Bell Ringer

Section 5.6

1. What is the common ratio for the sequence 2, -18, 162, -1458, ...?

2. Determine whether each sequence is geometric or arithmetic.

   a. 3, 12, 48, 192, ...
   b. 4, 8, 12, 16, ...

3. Use the sequence 7, 28, 112, 448, ...
   a. Write a recursive formula for the sequence and use it to find the next term of the sequence.

   b. Write an explicit formula for the sequence and use it to find the 10^{th} term in the sequence.

4. Write a function for the sequence 4, 32, 256, 2048, ...

Solutions

Section 5.6

1. What is the common ratio for the sequence 2, -18, 162, -1458, ...? r = -9

2. Determine whether each sequence is geometric or arithmetic.

   a. 3, 12, 48, 192, ... Geometric $r = 4$
   b. 4, 8, 12, 16, ... Arithmetic $d = 4$

3. Use the sequence 7, 28, 112, 448, $\times 4 = 1,792$
   a. Write a recursive formula for the sequence and use it to find the next term of the sequence. $a(n) = a(n-1) \cdot 4, a(1) = 7$ next term: 1792 $a_1 = 7, a_n = a_{n-1}(4)$
   b. Write an explicit formula for the sequence and use it to find the 10th term in the sequence. $a_n = 7(4)^{n-1}$

$A(n) = 7 \cdot 4^{n-1}$ $A(10) = 1,835,008$ $a_{10} = 7(4)^9$

4. Write a function for the sequence 4, 32, 256, 2048, ... $y = 4 \cdot 8^{x-1}$

$a_1 = 4$
$r = 8$
$a_n = 4(8)^{n-1}$
$y = 4(8)^{x-1}$

correct Exponential Equations ws

Math 1 Honors Name_____

Exponential Equations

Date_____ Hour____

Solve each equation.

1) $4^{-3n} = 16$

2) $3^{-n} = 3^{3}$

3) $3^{3b-2} = 3^{-b-1}$

4) $4^{b-3} = 4^{2b}$

5) $5^{2x+3} = 5^{-2x-1}$

6) $6^{-n} = 36$

7) $4^{2n} = 64$

8) $5^{-b} = 25$

9) $4^{-3n+2} = 4^{-n-3}$

10) $3^{-3x-2} = 3^{-2x}$

11) $6^{-3x-3} = 6^{2x}$

12) $4^{-3x-3} = 4^{2x}$

13) $3^{-3n} = 81$

14) $2^{-3r} = 2^{-r}$

15) $4^{-2x-2} = 16$

16) $6^{2n} = 6^{-n-1}$

Answers to Exponential Equations

1) $\left\{-\frac{2}{3}\right\}$ 2) $\{-3\}$ 3) $\left\{\frac{1}{4}\right\}$ 4) $\{-3\}$

5) $\{-1\}$ 6) $\{-2\}$ 7) $\left\{\frac{3}{2}\right\}$ 8) $\{-2\}$

9) $\left\{\frac{5}{2}\right\}$ 10) $\{-2\}$ 11) $\left\{-\frac{3}{5}\right\}$ 12) $\left\{-\frac{3}{5}\right\}$

13) $\left\{-\frac{4}{3}\right\}$ 14) $\{0\}$ 15) $\{-2\}$ 16) $\left\{-\frac{1}{3}\right\}$

Review from yesterday

Geometric Sequences

Write the recursive and explicit formulas for the sequence

R: $a_1 = a$, $a_n = a_{n-1} \cdot r$ E: $a_n = a_1 \cdot r^{n-1}$

2, 8, 32, 128, ...

$a_1 = 2$,
$a_n = a_{n-1}(4)$

$a_n = 2(4)^{n-1}$

Geometric Sequences

Write the recursive and explicit formulas for the sequence

R: $a_1 = a,\ a_n = a_{n-1} \cdot r$ E: $a_n = a_1 \cdot r^{n-1}$

-405, -135, -45, -15

a_1 ... $\times \frac{1}{3}$ $\times \frac{1}{3}$

$a_1 = -405,$

$a_n = a_{n-1}\left(\frac{1}{3}\right)$

$a_n = -405\left(\frac{1}{3}\right)^{n-1}$

Given the recursive form, write the first 4 terms of the geometric sequence

$$a_1 = 4, \quad a_n = a_{n-1} \cdot 3$$

4, 12, 36, 108

Given the explicit form, write the first four terms of the geometric sequence.

$$a_n = -486 \cdot \left(\frac{1}{3}\right)^{n-1}$$

a. r

$-486, -162, -54, -18$

$\times \frac{1}{3}$ $\times \frac{1}{3}$ $\times \frac{1}{3}$

Given the explicit form, find the seventh term of the sequence

$$a_n = -486 \cdot \left(\frac{1}{3}\right)^{n-1}$$

$a_7 = -\frac{2}{3}$

$-486\left(\frac{1}{3}\right)^6$

Activity...

How long until the zombies take over?

On the TV show The Walking Dead, a disease was contracted that turns people into zombies (or Walkers). If the Walkers bite a human, the human is turned in to a Walker. Assume that the each Walker turns one person a week into a zombie and that none of the Walkers are killed.

1. The diagram below represents a town with 150 people. Each box represents a human; each filled in box represents a Walker. Keep track of the Walker and human populations over time.

Weeks	1	2	3	4	5	6	7	8	9	10	11
■ Walkers	1	2	4	8	16	32	64	128	150		
□ Humans	149	148	146	142	134	118	86	22	0		

a. How does the Walker population change each week, and how long will it take before everyone in town is a Walker?

doubles, 9 weeks

b. List the number of Walkers as a sequence for the first 5 weeks.

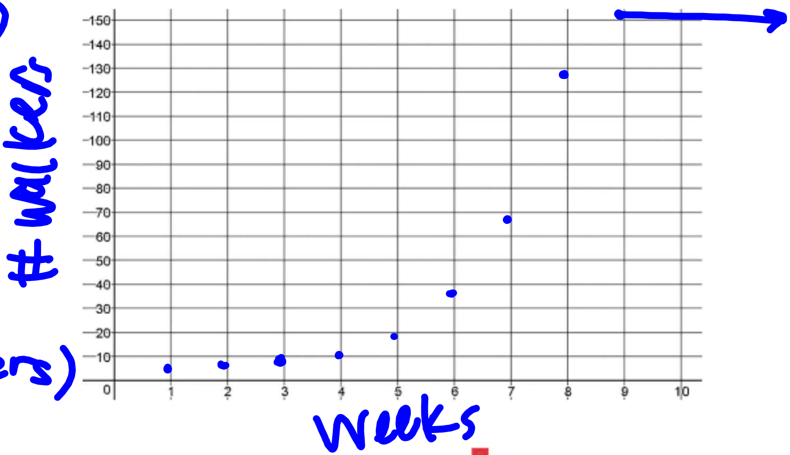
→ 1, 2, 4, 8, 16, ...

c. Write a **recursive and explicit** formula for the sequence.

R: $a_1 = 1,\ a_n = a_{n-1}(2)$

E: $a_n = 1(2)^{n-1}$

d. Graph the sequence.



e. What *x* values are used?

1-9 (wks)

f. What *y* values are used?

1-150 (walkers)

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2. A different town of 150 people started with 3 Walkers. Complete the table below.

Weeks	1	2	3	4	5	6	7	8	9	10	11
■ Walkers	3	6	12	24	48	96	150				
□ Humans	147	144	138	126	102	54	0				

a. How long will it take for everyone in that town to become a Walker?

7 weeks

b. List the number of Walkers as a sequence for the first 5 weeks.

3, 6, 12, 24, 48

c. Write a **recursive and explicit** formula for the sequence.

R: $a_1 = 3,\ a_n = a_{n-1}(2)$

E: $a_n = 3(2)^{n-1}$

3. Imagine there is an infinite number of people who can be infected by the Walkers.

a. Create a sequence showing how many people are infected if there are 4 Walkers to start at week 0. Show weeks 0 to 5.

0 1 2 3 4 5

4, 8, 16, 32, 64, 128

$y = a \cdot b^x$

$y = 4 \cdot 8$

b. Write a recursive formula for the sequence.

$a_1 = 8 \quad a_n = a_{n-1}(2)$ $\quad a_0 = 4,\ a_n = a_{n-1}(2)$

c. How many Walkers will there be in…

$a_n = 8(2)^{n-1}$

Week 8?

1,024

$8(2)^7$

Week 13?

32768

$8(2)^{12}$

Week 24?

67,108,864

$8(2)^{23}$

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due Monday

Name _____ Date _____ Hour _____ Score

Geometric Sequences – Recursive and Explicit Formulas

Fill in the blanks so the values fit the geometric sequence. Write the explicit and the recursive formula.

1)

n	a_n
1	2
2	4
3	8
4	16
5	32

R: $a_1 = 2, a_n = a_{n-1}(2)$
E: $a_n = 2(2)^{n-1}$

2)

1	1
2	3
3	9
4	27
5	

3)

1	-5
2	-25
3	-125
4	-625
5	

4)

1	2
2	6
3	18
4	54
5	

5)

1	16
2	8
3	4
4	2
5	

6)

1	-36
2	-6
3	-1
4	-1/6
5	

$\times \frac{1}{6}$

7)

1	-2
2	-4
3	-8
4	-16
5	

8)

1	48
2	24
3	12
4	6
5	

9)

1	
2	5
3	15
4	45
5	

10)

1	
2	4
3	16
4	64
5	

11)

1	
2	6,561
3	2,187
4	729
5	

12)

1	-2
2	-8
3	-32
4	-128
5	

$\times 4$
$\times 4$

13) Tearing: Begin with 1 piece of paper at stage 1. For stage 2, tear it in half. For each succeeding stage tear each piece of paper in half. Keep track of the total pieces of paper.

Sequence Rule: 10^{th} number

_____ _____

Stage (n)	total pieces (a_n)
1	1
2	2

Describe the pattern_____ equation: a_n =_____

Describe what the graph would look like _____

14) Gossip: One student tells three other students a secret. Those three students plus the original student each tell three more students. At each stage, all those who know the secret tell three more people. Keep track of the total people who know the secret.

Sequence Rule: 10^{th} number

_____ _____

1 4 ____ ____ ____

stage (n)	total (a_n)
1	1
2	4

Describe the pattern_____