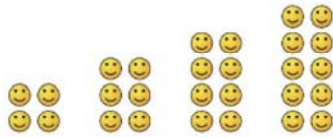


Homework!

- (1) Write a sequence that represents the number of smiley faces in each group. Is the sequence arithmetic? Explain.



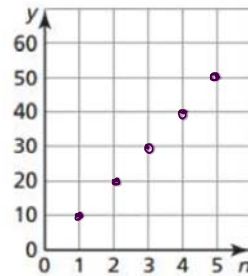
4, 6, 8, 10

Yes, it has a common diff. of 2.

- (2) Use the figure to complete the table and plot the points.



Number of stars, n	1	2	3	4	5
Number of sides, y	10	20	30	40	50



Write an equation that models the pattern displayed by the figure.

$$a_n = 10 + 10(n-1)$$

- (3) A carnival charges \$2 for each game after you pay a \$5 entry fee.

$a_1 = 7$
 $d = 2$

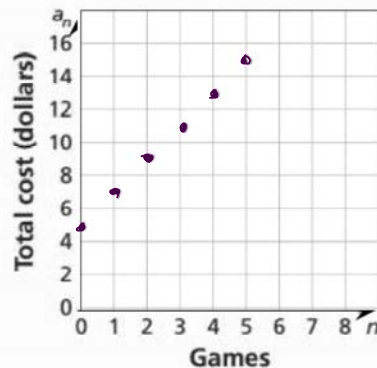
- (a) Write a function rule that represents the situation.

explicit formula
 $a_n = 7 + 2(n-1)$

common diff \Rightarrow SLOPE

- (b) Graph the function.

Games	\$ cost
0	5
1	7
2	9
3	11
4	13



- (c) How many games can you play when you take \$29 to the carnival?

5	15
6	17
7	19
8	21
9	23
10	25
11	27

12 games \rightarrow \$29
12 games

$$a_n = 7 + 2(n-1)$$

$$29 = 7 + 2n - 2$$

$$29 = 5 + 2n$$

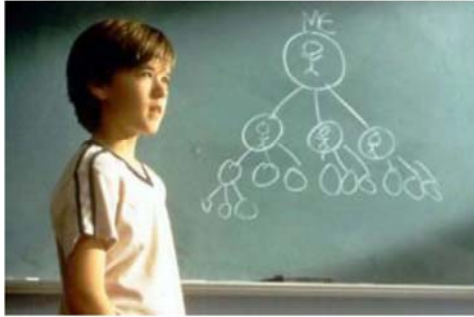
$$\begin{array}{r} -5 \\ -5 \\ \hline 24 = 2n \\ \frac{24}{2} = \frac{2n}{2} \\ n = 12 \checkmark \end{array}$$

Name: _____

Date: _____

Geometric Sequences: Day 1

Do Now: In the movie "Pay it Forward" the main character, a young boy, determines that he can make a significant difference in the world by creating a chain of events. During the movie he helps three people, who each help three people and so on.



(a) How many people's lives would be affected in the 6th round of this pattern?

1, 3, 9, 27, 81, 243

(b) Identify the pattern in this sequence of numbers.

Multiplying by 3

→ diff. from Arithmetic

→ or dividing

What is a Geometric Sequence?

If a sequence of values follows a pattern of multiplying a fixed amount (not zero) to arrive at the next term, it is referred to as a geometric sequence. In a geometric sequence, the ratio of successive terms is called the common ratio (r).

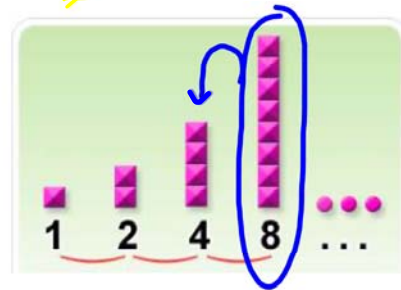
To find the common ratio: Divide any term by the previous term.

$8 \div 4 = 2$

➤ The common ratio in this example is 2.

To find the next term: Multiply the previous term by the common ratio.

➤ The next term in this example is 16.



Let's take a look at some sequences...is there a common ratio? If so, find the next term in the sequence.

(1) 1, -2, 4, -8, ...

$-8 \div 4 = -2$
 $4 \div -2 = -2$
 $-2 \div 1 = -2$
 Yes
-2

(2) 3, 6, 10, 15, ...

$15 \div 10 = 1.5$
 $10 \div 6 = 1.6$
 $6 \div 3 = 2$
 No.

(3) 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, ...

$\frac{1}{8} \div \frac{1}{4} = \frac{1}{2}$
 $\frac{1}{4} \div \frac{1}{2} = \frac{1}{2}$
 $\frac{1}{2} \div 1 = \frac{1}{2}$

$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$
 $\frac{1}{4} \cdot \frac{1}{2} = \frac{1}{8}$

Yes
 $\frac{1}{2}$

→ explicit formula

Writing Geometric Sequences as Functions

You can use the first term and the common ratio to write a function rule that describes a geometric sequence. Assume the first term is 4 and the common ratio is 3.

$a_1 = 4$ $r = 3$

4, 12, 36

Term # n	Term a_n	Written in terms of a_1 and r	Term
1	a_1	a_1	4
2	a_2	$a_1 \cdot r$	$4 \cdot 3 = 12$
3	a_3	$a_1 \cdot r \cdot r \rightarrow a_1 \cdot r^2$	$4(3)^2 = 36$
4	a_4	$a_1 \cdot r \cdot r \cdot r \rightarrow a_1 \cdot r^3$	$4(3)^3 = 108$
n	a_n		

mystery value (any value)

The Explicit Formula to find the n th term of a geometric sequence:

Subscript Notation $a_n = a_1 \cdot r^{n-1}$

Function Notation $a(n) = a(1) \cdot r^{n-1}$

(4) Given the following geometric sequence: 1, 4, 16, 64, ... $64 \div 16 = 4$

a) Define the sequence explicitly.

$a_1 = 1$ $r = 4$

$a_n = a_1 \cdot r^{n-1}$

$a_n = 1 \cdot 4$

b) Find the 11th term. $n =$ _____

$a_{11} = 1 \cdot 4^{11-1}$

$a_{11} = 1 \cdot 4^{10}$

$a_{11} = 1 \cdot 1,048,576$
 $a_{11} = 1,048,576$

(5) Given the following geometric sequence: 128, 32, 8, 2, 0.5, ...

- a) Write an equation to find the n th term. b) Find the 8th term. $n =$ _____

$a_1 =$ _____ $r =$ _____

(6) Given the following geometric sequence:

n	1	2	3	4
a_n	$\frac{2}{3}$	-2	6	-18

- a) Write an equation to find the n th term. b) Find the 7th term.

Conclusion!

- The ratio of successive terms in a geometric sequence is called the _____.
- The explicit formula for a geometric sequence allows you to find the n th term of the sequence by substituting the values of _____ (first term) and _____ (common ratio) in the equation $a_n =$ _____.

Homework!

1. Find the common ratio of each of the following geometric sequences.

a) 2, 6, 18, 54, ...

b) 135, 45, 15, 5, ...

c) 7, -14, 28, -56, ...

2. (a) Write an equation for the n th term of the geometric sequence.

(b) Using the equation, find a_6 .

a) 3, 6, 12, 24, ...

b) 0.375, 3, 24, 192, ...

c)

n	1	2	3	4
a_n	-1024	128	-16	2