

Grab a textbook from the back  
and tear out chapter 8, pgs.

571-646 - **DO NOT PUT THE  
BOOK BACK!!!**

## Questions on 7.5?

Answer these two questions in your notes for review.

Which function has a lower minimum?

$x$	$g(x)$
-2	4
-1	1
0	0
1	1
2	4

min @ 0

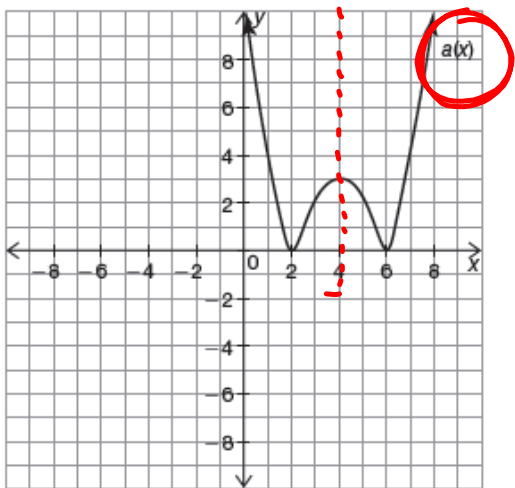
$h(x) = 4g(x - 3) - 8$

linear  
end behavior  
 $\rightarrow \pm \infty$

Which function's axis of symmetry has a greater x-value?

A quadratic function  $z(x)$  with zeros at  $-4$  and  $4$ .

AoS is at  $x=0$



# Sequence—Not Just Another Glittery Accessory

## Arithmetic and Geometric Sequences

8.1

pg.573-574 in your book. 01,001,0001, ...

Patterns, both numerical and physical, can be defined as sequences. Recall, a sequence is a pattern involving an ordered arrangement of numbers, geometric figures, letters, or other objects called terms. An arithmetic sequence is a sequence of terms in which the difference between any two consecutive terms is a constant. A geometric sequence is a sequence of terms in which the ratio between any two consecutive terms is a constant. A sequence that is neither arithmetic or geometric has a pattern, but there is no common difference or ratio.

Sequences can have a fixed number of terms, or they can continue forever. If a sequence terminates it is called a finite sequence. If a sequence continues forever it is called an infinite sequence.

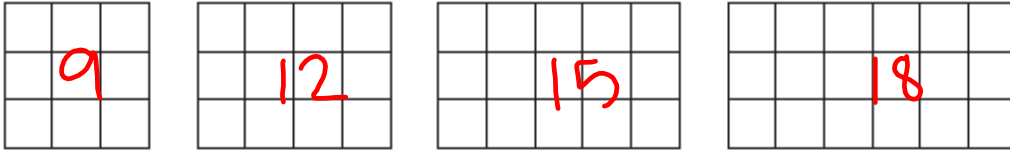
An ellipsis is 3 periods which means "and so on." Ellipses are used to represent infinite sequences.



pg.575 in your book

2. Analyze each sequence and then circle the appropriate type of sequence. If the sequence is arithmetic, identify the common difference. If the sequence is geometric, identify the common ratio. Finally, circle whether the sequence is finite or infinite.

a. number of tiles



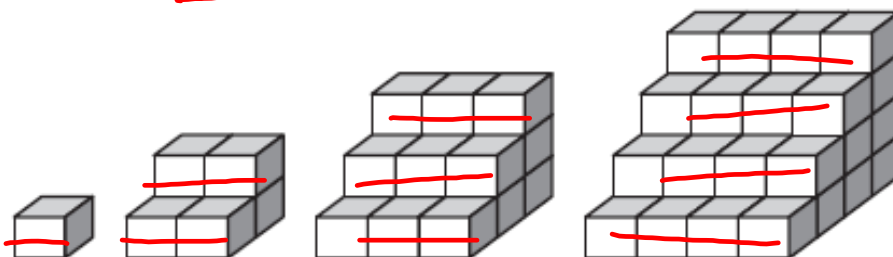
Arithmetic Sequence  $d=3$  Geometric Sequence  $r=$  Neither  
 Infinite Sequence Finite Sequence

b. number of toothpicks



Arithmetic Sequence \_\_\_\_\_ Geometric Sequence \_\_\_\_\_ Neither  
 Infinite Sequence Finite Sequence

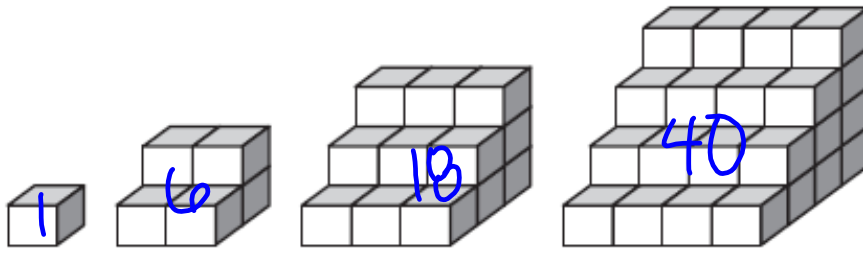
c. number of rows



Arithmetic Sequence  $d=1$  Geometric Sequence \_\_\_\_\_ Neither  
 Infinite Sequence Finite Sequence

Take 5 minutes to finish pg.576-577 in your book  
(pg.576 in your book)

d. number of cubes



Arithmetic Sequence \_\_\_\_\_

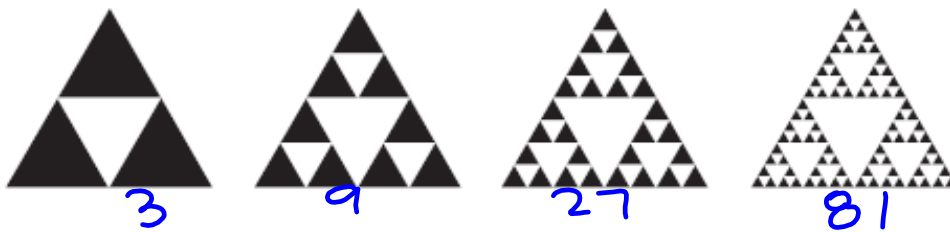
Geometric Sequence \_\_\_\_\_

Neither

Infinite Sequence

Finite Sequence

e. number of black triangles



Arithmetic Sequence \_\_\_\_\_

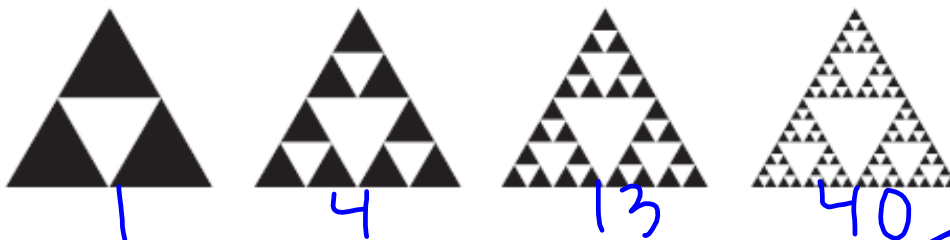
Geometric Sequence  $r=3$

Neither

Infinite Sequence

Finite Sequence

f. number of white triangles



Arithmetic Sequence \_\_\_\_\_

Geometric Sequence \_\_\_\_\_

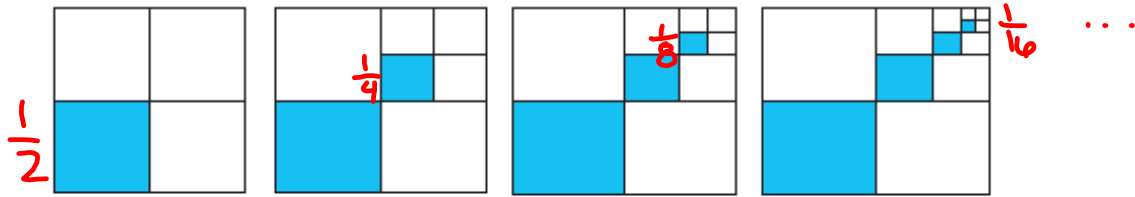
Neither

Infinite Sequence

Finite Sequence

(pg.577 in your book)

g. Side length of smallest shaded square within the unit square



Arithmetic  
Sequence

\_\_\_\_\_

Geometric  
Sequence

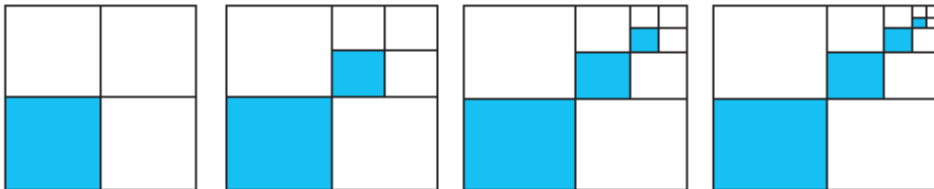
$r = \frac{1}{2}$

Neither

Infinite Sequence

Finite Sequence

h. Number of shaded squares



Arithmetic  
Sequence

$d = 1$

Geometric  
Sequence

\_\_\_\_\_

Neither

Infinite Sequence

Finite Sequence

. Create your own sequence given the type indicated. Include the first three terms.

a. Arithmetic Sequence

b. Geometric Sequence

c. Neither Arithmetic or Geometric Sequence

## pg.578 in your book

Previously, you learned the explicit and recursive formulas for arithmetic and geometric sequences. An explicit formula for a sequence is a formula used for calculating each term of the sequence using the index, a term's position in the sequence. A recursive formula generates each new term of a sequence based on a preceding term of the sequence.

	Arithmetic Sequence	Geometric Sequence
Explicit Formula	$a_n = a_1 + d(n - 1)$ where $a_1$ is the first term, $d$ is the common difference, and $n$ is the $n$ th term in the sequence.	$g_n = g_1 \cdot r^{n-1}$ where $g_1$ is the first term, and $r$ is the common ratio.
Recursive Formula	$a_n = a_{n-1} + d$ where $a_{n-1}$ is the term previous to $a_n$ , and $d$ is the common difference.	$g_n = g_{n-1} \cdot r$ where $g_{n-1}$ is the term previous to $g_n$ , and $r$ is the common ratio.

1. Consider the sequence in Problem 1, Question 1, part (a), *number of tiles*.

a. Use the recursive formula to determine the 5th term.

$$9, 12, 15, 18, \dots$$

$$a_1 = 9$$

$$n = 5$$

$$d = 3$$

$$a_n = a_{n-1} + d$$

$$a_5 = a_{5-1} + 3$$

$$a_5 = a_4 + 3$$

$$a_5 = 18 + 3$$

$$a_5 = 21$$

b. Use the explicit formula to determine the 5th term.

$$a_n = a_1 + d(n-1)$$

$$a_5 = 9 + 3(5-1)$$

$$a_5 = 9 + 3(4)$$

$$a_5 = 9 + 12$$

$$a_5 = 21$$

2. Consider the sequence in Problem 1, Question 1, part (e), *number of black triangles*.

a. Use the recursive formula to determine the 5th term.

b. Use the explicit formula to determine the 5th term.

3. Which formula would you use if you wanted to determine the 95<sup>th</sup> term of either sequence? Explain your reasoning.

pg.579 in your book

4. Identify each sequence as arithmetic, geometric, or neither. If possible, determine the 50<sup>th</sup> term of each sequence.

a.  $-5, -1, 3, 7, 11, 15, 19, 23 \dots$

Type of Sequence: \_\_\_\_\_

50<sup>th</sup> term: \_\_\_\_\_

b.  $0, 1, 1, 2, 3, 5, 8, 13 \dots$

Type of Sequence: neither

50<sup>th</sup> term: \_\_\_\_\_

c.  $27, 9, 3, 1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$

$\div 3$

Type of Sequence: geometric

50<sup>th</sup> term:  $1.1 \times 10^{-22}$

$$r = \frac{1}{3}$$

$$g_1 = 27$$

$$n = 50$$

$$g_n = g_1 \cdot r^{n-1}$$

$$g_{50} = g_1 \cdot \left(\frac{1}{3}\right)^{50-1}$$

$$g_{50} = 27 \left(\frac{1}{3}\right)^{49}$$

$$g_{50} = 1.1 \times 10^{-22}$$

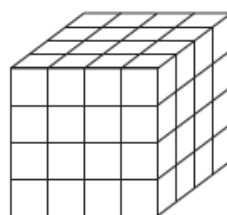
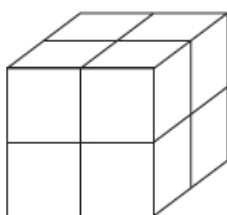
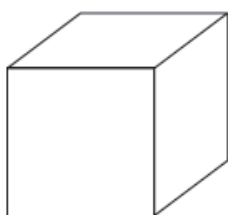
5. Use either the recursive or explicit formula to determine each answer.

- a. The sum of the interior angles in a triangle is  $180^\circ$ , in a quadrilateral is  $360^\circ$ , and in a pentagon is  $540^\circ$ . How many degrees are in a decagon?

- b. The employees at Franco's Pizza Shack turn the pizza ovens down to  $200^\circ$  overnight. When the workers open the shop in the morning, they turn the ovens up to  $550^\circ$ . The temperature of each oven increases by 40% every 30 minutes. Will the ovens reach the required  $550^\circ$  in 1.5 hours?

**NOT in your book**

1. Consider the first 3 terms in the given sequence of stacked cubes.



- Determine whether the number of cubes in each term represents an arithmetic or a geometric sequence. Explain your reasoning.
- Determine an explicit formula and a recursive formula for the sequence.
- Use both the explicit formula and the recursive formula to calculate the 4th term in the sequence.
- Which formula would you use to determine the 9th term in the sequence? Explain your reasoning. Determine the 9th term of the sequence.



## NOT in your book

2. Several students collect a donation of 20 cans during the 1st day of their 10-day canned food drive. Their goal is to collect twice as many cans as they did the previous day for the remaining days of the food drive. Write an explicit formula to represent this situation and use the formula to calculate the amount of cans the students will collect on the final day of the drive if they meet their daily goals.
3. Kevin is trying to choose between two new pressure washers. He wants the one that will build the highest pressure 20 seconds after it is started. The Super Wash pressure washer has a pressure of 50 psi (pounds per square inch) 1 second after it is started and continues to increase in pressure at a rate of 80 psi per second. The Power Wash pressure washer has a pressure of 50 psi 1 second after it is started and the pressure continues to increase by 20% every second. For each washer, write an explicit formula to represent the amount of pressure in the washer  $n$  seconds after it is started. Use the formulas to help Kevin determine which pressure washer he should choose.
4. A weld breaks on a gas tank that initially contains 1000 gallons of gasoline. The gas leaks at a rate of 12.7 gallons per minute. Write an explicit formula to represent this situation and use the formula to calculate the amount of gas in the tank 1 hour after the weld breaks.

Homework  
Finish Lesson 8.1