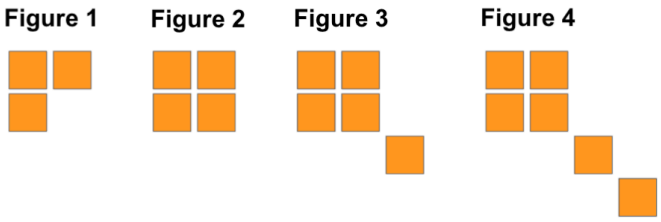
Name:

APPLICATION: Linear Growth Patterns

Level 1

1. Use the pattern to answer the questions.

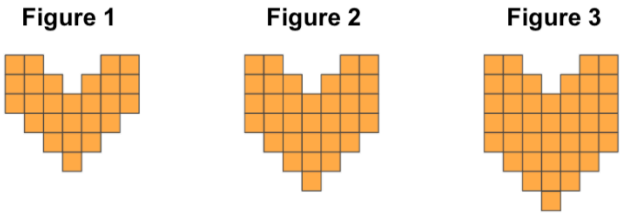


a. Describe the pattern.

b. Rate of change *(slope)*: _____

c. How many squares are in Figure 6? _____

2. Use the pattern to answer the questions.

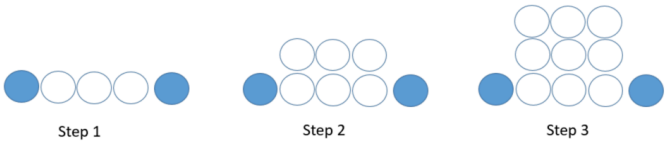


a. Describe the pattern.

b. Rate of change *(slope)*: _____

c. How many squares are in Figure 7? _____

3. Use the pattern to answer the questions.



a. Rate of change (*slope*): _____

b. How many circles are in Step 6? _____

c. How many circles are in Step 0? _____

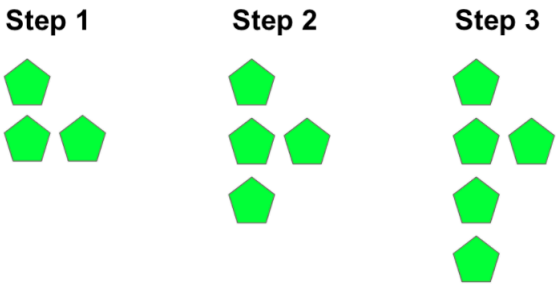
4. Complete the table and identify the rate of change.

x	y
0	
1	7
2	13
3	19
4	
5	

Rate of change *(slope)*: _____

Level 2

1. Use the pattern to answer the questions.



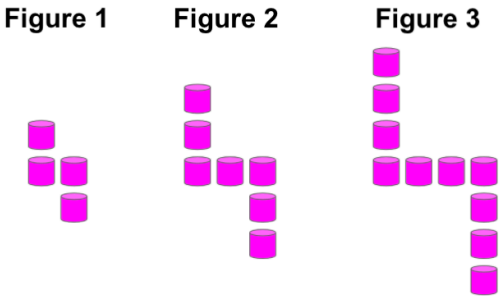
a. Describe the pattern

b. How many pentagons are in Step 0? _____

c. Rate of change *(slope)*: _____

d. Write an equation to represent the number of pentagons (y) in a given step (x).

2. Use the pattern to answer the questions.

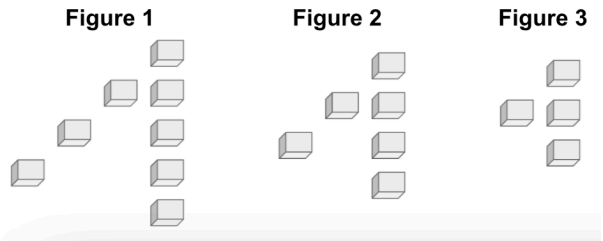


a. Create a table showing the number of cylinders in a given step

b. Write an equation to represent the number of cylinders (y) in a given step (x).

3. Draw your own linear growth pattern and write an equation to model it.

4. Use the pattern to answer the questions.



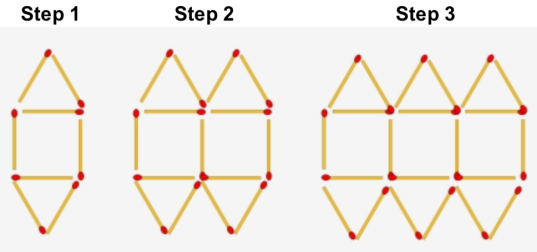
a. How many cubes are in Figure 0? _____

b. Rate of change *(slope)*: _____

c. Write an equation to represent the number of squares (y) in a given step (x).

Level 3

1. Use the pattern to answer the questions.



a. Rate of change *(slope)*: ____

b. How many matchsticks are in step 0? ____

c. Write an equation to represent the number of matchsticks (y) in a given step (x).

d. How many matchsticks would be in step 43?

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2. Sara starts a new job and deposits the same paycheck in her checking account each month. After 3 months, her checking account balance is $2,500. It increases to $3100 after four months and $3700 after five months. Assume she makes no withdrawals.

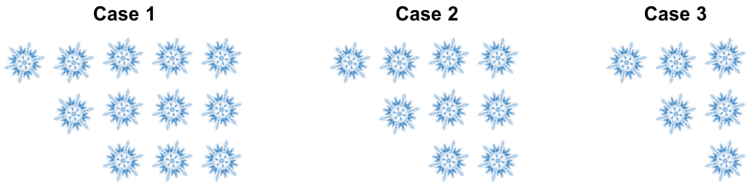
a. Create a table to represent her account balance.

x months	**y** balance ($)

b. How much did she have before starting direct deposit?

c. Write an equation to model Sara's account balance, y, after x months.

3. Use the pattern to answer the questions.



a. Write an equation to represent the number of snowflakes (y) in a given step (x).

b. Based on the equation for this pattern, how many snowflakes are in step 7?

c. Consider the visual pattern. How might you represent step 7 visually?

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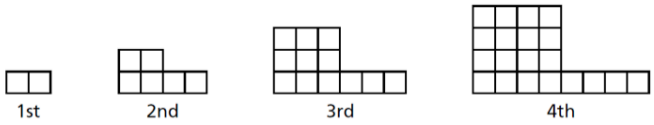
4. Sky writes the equation y = 4x - 2 to represent the pattern below, where *y* is the number of small squares and *x* is the figure.



a. Why is Sky's equation incorrect? Justify your response.

b. How is this pattern different from the other patterns we've seen so far?

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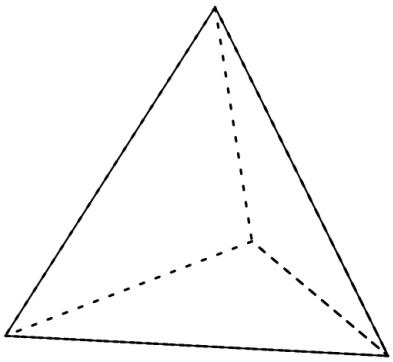
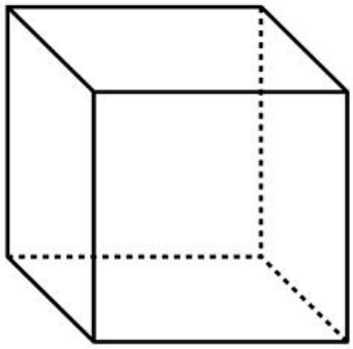
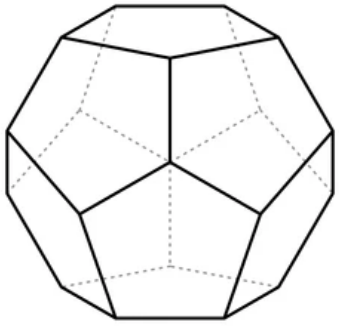
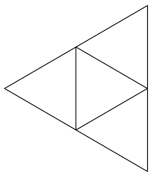
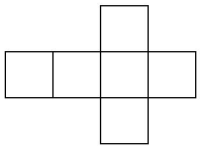
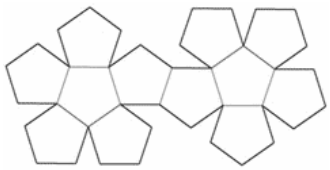
5. Draw your own linear growth pattern and write an equation to model it. It must have either a <u>fractional</u> or <u>negative</u> slope.

Challenge

A Platonic Solid is made up of faces that are identical regular polygons. These faces meet at vertices *(meeting points, corners)* that have the same angles. Here are three examples of Platonic solids:

Tetrahedron	Cube	Dodecahedron
		
		

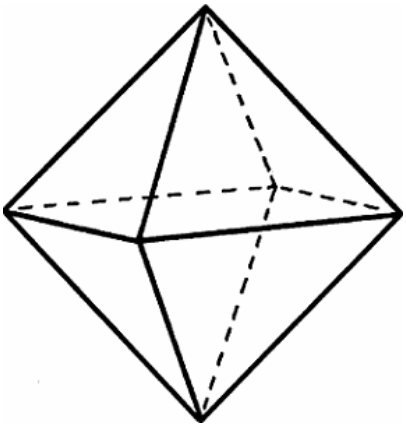
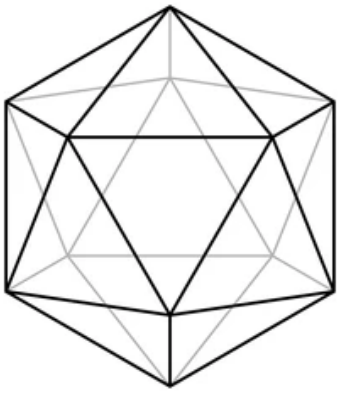
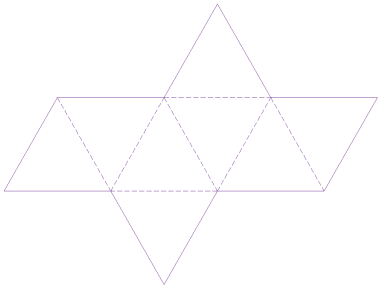
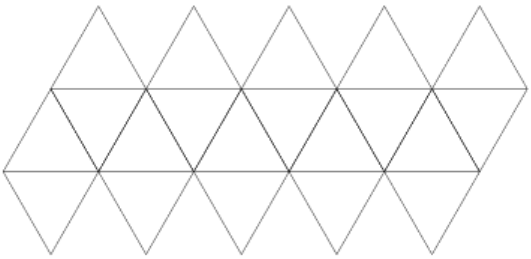
1. **Complete the table below.**

	faces (f)	vertices (v)	edges (e)
tetrahedron			
cube			
dodecahedron	12	20	30

2. **What patterns do you notice about the number of faces, edges, and vertices in these shapes?**

3. **There are multiple relationships between the number of faces (F), vertices (V), and edges (E) in these three shapes that can be expressed with a linear equation. Can you find one?**
   Note: these relationships are NOT true for ALL Platonic solids. You'll explore that on the next page.

This pattern does not work for all Platonic Solids. There are two additional Platonic Solids, pictured below.

Octahedron	Icosahedron
	
	

	faces (f)	vertices (v)	edges (e)
octahedron	8	6	12
icosahedron	20	12	30

4. **Does your equation from Question 3 fit both the octahedron and icosahedron? Justify your response.**

5. **Challenge: Write an equation, inequality, or statement that is true for ALL FIVE Platonic Solids.**