Chapter 1: Expressions, Equations, & Inequalities

Lesson 1.1 Patterns & Expressions

Essential Understanding: You can represent some patterns using diagrams, words, numbers, or algebraic expressions.

Ex. Look at the figures from left to right. What is the pattern? What would the next figure in the pattern look like?

Ex. Look at the figures from left to right. What is the pattern? Draw the next figure in the pattern.
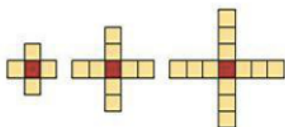
Key Concepts Variables and Expressions

Definition	Examples	
A **variable** is a symbol, usually a letter, that represents one or more numbers.	n	x
A **numerical expression** is a mathematical phrase that contains numbers and operation symbols.	$3 + 5$	$(8 - 2) + 5$
An **algebraic expression** is a mathematical phrase that contains one or more variables.	$3n + 5$	$(8x - 2) + 5n$

What do we call quantities whose values do not change?

One way to find patterns or organize data is through a table. They can act as an input/output machine.

Use a pattern to answer each question.

A How many toothpicks are in the 20th figure?

Use a table. Look for a pattern that relates the figure number to the number of toothpicks.

Figure Number (Input)	Process Column	Number of Toothpicks (Output)
1	1(4)	4
2	2(4)	8
3	3(4)	12
⋮	⋮	⋮
n	■	■

To get the output, multiply the input by 4.

B. What is an expression that describes the number of toothpicks in the nth figure?

How many tiles are in the 25th figure in this pattern? Show a table of values with a process column.

Figure	Tiles
1	
2	
3	
4	
5	
6	
25	

Another way to find patterns is from a graph. Use the graph below to find points on the graph and thus find a pattern.

Aquarium You want to set up an aquarium and need to determine what size tank to buy. The graph shows tank sizes using a rule that relates the capacity of the tank to the combined lengths of the fish it can hold.

If you want five 2-in. platys, four 1-in. guppies, and a 3-in. loach, which is the smallest capacity tank you can buy: 15-gallon, 20-gallon, or 25-gallon? Use a table to find the answer.

Tank Sizes
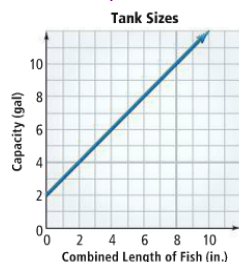
Ex. The graph below shows the total cost of platys at the aquarium shop. Use a table to answer the questions.

a. How much do 6 platys cost?

b. How much do ten platys cost?

c. Why is the graph of the previous problem a line while the graph below is a set of points?

Cost of Platys