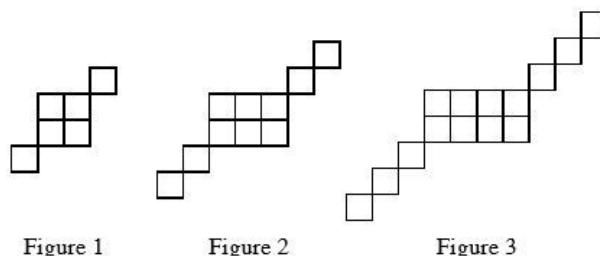
b. Sketch the next figure in the sequence (Figure 4). Sketch Figure 0, which is the figure that comes before Figure 1.

                    Figure 0   Figure 4

c. How is the tile pattern growing? Where are the tiles being added with each new figure? Use pencil to shade in the new tiles in each figure.
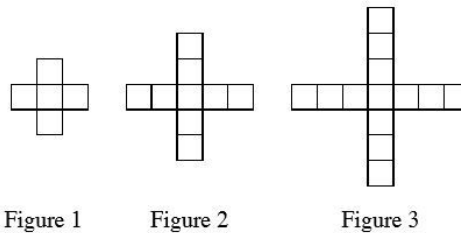
d. Make a table of values relating the figure number and the number of tiles.

x (input) Figure #	0					100	x
y (output) # of tiles							

e. How many tiles would be in the 100th figure? How can you use the equation to find the solution?

4-13. Exam the two patterns below. Create a table and write out the equation for each.
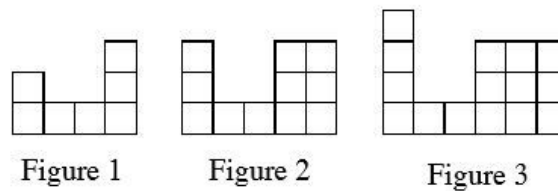
A. **Tile Pattern #2:**

Figure 1   Figure 2   Figure 3

x (input) Figure #	0					100	x
y (output) # of tiles							

Equation:_____

B. **Tile Pattern #3:**

Figure 1   Figure 2   Figure 3

x (input) Figure #	0						x
y (output) # of tiles						63	

Equation:_____

4-14. PUTTING IT TOGETHER   Look back at the **Pattern #1**, **2**, and **3** in problems 4-12 and 4-13 to answer the following questions.
 a. When you compare these three patterns, what is the same and what is different?

b. Write an equation (rule) for the number of tiles in each pattern.

Pattern #1 _____ Pattern #2 _____ Pattern #3_____

c. What connections do you see between your equations and the tile pattern? Explain.

4-15. Consider Tile **Pattern #4**, shown below.
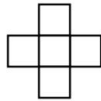

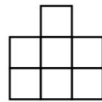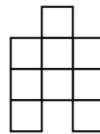Figure 0   Figure 1   Figure 2   Figure 3   Figure 4

a. Draw Figures 0 and 4 above.

b. Find an equation (rule) for the number of tiles in this pattern. Label Tile **Pattern #4** above with its rule.

c. What is the same about this pattern and Tile **Pattern #3**?

   What is different?

   What do those similarities and differences look like in the equation?

d. How is the number of tiles by which the pattern increases each time you move from one figure to the next figure in the sequence represented in each equation?

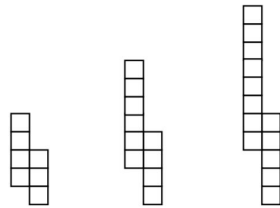4-3. Draw Figure 0 and Figure 4 for the pattern below.
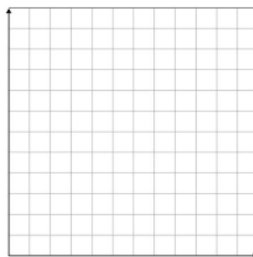
Figure 1   Figure 2   Figure 3

Figure 0   **Figure 4**

a. Represent the number of tiles in each figure in an x→y table. Let x be the figure number and y be the total number of tiles.

x (input) Figure #						X
y (output) # of tiles						

b. Use the table to graph the pattern.

c. Without drawing Figure 5, predict where its point would lie on the graph. Justify your prediction.

4-19. Complete the table below.

IN (x)	2	10	6	7	-3		-10	1000	X
OUT (y)	9	25	17			15			

a. Explain in words what is done to the input value (x) to produce the output value (y)

b. Write the rule you described in part (a) with algebraic symbols.