

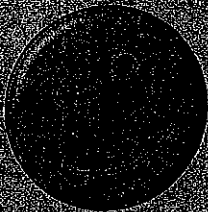
Pacing Guide
Unit 5 Series and Sequences

Day	Topic	Assignment
1	Arithmetic Sequences and Series	TOC pg 48-49 notes Arithmetic Sequence and Series Alg 2 Id 1
2		Arithmetic Series Alg 2id 1 Sequences and Series finding nth term
3	Geometric Sequences and Series	TOC pg 50-51 Geometric Sequences and Series Geometric Sequences Alg 2 Id 1
4		Geometric Series Finding the nth term of a geometric sequence First 3 terms of a sequence Finding terms of a geometric sequence
5	Review/Test	

Due April 3rd

One test on Schoology
one quiz on schoology

Arithmetic and Geometric Sequences and Series Chart

	Arithmetic	Geometric	Extra Info
Need to Know	"d" common difference	"r" common ratio	Sequence – a pattern Series – the sum of terms in the pattern
nth term explicit	$a_n = a_1 + (n - 1)d$	$a_n = a_1 r^{n-1}$	a_1 = first term
recursive	$a_n = a_{n-1} + d$	$a_n = a_{n-1} r$	a_n = nth term
Sum (finite or partial)	$S_n = \frac{n}{2} (a_1 + a_n)$ or $S_n = \frac{n}{2} (2a_1 + (n - 1)d)$	$S_n = \frac{a_1(1-r^n)}{1-r}$	S_{12} sum of first 12 terms S_n sum of first n terms
Sum (infinite)		$S = \frac{a_1}{1-r}$	\sum this means sum

Arithmetic Sequences and Series

Sequence- a pattern of #'s

Series- sum of a sequence

$a_n = \underline{n^{\text{th}} \text{ term}}$ $a_1 = \underline{1^{\text{st}} \text{ term}}$ $n = \underline{\text{term \#}}$ $d = \underline{\text{common difference}}$

A sequence or series is arithmetic if *repeated addition*

Explicit: A formula for any term, depending on the term number

Formula for finding the **nth term**- $a_n = a_1 + (n - 1)d$

Recursive: A formula for the next term, depending on the previous term

Formula for finding the **nth term**- $a_n = a_{n-1} + d$

Formula for **sum of series**- $S_n = \frac{n}{2}(a_1 + a_n)$

FINDING THE NEXT TERM

Find the next four terms of the arithmetic sequence -8, -6, -4, .. -2, 0, 2

Ex 1: Given the sequence 5, 10, 15... Find the explicit and recursive formulas and the 18 term.

$a_1 = 5$ $d = 5$ $n = 18$

Explicit $a_n = 5 + (n-1)5$

Recursive $a_n = a_{n-1} + 5$

Find the sum of the first 18 terms of this series.

$a_{18} = 5 + (18-1)5$ $a_{18} = 90$

EX. Given a term of an arithmetic sequence and the common difference, the explicit and recursive formulas and the 18th term.

$a_{10} = 15; d = -2$

$a_{10} = a_1 + (10-1)(-2)$ $a_{10} = a_1 + (9)(-2)$

$15 = a_1 + \frac{-18}{+18}$ $33 = a_1$

Exp $a_n = 33 + (n-1)(-2)$

Rec $a_n = a_{n-1} - 2$

$a_{18} = 33 + (18-1)(-2)$

$a_{18} = -1$

$\sum_{n=1}^3 2n + 4$ means sum of terms from 1 to 3 using the formula $2n+4$. List the

three terms $a_1 = 2(1) + 4 = 6$ $S_3 = \frac{3}{2}(6 + 10)$

$a_2 = 2(2) + 4 = 8$ $\frac{3}{2} \cdot 16$

$a_3 = 2(3) + 4 = 10$ $S_3 = 24$

← same

Arithmetic Sequences and Series

Determine if the sequence is arithmetic. If it is, find the common difference, the 52nd term, and the explicit formula.

1) 20, 13, 6, -1, ...

2) -32, -42, -52, -62, ...

3) 3, 103, 203, 303, ...

4) 6, -4, -14, -24, ...

5) -32, -38, -44, -50, ...

Given the explicit formula for an arithmetic sequence find the common difference and the 52nd term.

6) $a_n = -58 + 30n$

7) $a_n = 23 + 6n$

8) $a_n = -46 + 8n$

9) $a_n = 47 - 9n$

10) $a_n = 21 - 8n$

Given the recursive formula for an arithmetic sequence find the common difference and the 52nd term.

11) $a_n = a_{n-1} + 20$
 $a_1 = -37$

12) $a_n = a_{n-1} - 20$
 $a_1 = -21$

13) $a_n = a_{n-1} - 100$
 $a_1 = -21$

14) $a_n = a_{n-1} + 4$
 $a_1 = 40$

Even

$$15) a_n = a_{n-1} + 3$$

$$a_1 = -10$$

Even

Given the first term and the common difference of an arithmetic sequence find the 52nd term.

$$16) a_1 = -40, d = 200$$

$$17) a_1 = 8, d = -30$$

$$18) a_1 = -5, d = -2$$

$$19) a_1 = 18, d = 8$$

$$20) a_1 = -23, d = 5$$

Given the second term and the common difference of an arithmetic sequence find the 52nd term.

$$21) a_2 = 34, d = 6$$

$$22) a_2 = 6, d = 20$$

$$23) a_2 = -98, d = -100$$

$$24) a_2 = 12, d = -8$$

$$25) a_2 = -9, d = -5$$

Given a term in an arithmetic sequence and the common difference find the 52nd term.

$$26) a_{21} = -380, d = -20$$

$$27) a_{20} = 119, d = 8$$

$$28) a_{27} = -222, d = -9$$

$$29) a_{22} = -106, d = -4$$

$$30) a_{23} = -409, d = -20$$

Arithmetic Series

Name _____ ID: 1

Date _____ Period _____

even

Evaluate the related series of each sequence.

1) 17, 27, 37, 47, 57, 67, 77

2) -11, -13, -15, -17, -19, -21, -23

3) 25, 35, 45, 55, 65, 75

4) 21, 29, 37, 45, 53, 61, 69

5) 1, 6, 11, 16, 21, 26, 31

~~Evaluate each arithmetic series described.~~

6) $\sum_{m=1}^8 (2m + 3)$

7) $\sum_{k=1}^5 (2k + 4)$

8) $\sum_{k=1}^{30} (2k - 3)$

9) $\sum_{n=1}^8 -9n$

10) $\sum_{n=1}^{10} (9n - 7)$

11) $a_1 = 11, a_n = 81, n = 15$

$$12) a_1 = 8, a_n = 96, n = 12$$

$$13) a_1 = -8, a_n = -36, n = 15$$

even

$$14) a_1 = -29, a_n = -64, n = 8$$

$$15) a_1 = 17, a_n = 115, n = 15$$

$$16) a_1 = -14, d = -6, n = 20$$

$$17) a_1 = -14, d = -7, n = 45$$

$$18) a_1 = -3, d = -2, n = 14$$

$$19) a_1 = -25, d = -4, n = 6$$

$$20) a_1 = 44, d = 9, n = 12$$

$$21) 8 + 16 + 24 + 32 \dots, n = 12$$

$$22) 13 + 20 + 27 + 34 \dots, n = 20$$

$$23) 8 + 10 + 12 + 14 \dots, n = 7$$

$$24) 44 + 54 + 64 + 74 \dots, n = 8$$

$$25) 10 + 15 + 20 + 25 \dots, n = 12$$

all

Sequences and Series - Finding the Nth Term of Arithmetic Sequence

You will be given the common difference and the first term. You will be asked to find an arbitrary term in that sequence. Match the problem number with the word associated with the solution to find an obvious saying.

1. $a_1 = -32, d = -9, a_{39} =$ _____

-399 = American

-387 = and

2. $a_1 = 31, d = -8, a_{38} =$ _____

-380 = dogs

-374 = four

3. $a_1 = 20, d = -10, a_{25} =$ _____

-265 = five

-240 = make

4. $a_1 = 9, d = 9, a_{30} =$ _____

-220 = of

-192 = out of

5. $a_1 = 19, d = 10, a_{27} =$ _____

-154 = owns

-119 = people

6. $a_1 = 16, d = 5, a_{36} =$ _____

191 = percent

198 = population

7. $a_1 = -32, d = -3, a_{30} =$ _____

270 = seventy

279 = the

8. $a_1 = 33, d = 17, a_{16} =$ _____

281 = thirty

288 = three

9. $a_1 = 28, d = 9, a_{35} =$ _____

321 = town

334 = up

10. $a_1 = 32, d = -8, a_{29} =$ _____

411 = under

419 = zebras

11. $a_1 = 38, d = 8, a_{21} =$ _____

12. $a_1 = 39, d = -9, a_{32} =$ _____

8

10

1

7

12

9

4

2

6

3

5

11

Geometric Sequences and Series

A sequence is geometric if each term is found after the first by Multiplication
 The previous term by a constant r called the Common Ratio

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

Geometric Recursive Formula $a_n = a_{n-1} \cdot r$

Geometric Series Sum $S_n = \frac{a_1(1-r^n)}{1-r}$

1. Given the sequence 3, 9, 27, ... find the 15th term, recursive and explicit formula.

$\frac{9}{3} = 3$ $E: a_n = 3 \cdot 3^{n-1}$ $a_{15} = 3 \cdot 3^{15-1} = 14348907$
 $a_1 = 3$ $r = 3$ $R: a_n = a_{n-1} \cdot 3$

2. Given the sequence 4, -12, 36, -108, ... find the 15th term, recursive and explicit formula.

$a_1 = 4$ $E: a_n = 4 \cdot (-3)^{n-1}$ $a_{15} = 4 \cdot (-3)^{15-1} = 19131876$
 $r = \frac{-12}{4} = \frac{36}{-12} = -3$ $R: a_n = a_{n-1} \cdot -3$

3. Find the first 4 terms of the sequence and the 10th term if $a_1 = 8$ and $r = -2$.

$a_1 = 8$ $a_n = 8(-2)^{n-1} = -4096$
 $a_2 = 8 \cdot -2 = -16$
 $a_3 = 8 \cdot (-2)^2 = 32$
 $a_4 = 8 \cdot (-2)^3 = -64$

4. Given 100 + 50 + 25, ... Want would be the sum of the first 10 terms.

$a_1 = 100$ $r = \frac{1}{2}$ $S_n = \frac{100(1 - .5^{10})}{1 - .5} = \frac{99.9023}{.5} \approx 199.805$

5. If $a_1 = 4$ and $a_5 = 324$ find S_8 .

$a_5 = a_1 \cdot r^4$ $\frac{324}{4} = \frac{4 \cdot r^4}{4}$ $81 = r^4$ $r = 3$ $S_8 = \frac{4(1-3^8)}{1-3} = \frac{-26240}{-2} = 13120$

6. Evaluate $\sum_{n=1}^4 2 \cdot 3^{n-1}$
 $a_1 = 2$
 $r = 3$

$S_4 = \frac{2(1-3^4)}{1-3} = \frac{-160}{-2} = 80$

Geometric Sequences

Date _____ Period _____

Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.

1) $-6, -10, -14, -18, \dots$

2) $-2, -12, -72, -432, \dots$

3) $-3, 9, -27, 81, \dots$

4) $-4, -16, -64, -256, \dots$

5) $2, 12, 72, 432, \dots$

Given the explicit formula for a geometric sequence find the common ratio and the 8th term.

6) $a_n = 3^{n-1}$

7) $a_n = 3 \cdot 6^{n-1}$

8) $a_n = -4 \cdot 4^{n-1}$

9) $a_n = 4 \cdot 2^{n-1}$

10) $a_n = 4 \cdot (-5)^{n-1}$

Given the recursive formula for a geometric sequence find the common ratio and the 8th term.

11) $a_n = a_{n-1} \cdot -3$
 $a_1 = -3$

12) $a_n = a_{n-1} \cdot 2$
 $a_1 = -3$

13) $a_n = a_{n-1} \cdot 5$
 $a_1 = -3$

14) $a_n = a_{n-1} \cdot -2$
 $a_1 = -4$

15) $a_n = a_{n-1} \cdot 3$
 $a_1 = 1$

16) $a_5 = -64$ and $a_2 = -8$

17) $a_2 = -12$ and $a_5 = -2592$

18) $a_6 = -3072$ and $a_1 = 3$

19) $a_3 = -64$ and $a_6 = -4096$

20) $a_1 = 1$ and $a_6 = 7776$

Given the first term and the common ratio of a geometric sequence find the 8th term.

21) $a_1 = 3, r = -2$

22) $a_1 = -2, r = -3$

23) $a_1 = -1, r = 3$

24) $a_1 = -1, r = 6$

25) $a_1 = -1, r = -5$

Given the second term and the common ratio of a geometric sequence find the 8th term.

26) $a_2 = -6, r = 2$

27) $a_2 = 8, r = 2$

28) $a_2 = -18, r = 6$

29) $a_2 = 10, r = 5$

30) $a_2 = 10, r = -5$

31) $a_2 = 5, r = 5$

32) $a_2 = -6, r = -6$

33) $a_2 = 6, r = 6$

34) $a_2 = -12, r = 6$

35) $a_2 = -10, r = -5$

Geometric Series

Date _____ Period _____

Evaluate the related series of each sequence.

1) 2, -8, 32, -128, 512

2) 1, -3, 9, -27

Even

3) 2, -10, 50, -250, 1250

4) 1, -6, 36, -216, 1296

5) 4, 24, 144, 864, 5184

Evaluate each geometric series described.

6) $\sum_{m=1}^{10} 4^{m-1}$

7) $\sum_{m=1}^{10} 3 \cdot 2^{m-1}$

8) $\sum_{k=1}^{10} 3^{k-1}$

9) $\sum_{i=1}^7 5^{i-1}$

10) $\sum_{k=1}^7 (-2)^{k-1}$

11) $a_1 = 1, a_n = -2187, r = -3$

12) $a_1 = -1, a_n = -64, r = 2$

13) $a_1 = -2, a_n = -31250, r = 5$

$$16) a_1 = -3, a_9 = -768, r = 2$$

$$17) a_1 = 1, a_9 = 6561, r = 3$$

$$18) a_1 = -3, a_7 = -192, r = 2$$

$$19) a_1 = 3, a_{10} = 59049, r = 3$$

$$20) a_1 = 2, a_7 = 1458, r = -3$$

$$21) a_1 = 2, r = -2, n = 7$$

$$22) a_1 = -4, r = 3, n = 7$$

$$23) a_1 = -4, r = 4, n = 8$$

$$24) a_1 = -3, r = 2, n = 7$$

$$25) a_1 = 1, r = 2, n = 7$$

$$26) 2 + 4 + 8 + 16 \dots, n = 6$$

$$27) 3 + 15 + 75 + 375 \dots, n = 6$$

$$28) 2 + 6 + 18 + 54 \dots, n = 6$$

$$29) 1 - 2 + 4 - 8 \dots, n = 8$$

$$30) 2 + 6 + 18 + 54 \dots, n = 9$$

all

Sequences and Series - Finding Terms of a Geometric Sequence

Color in a square that contains each solution to find which side of the dog has the most hair.

Find the next four terms in the geometric sequence.

- 1. -9375, 1875, -375, 75, ...
- 2. -4, -8, -16, -32, ...
- 3. $\frac{3}{2}, -3, 6, -12, \dots$
- 4. 1280, 320, 80, 20, ...
- 5. 0.5, 1, 2, 4, ...
- 6. -16, 4, -1, $\frac{1}{4}, \dots$
- 7. $-\frac{6250}{243}, \frac{1250}{81}, -\frac{250}{27}, \frac{50}{9}, \dots$
- 8. -0.008, 0.04, -0.2, 1, ...
- 9. -500, -100, -20, -4, ...
- 10. $\frac{2}{3}, -1, -3, -9, \dots$
- 11. -3888, 648, -108, 18, ...
- 12. $\frac{32}{3}, \frac{1}{10}, \frac{1}{8}, \frac{1}{4}, \dots$

Find the first three terms in each explicit formula.

- 13. $a_n = -4(5)^{n-1}$
- 14. $a_n = 12(4)^{n-1}$
- 15. $a_n = \frac{1}{10}(-4)^{n-1}$
- 16. $a_n = \frac{2}{5}(4)^{n-1}$
- 17. $a_n = 13(\frac{1}{5})^{n-1}$
- 18. $a_n = \frac{1}{100}(-100)^{n-1}$

$\frac{1}{1024}$	-27	$\frac{4}{125}$	-100	9	32	$\frac{1}{16}$	$\frac{4}{25}$	16	$\frac{1}{5}$	$-\frac{90}{11}$	-1	625	$\frac{13}{36}$	4	-6	$\frac{1}{256}$	-40	$\frac{1}{64}$
$\frac{3}{25}$	19	$\frac{1}{12}$	-256	0	-64	$\frac{4}{25}$	1	99	25	-8	$\frac{2}{11}$	727	-5	6	$\frac{5}{4}$	48	-17	-41
-243	31	$\frac{18}{25}$	-512	$\frac{1}{11}$	-48	$\frac{3}{8}$	$\frac{1}{10}$	28	5	$-\frac{3}{5}$	-4	-128	-2	$\frac{11}{2}$	$\frac{8}{5}$	96	$\frac{5}{16}$	-20
$\frac{5}{64}$	$\frac{1}{215}$	-3	-729	7	24	$\frac{8}{9}$	2	11	$\frac{5}{8}$	23	8	192	12	$\frac{21}{21}$	$-\frac{5}{2}$	$\frac{1}{72}$	51	85
100	$-\frac{1}{2}$	$\frac{4}{5}$	-125	$\frac{1}{2}$	-15	$\frac{1}{6}$	$\frac{4}{125}$	37	3	-81	$\frac{1}{100}$	-192	-10	$\frac{13}{9}$	-7	13	$-\frac{6}{5}$	64

Sequences and Series - First Three Terms in a Sequence

all

An easy way to remember the Great Lakes is the mnemonic HOMES (Huron, Ontario, Michigan, Erie, and Superior). But, do you know the mnemonic to memorize the Great Lakes in order from largest to smallest? Find the first three terms of these sequences. Match the letter below each number in each sequence at the bottom of the page. (There will be solutions which are not used.)

1. $a_n = 6.3 + 0.7n$ / /
A E I

2. $a_n = -5\left(\frac{1}{3}\right)^n$ / /
M U N

3. $a_n = (-1) \cdot 2^n$ / /
R G O

4. $a_n = 1 - \frac{1}{2}n$ / /
S H E

5. $a_n = \frac{3}{2} + \frac{3}{2}n$ / /
P T A

6. $a_n = -12(0.5)^{n-1}$ / /
E S N

7. $a_n = \frac{6 \cdot (-1)^n}{3n+1}$ / /
A O S

8. $a_n = \frac{-12}{n} + 5$ / /
E T R

- $\frac{16}{5}$ $\frac{1}{9}$ 3 -12 1 $\frac{3}{2}$ $\frac{5}{3}$ $\frac{3}{2}$ $\frac{5}{27}$ 2 0 7 -1 7.7
- 6 $\frac{13}{2}$ $-\frac{1}{2}$ 6 $\frac{9}{2}$ 8.4 -3 4 $\frac{6}{5}$ $\frac{6}{7}$ -2 -7 -8 $\frac{1}{2}$