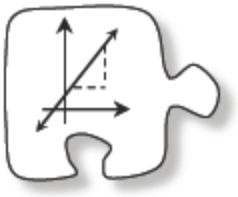
2.1.2 How can I measure steepness?



Slope

In the previous lesson, you determined the growth and starting value of geometric tile patterns, and made connections to the table and equation. In this lesson you will use your knowledge to determine an accurate value of growth from a graph.

During this lesson, ask your teammates the following focus questions:

What makes lines steeper? What makes lines less steep?

How is growth related to steepness?

Where is the starting value on a line?

2-11.

Figure #	0	1	2	3	4
# of Tiles	2	7	12	17	22

- **Determine the growth of this pattern:**
- **Use the table to find the starting value:**

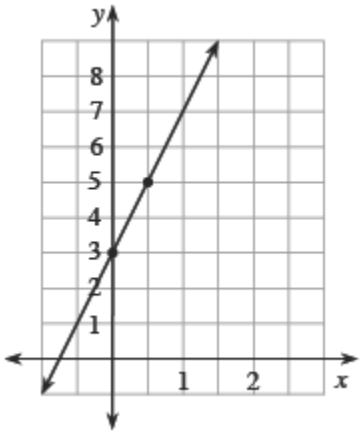
How can growth and starting value be used to write the equation of the line.

2-12. Does the relation in the table above appear to be a function? If so, write the equation in function notation. If not, explain why it is not a function.

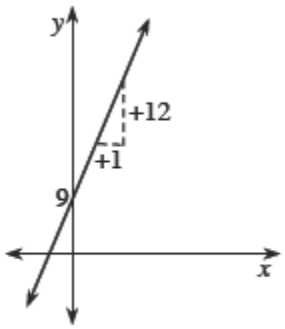
2-13. For each of the graphs below:

- Describe how the pattern grows and how many tiles are in Figure 0. *x* represents the figure number, and *y* represents the number of tiles in the figure.
- Decide if the graph represents a function If not, explain why the graph does not represent a function.

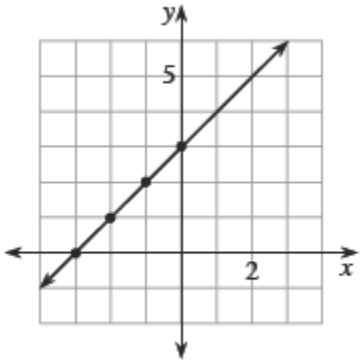
a.



b.

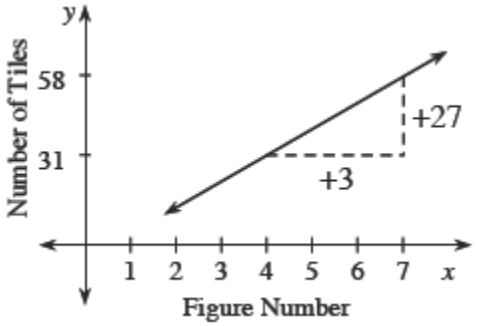


c.

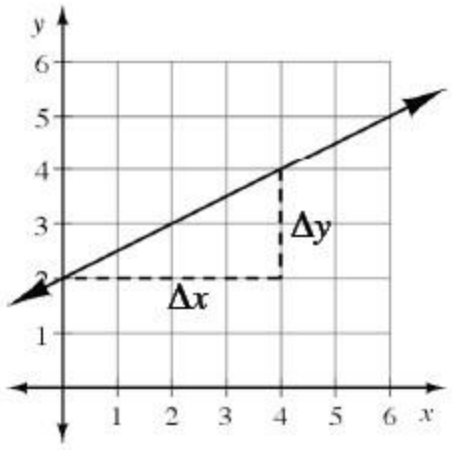


- Write an equation that relates the number of tiles, *x*, to the figure number, *y*.

2-14. The graph below shows a line for a tile pattern. What is the **growth factor** for this line? That is, how many tiles are added each time the figure number is increased by 1? Explain how you found your answer.



2-15. The triangles in problems 2-13 and 2-14 are called **slope triangles**. **Slope** is a measure of the steepness of a line. It is the ratio of the vertical distance to the horizontal distance of a slope triangle. The vertical part of the triangle is called **Δ*y*** (read "change in *y*"), while the horizontal part of the triangle is called **Δ*x*** (read "change in *x*"). Note that "Δ" is the Greek letter "delta" that is often used to represent a difference or a change.



a. What is the vertical distance (Δ*y*) for this slope triangle?

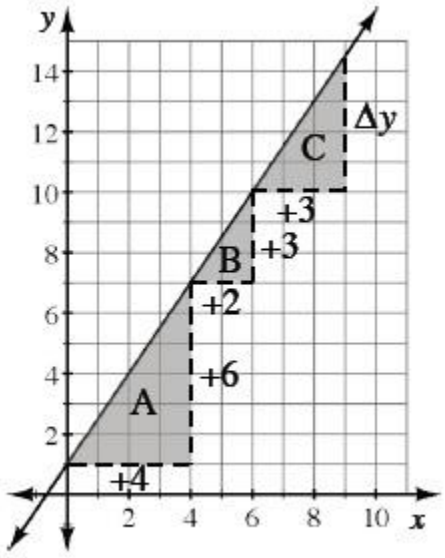
b. What is the horizontal distance (Δ*x*) for this slope triangle?

c. Draw smaller slope triangles for this line that has a horizontal distance (Δ*x*) of 1. Use one of these triangles to find the slope for this line.

d. How could you use Δ*y* and Δ*x* to find the slope of this line?

e. What is the equation of this line?

2-16. Find the line graphed at right with slope triangles A, B, and C



a. Find the slope using slope triangles A and B. What do you notice?

b. What is the vertical distance (Δy) of slope triangle C? Explain your reasoning.

c. Draw a slope triangle on the line with a horizontal distance (Δx) of 1 unit. Find the vertical distance (Δy) of this new triangle. What do you notice?