

# Arithmetic and Geometric Sequences, Series ... Set 2

## Sequences & Series Worksheet

Write the first five terms of the sequence. Determine whether or not the sequence is arithmetic. If it is, find the common difference.

1.  $a_n = 8 + 13n$

2.  $a_n = \frac{1}{n+1}$

3.  $a_n = 2^n + n$

Find the  $n$ th term of the sequence, then find the 20th term.

4.  $a_1 = 2$  and  $d = 3$

5.  $-6, -4, -2, \dots$

6.  $a_1 = 0$  and  $d = \frac{2}{3}$

7.  $\frac{2}{5}, \frac{1}{15}, \frac{-4}{15}, \dots$

Find the  $n$ th term of the sequence.

8.  $a_1 = -4$  and  $a_5 = 16$

9.  $a_3 = 94$  and  $a_6 = 85$

10.  $a_5 = 190$  and  $a_{10} = 115$

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### Answers

1. 21, 34, 47, 60, 73; Arithmetic;  $d = 13$
2.  $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$ ; Not Arithmetic
3. 3, 6, 11, 20, 37; Not Arithmetic
4.  $a_n = 3n - 1$ ;  $a_{20} = 59$
5.  $a_n = 2n - 8$ ;  $a_{20} = 32$
6.  $a_n = \frac{2}{3}n - \frac{2}{3}$ ;  $a_{20} = \frac{38}{3}$
7.  $a_n = -\frac{1}{3}n + \frac{11}{15}$ ;  $a_{20} = -\frac{89}{15}$
8.  $a_n = 5n - 9$
9.  $a_n = -3n + 103$
10.  $a_n = -15n + 265$

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*Find the  $n$ th term of the sequence.*

11.  $a_6 = -38$  and  $a_{11} = -73$

12.  $a_3 = 19$  and  $a_{15} = -1.7$

13.  $a_5 = 16$  and  $a_{14} = 38.5$

*Find the indicated  $n$ th partial sum ( $S_n$ ) of the arithmetic sequence.*

14. 8, 20, 32, 44, ...  $n = 10$

15.  $a_1 = -6, d = 4, n = 50$

16.  $100 + 105 + 110 + \dots + 220$

17.  $0.5 + 1.3 + 2.1 + \dots + 70.1$

18.  $a_1 = 3, d = 2, n = 12$

19.  $a_1 = 100, d = -5, n = 8$

20.  $a_2 = 8, a_5 = 9.5, n = 12$

21.  $-3 + \left(\frac{-3}{2}\right) + 0 + \dots + 30$

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### Answers

11.  $a_n = -7n + 4$

12.  $a_n = -1.725n + 24.175$

13.  $a_n = 2.5n + 3.5$

14.  $S_{10} = 620$

15.  $S_{50} = 4,600$

16.  $S_{25} = 4,000$

17.  $S_{88} = 3,106.4$

18.  $S_{12} = 168$

19.  $S_8 = 660$

20.  $S_{12} = 123$

21.  $S_{23} = \frac{621}{2}$

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Find the sums of the following arithmetic series in summation notation.

$$22. \sum_{n=1}^{50} n$$

$$23. \sum_{n=51}^{100} 2n$$

$$24. \sum_{n=75}^{500} (n+6)$$

$$25. \sum_{n=100}^{250} (600-n)$$

$$26. \sum_{n=11}^{30} n - \sum_{n=1}^{10} n$$

$$27. \sum_{n=2}^{17} 2n - \sum_{n=5}^{10} n$$

28. How many terms of the arithmetic sequence  $-2, 3, 8, \dots$  must be added to get 1573?

29. How many terms of the arithmetic sequence  $15, 12, 9, \dots$  must be added to get  $-39$ ?

30. How many terms of the arithmetic sequence  $-1, 2, 5, \dots$  must be added to get 609?



# Arithmetic and Geometric Sequences, Series ... Set 2

## Sequences & Series Worksheet

The  $n$ th term of a sequence is given. Find the first five terms of the sequence.

1.  $a_n = 3(-4)^{n-1}$

2.  $a_n = 3^{n-1}$

Find the  $n$ th term or the geometric sequence with given first term  $a$  and a common ratio  $r$ . What is the fourth term?

3.  $a = -6, r = 3$

4.  $a = \sqrt{3}, r = \sqrt{3}$

Determine if the sequence is geometric. If it is geometric, find the common ratio.

5. 2, 6, 18, 36 ...

6. 27, -9, 3, -1 ...

7.  $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8} \dots$

Find the first five terms of the sequence and determine if it is geometric. If it is geometric, find the common ratio and express the  $n$ th term of the sequence in the standard form  $a_n = ar^{n-1}$

8.  $a_n = 4 + 3^n$

9.  $a_n = (-1)^n 2^n$

10.  $a_n = n^n$

## Arithmetic and Geometric Sequences, Series ... Set 2

### Answers

1. 3, -12, 48, -192, 768

2. 1, 3, 9, 27, 81

3.  $a_n = -6(3)^{n-1}$ ,  $a_4 = -162$

4.  $a_n = \sqrt{3}(\sqrt{3})^{n-1}$ ,  $a_4 = 9$

5. Not geometric

6.  $r = -\frac{1}{3}$

7. Not geometric

8. 7, 13, 31, 85, 247; Not geometric

9. -2, 4, -8, 16, -32;  $r = -2$ ;  $a_n = -2(-2)^{n-1}$

10. 1, 4, 27, 256, 3125; Not geometric

## Arithmetic and Geometric Sequences, Series ... Set 2

Determine the common ratio, the fifth term, and the  $n$ th term of the geometric sequence.

11.  $7, \frac{14}{3}, \frac{28}{9}, \frac{56}{27} \dots$

12.  $1, \sqrt{2}, 2, 2\sqrt{2} \dots$

13.  $-8, -2, -\frac{1}{2}, -\frac{1}{8} \dots$

14. The first term of a geometric sequence is 3, and the third term is  $\frac{4}{3}$ . Find the fifth term.

15. The common ratio in a geometric sequence is  $\frac{3}{2}$ , and the fifth term is 1. Find the first three terms.

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### Answers

11.  $r = \frac{2}{3}$ ;  $a_5 = \frac{112}{81}$ ;  $a_n = 7\left(\frac{2}{3}\right)^{n-1}$

12.  $r = \sqrt{2}$ ;  $a_5 = 4$ ;  $a_n = 1(\sqrt{2})^{n-1}$

13.  $r = \frac{1}{4}$ ;  $a_5 = -\frac{1}{32}$ ;  $a_n = -8\left(\frac{1}{4}\right)^{n-1}$

14.  $a_5 = \frac{16}{27}$

15.  $\frac{16}{81}$ ,  $\frac{8}{27}$ ,  $\frac{4}{9}$

## Arithmetic and Geometric Sequences, Series ... Set 2

For the following problems, find the sum of the infinite geometric series, if possible.

16.  $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots$

17.  $\frac{2}{5} + \frac{4}{25} + \frac{8}{125} + \dots$

18.  $3 - \frac{3}{2} + \frac{3}{4} - \frac{3}{8} + \dots$

Express the repeating decimal as a fraction.

19.  $0.2\overline{53}$

20.  $0.123123123123\dots$

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### Answers

16.  $\frac{2}{3}$

17.  $\frac{2}{3}$

18. 2

19.  $\frac{251}{990}$

20.  $\frac{123}{999}$