# Algebra II Sequence and Series Review

**Determine whether each sequence is *arithmetic* or *geometric*. Then identify the common difference or the common ratio.**

1) 3, 18, 33, 48, …

Arithmetic
$d = 15$

2) $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$

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

3) 7, 10, 13, 16, …

Arithmetic
$d = 3$

4) 3, 3.6, 4.32, 5.184, …

Geometric
$r = 1.2$

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**Determine whether each sequence is *arithmetic or geometric*. Then find the ninth term.**

5) 23, 27, 31, 35, 39, ….

Arithmetic
$a_9 = 23 + (9-1)(4)$
$a_9 = 55$

6) -12, -5, 2, 9, 16, …

Arithmetic
$a_9 = -12 + (9-1)(7)$
$a_9 = 44$

7) -5, 15, -45, 135, -405, …

Geometric
$a_9 = -5(-3)^{9-1}$
$a_9 = -32805$

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**Generate the first four terms of each sequence; r is a common ratio, and d is a common difference.**

8) $a_1 = 2, r = -2$

2, -4, 8, -16

9) $a_1 = 3, d = 7$

3, 10, 17, 24

10) $a_1 = -100, r = \frac{1}{5}$

$-100, -20, -4, -\frac{4}{5}$

11) $a_1 = 19, d = -4$

19, 15, 11, 7

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12) Use the sequence to answer the following questions: 4.5, 3.3, 2.1, …

A. $a_6 = 4.5 + (6-1)(-1.2)$
$a_6 = -1.5$

B. Recursive form:
$a_1 = 4.5$
$a_n = a_{n-1} - 1.2$

C. Explicit/Closed Formula:
$a_n = 4.5 + (n-1)(-1.2)$
$a_n = -1.2n + 5.7$

D. $a_{40} = 4.5 + (40-1)(-1.2)$
$a_{40} = -42.3$

13) Use the sequence to answer the following questions: 8, 12, 16, …

A. $a_7 = 8 + (7-1)(4)$
$a_7 = 32$

B. Recursive Form:
$a_1 = 8$
$a_n = a_{n-1} + 4$

C. Explicit/ Closed Form:
$a_n = 8 + (n-1)(4)$
$a_n = 4n + 4$

D. $a_{72} = 4(72) + 4$
$a_{72} = 292$

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**Find the next three terms in each geometric sequence.**

14) -5, 15, -45, 135, -405, 1215, -3645, 10935

$r = -3$

15) 216, -36, 6, -1, $\frac{1}{6}$, $-\frac{1}{36}$, $\frac{1}{216}$

$r = -\frac{1}{6}$

**Tell whether the sequence is geometric. If yes, write the explicit and recursive formula.**

16) 100, 50, 25, $\frac{25}{2}$, $\frac{25}{4}$, ... yes

E: $a_n = 100\left(\frac{1}{2}\right)^{n-1}$

R: $a_1 = 100$, $a_n = a_{n-1} \cdot \left(\frac{1}{2}\right)$

17) 1, 3, 5, 7, ... NO

18) -6, -2, $-\frac{2}{3}$, $-\frac{2}{9}$, ... yes

E: $a_n = -6\left(\frac{1}{3}\right)^{n-1}$

R: $a_1 = -6$, $a_n = a_{n-1} \cdot \left(\frac{1}{3}\right)$

**Find the missing term.**

19) If $a_n = \frac{1}{5} a_{n-1}$ and $a_1 = -100$, what is $a_6$?

↑ r

$a_6 = -100\left(\frac{1}{5}\right)^{6-1}$

$a_6 = -\frac{4}{125}$

**Find the sum to the given term.**

20) 5000 + 1000 + 200 + ....; $S_{15}$ $r = 0.2$

$S_{15} = \frac{5000(1-(0.2)^{15})}{1-0.2}$

$S_{15} = 6250$

21) $\sum_{k=1}^{6}(-2)^{k-1}$ $a_1 = 1$, $r = -2$, $n = 6$

$S_6 = \frac{1(1-(-2)^6)}{1-(-2)} = -21$

22) 6 + 0.6 + 0.06 + 0.006 + ...; $S_8$ $r = 0.1$

$S_8 = \frac{6(1-(0.1)^8)}{1-0.1}$

$S_8 = 6.66666666$

23) $\sum_{k=1}^{5} 18\left(\frac{1}{6}\right)^{k-1}$ $a_1 = 18$, $r = \frac{1}{6}$, $n = 5$

$S_5 = \frac{18\left(1-\left(\frac{1}{6}\right)^5\right)}{1-\frac{1}{6}}$

$S_5 = \frac{1555}{72}$ OR 21.597

24) $\sum_{n=1}^{5}(3n+1)$

$a_1 = 3(1)+1$

$a_1 = 4$

$a_5 = 3(5)+1$

$a_5 = 16$

$S_5 = \frac{5}{2}(4+16)$

$S_5 = 50$

25) 7 + 14 + 21 + 28 + ....; $S_9$ $d = 7$

$a_9 = 7 + (9-1)(7)$

$a_9 = 63$

$S_9 = \frac{9}{2}(7+63)$

$S_9 = 315$

Find $S_n$ for each arithmetic series.

26) $a_1 = 50$, $n = 20$, $d = -4$

$a_{20} = 50 + (20-1)(-4)$

$a_{20} = -26$

$S_{20} = \frac{20}{2}(50-26)$

$S_{20} = 240$

27) $a_1 = 76$, $n = 16$, $a_n = 31$

$S_{16} = \frac{16}{2}(76+31)$

$S_{16} = 856$

Find $a_1$ for each geometric series.

28) $S_n = 1031$, $r = \frac{2}{5}$, $n = 5$

$1031 = a_1\left(\frac{1-\left(\frac{2}{5}\right)^5}{1-\left(\frac{2}{5}\right)}\right)$

$1031 = a_1\left(\frac{0.98976}{0.6}\right)$

$618.6 = a_1(0.98976)$

$625 = a_1$

29) $S_n = -61$, $n = 5$, $r = -1$

$-61 = a_1\left(\frac{1-(-1)^5}{1-(-1)}\right)$

$-61 = a_1\left(\frac{2}{2}\right)$

$-61 = a_1$