

## Arithmetic Sequences and Series

Date \_\_\_\_\_ Period \_\_\_\_\_

**Determine if the sequence is arithmetic. If it is, find the common difference, the 52nd term, the explicit formula, and the three terms in the sequence after the last one given.**

1) 13, 15, 17, 19, ...

2) 4, 7, 12, 19, ...

3)  $2, \frac{5}{2}, 3, \frac{7}{2}, \dots$

4) 34, 28, 22, 16, ...

**Given the explicit formula for an arithmetic sequence find the common difference, the term named in the problem, and the recursive formula.**

5)  $a_n = 17 + 8n$   
Find  $a_{39}$

6)  $a_n = -\frac{5}{2} + \frac{3}{2}n$   
Find  $a_{22}$

**Given two terms in an arithmetic sequence find the common difference, the explicit formula, and the recursive formula.**

7)  $a_{11} = 110$  and  $a_{37} = 370$

8)  $a_{10} = 14$  and  $a_{37} = 122$

**Find the missing terms in each arithmetic sequence.**

9) ...,  $\frac{3}{2}$ , \_\_\_\_, \_\_\_\_, 0, ...

10) ..., 3.4, \_\_\_\_, \_\_\_\_, -2, ...

**Evaluate the related series of each sequence.**

11) 3.7, 4.6, 5.5, 6.4

12) 26, 36, 46, 56, 66, 76, 86

**Evaluate each arithmetic series described.**

13)  $a_1 = \frac{3}{2}, d = \frac{1}{2}, n = 50$

14)  $a_1 = -22, d = -3, n = 12$

15)  $a_1 = 20, a_n = 55, n = 6$

16)  $a_1 = 14, a_n = 86, n = 10$

17)  $\sum_{m=1}^{10} \left(-2 + \frac{4}{3}m\right)$

18)  $\sum_{n=1}^9 (7n - 17)$

19)  $\sum_{m=1}^{35} (7m - 12)$

20)  $\sum_{k=1}^{14} \left(-\frac{2}{3} + \frac{1}{2}k\right)$

21)  $\sum_{i=2}^{10} (0.8i - 6.3)$

22)  $\sum_{n=4}^{53} (2n - 7)$

**Determine the number of terms  $n$  in each arithmetic series.**

23)  $1 + (-2) + (-5) + (-8)\dots, S_n = -259$

24)  $18 + 21 + 24 + 27\dots, S_n = 468$

## Arithmetic Sequences and Series

**Determine if the sequence is arithmetic. If it is, find the common difference, the 52nd term, the explicit formula, and the three terms in the sequence after the last one given.**

1) 13, 15, 17, 19, ...

Common Difference:  $d = 2$

Next 3 terms: 21, 23, 25

$a_{52} = 115$

Explicit:  $a_n = 11 + 2n$

2) 4, 7, 12, 19, ...

Not arithmetic

3)  $2, \frac{5}{2}, 3, \frac{7}{2}, \dots$  Common Difference:  $d = \frac{1}{2}$

Next 3 terms:  $4, \frac{9}{2}, 5$

$a_{52} = \frac{55}{2}$

Explicit:  $a_n = \frac{3}{2} + \frac{1}{2}n$

4) 34, 28, 22, 16, ...

Common Difference:  $d = -6$

Next 3 terms: 10, 4, -2

$a_{52} = -272$

Explicit:  $a_n = 40 - 6n$

**Given the explicit formula for an arithmetic sequence find the common difference, the term named in the problem, and the recursive formula.**

5)  $a_n = 17 + 8n$

Find  $a_{39}$

Common Difference:  $d = 8$

$a_{39} = 329$

Recursive:  $a_n = a_{n-1} + 8$

$a_1 = 25$

6)  $a_n = -\frac{5}{2} + \frac{3}{2}n$  Common Difference:  $d = \frac{3}{2}$

Find  $a_{22}$

$a_{22} = \frac{61}{2}$

Recursive:  $a_n = a_{n-1} + \frac{3}{2}$

$a_1 = -1$

**Given two terms in an arithmetic sequence find the common difference, the explicit formula, and the recursive formula.**

7)  $a_{11} = 110$  and  $a_{37} = 370$

Common Difference:  $d = 10$

Explicit:  $a_n = 10n$

Recursive:  $a_n = a_{n-1} + 10$

$a_1 = 10$

8)  $a_{10} = 14$  and  $a_{37} = 122$

Common Difference:  $d = 4$

Explicit:  $a_n = -26 + 4n$

Recursive:  $a_n = a_{n-1} + 4$

$a_1 = -22$

**Find the missing terms in each arithmetic sequence.**

9) ...,  $\frac{3}{2}$ , \_\_\_\_, \_\_\_\_, 0, ... 1,  $\frac{1}{2}$

10) ..., 3.4, \_\_\_\_, \_\_\_\_, -2, ...  
1.6, -0.2

Evaluate the related series of each sequence.

11) 3.7, 4.6, 5.5, 6.4

20.2

12) 26, 36, 46, 56, 66, 76, 86

392

Evaluate each arithmetic series described.

13)  $a_1 = \frac{3}{2}$ ,  $d = \frac{1}{2}$ ,  $n = 50$

$\frac{1375}{2}$

14)  $a_1 = -22$ ,  $d = -3$ ,  $n = 12$

-462

15)  $a_1 = 20$ ,  $a_n = 55$ ,  $n = 6$

225

16)  $a_1 = 14$ ,  $a_n = 86$ ,  $n = 10$

500

17)  $\sum_{m=1}^{10} \left( -2 + \frac{4}{3}m \right)$

$\frac{160}{3}$

18)  $\sum_{n=1}^9 (7n - 17)$

162

19)  $\sum_{m=1}^{35} (7m - 12)$

3990

20)  $\sum_{k=1}^{14} \left( -\frac{2}{3} + \frac{1}{2}k \right)$

$\frac{259}{6}$

21)  $\sum_{i=2}^{10} (0.8i - 6.3)$

-13.5

22)  $\sum_{n=4}^{53} (2n - 7)$

2500

Determine the number of terms  $n$  in each arithmetic series.

23)  $1 + (-2) + (-5) + (-8) \dots$ ,  $S_n = -259$

14

24)  $18 + 21 + 24 + 27 \dots$ ,  $S_n = 468$

13

## Geometric Sequences and Series

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

1)  $-1, -3, -9, -27, \dots$

2)  $2, \frac{1}{2}, \frac{1}{8}, \frac{1}{32}, \dots$

3)  $148, 1488, 14888, 148888, \dots$

4)  $0.75, 3, 12, 48, \dots$

**Given the explicit formula for a geometric sequence find the common ratio, the term named in the problem, and the recursive formula.**

5)  $a_n = -3 \cdot \left(\frac{1}{2}\right)^{n-1}$   
Find  $a_{11}$

6)  $a_n = -1.5 \cdot (-2)^{n-1}$   
Find  $a_{10}$

**Given two terms in a geometric sequence find the common ratio, the explicit formula, and the recursive formula.**

7)  $a_4 = -\frac{1}{4}$  and  $a_1 = 2$

8)  $a_5 = -24$  and  $a_4 = -12$

**Find the missing term or terms in each geometric sequence.**

9)  $\dots, 4, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, 108, \dots$

10)  $\dots, -25, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, -\frac{1}{25}, \dots$

**Evaluate each geometric series described.**

11)  $-3 + 15 - 75 + 375\dots, n = 8$

12)  $2 + 8 + 32 + 128\dots, n = 8$

13)  $a_1 = 1, r = 4, n = 7$

14)  $a_1 = 3, r = 2, n = 7$

15)  $\sum_{k=1}^8 -2 \cdot 6^{k-1}$

16)  $\sum_{m=1}^8 32 \cdot \left(\frac{1}{2}\right)^{m-1}$

17)  $\sum_{i=1}^{10} 0.2 \cdot 5^{i-1}$

18)  $\sum_{n=1}^{10} -2 \cdot 2^{n-1}$

**Determine the number of terms  $n$  in each geometric series.**

19)  $\sum_{i=1}^n -4^{i-1} = -341$

20)  $a_1 = -1, r = -5, S_n = 104$

**Determine if each geometric series converges or diverges.**

21)  $-1 + 2 - 4 + 8\dots$

22)  $-16 - 4 - 1 - \frac{1}{4}\dots$

23)  $\sum_{k=1}^{\infty} -3 \cdot \left(\frac{2}{5}\right)^{k-1}$

24)  $\sum_{i=1}^{\infty} 2 \cdot 2^{i-1}$

**Evaluate each infinite geometric series described.**

25)  $\sum_{i=1}^{\infty} \left(\frac{1}{3}\right)^{i-1}$

26)  $\sum_{i=1}^{\infty} 0.4 \cdot 0.9^{i-1}$

27)  $\sum_{m=1}^{\infty} \left(-\frac{2}{3}\right)^{m-1}$

28)  $\sum_{k=1}^{\infty} -4^{k-1}$

## Geometric Sequences and Series

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

1)  $-1, -3, -9, -27, \dots$

Common Ratio:  $r = 3$

$a_8 = -2187$

Explicit:  $a_n = -3^{n-1}$

2)  $2, \frac{1}{2}, \frac{1}{8}, \frac{1}{32}, \dots$  Common Ratio:  $r = \frac{1}{4}$

$a_8 = \frac{1}{8192}$

Explicit:  $a_n = 2 \cdot \left(\frac{1}{4}\right)^{n-1}$

3)  $148, 1488, 14888, 148888, \dots$

Not geometric

4)  $0.75, 3, 12, 48, \dots$

Common Ratio:  $r = 4$

$a_8 = 12288$

Explicit:  $a_n = 0.75 \cdot 4^{n-1}$

Given the explicit formula for a geometric sequence find the common ratio, the term named in the problem, and the recursive formula.

5)  $a_n = -3 \cdot \left(\frac{1}{2}\right)^{n-1}$  Common Ratio:  $r = \frac{1}{2}$

Find  $a_{11}$ 

$a_{11} = -\frac{3}{1024}$

Recursive:  $a_n = a_{n-1} \cdot \frac{1}{2}$

$a_1 = -3$

6)  $a_n = -1.5 \cdot (-2)^{n-1}$

Find  $a_{10}$ 

Common Ratio:  $r = -2$

$a_{10} = 768$

Recursive:  $a_n = a_{n-1} \cdot -2$

$a_1 = -1.5$

Given two terms in a geometric sequence find the common ratio, the explicit formula, and the recursive formula.

7)  $a_4 = -\frac{1}{4}$  and  $a_1 = 2$  Common Ratio:  $r = -\frac{1}{2}$

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

Recursive:  $a_n = a_{n-1} \cdot -\frac{1}{2}$

$a_1 = 2$

8)  $a_5 = -24$  and  $a_4 = -12$

Common Ratio:  $r = 2$

Explicit:  $a_n = -1.5 \cdot 2^{n-1}$

Recursive:  $a_n = a_{n-1} \cdot 2$

$a_1 = -1.5$

Find the missing term or terms in each geometric sequence.

9)  $\dots, 4, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, 108, \dots$

$12, 36$

10)  $\dots, -25, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, -\frac{1}{25}, \dots$

$-5, -1, -\frac{1}{5}$

**Evaluate each geometric series described.**

11)  $-3 + 15 - 75 + 375\dots, n = 8$

195312

12)  $2 + 8 + 32 + 128\dots, n = 8$

43690

13)  $a_1 = 1, r = 4, n = 7$

5461

14)  $a_1 = 3, r = 2, n = 7$

381

15)  $\sum_{k=1}^8 -2 \cdot 6^{k-1}$

-671846

16)  $\sum_{m=1}^8 32 \cdot \left(\frac{1}{2}\right)^{m-1}$

$\frac{255}{4}$

17)  $\sum_{i=1}^{10} 0.2 \cdot 5^{i-1}$

488281.2

18)  $\sum_{n=1}^{10} -2 \cdot 2^{n-1}$

-2046

**Determine the number of terms  $n$  in each geometric series.**

19)  $\sum_{i=1}^n -4^{i-1} = -341$

5

20)  $a_1 = -1, r = -5, S_n = 104$

4

**Determine if each geometric series converges or diverges.**

21)  $-1 + 2 - 4 + 8\dots$

Diverges

22)  $-16 - 4 - 1 - \frac{1}{4}\dots$

Converges

23)  $\sum_{k=1}^{\infty} -3 \cdot \left(\frac{2}{5}\right)^{k-1}$

Converges

24)  $\sum_{i=1}^{\infty} 2 \cdot 2^{i-1}$

Diverges

**Evaluate each infinite geometric series described.**

25)  $\sum_{i=1}^{\infty} \left(\frac{1}{3}\right)^{i-1}$

$\frac{3}{2}$

26)  $\sum_{i=1}^{\infty} 0.4 \cdot 0.9^{i-1}$

4

27)  $\sum_{m=1}^{\infty} \left(-\frac{2}{3}\right)^{m-1}$   $\frac{3}{5}$

28)  $\sum_{k=1}^{\infty} -4^{k-1}$

No sum



## Sequences and Series

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

1) 1, 3, 6, 10, 15, ...

2) -4, -8, -16, -32, -64, ...

**Find the first four terms in each sequence.**

3)  $a_n = 3 \cdot 4^{n-1}$

4)  $a_n = -\frac{6}{n+3}$

5)  $a_n = a_{n-1} \cdot -5$   
 $a_1 = 0.4$

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

**Find the tenth term in each sequence.**

7)  $a_n = -\frac{15}{n}$

8)  $a_n = a_{n-1} + n$   
 $a_1 = -8$

**Determine if each sequence converges or diverges.**

9) -30, -14, -6, -2, 0, ...

10) 8, 108, 208, 308, 408, ...

11)  $a_n = \frac{6}{n+3}$

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

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

14)  $a_n = \frac{2 + a_{n-1}}{2}$   
 $a_1 = -30$

**Rewrite each series as a sum.**

$$15) \sum_{n=1}^4 (20 - n^2)$$

$$16) \sum_{n=1}^4 (n + 600)$$

$$17) \sum_{m=1}^4 \frac{1}{3^m}$$

$$18) \sum_{a=1}^6 \frac{a^2 + 1}{a}$$

**Evaluate each series.**

$$19) \sum_{m=5}^{11} (m + 400)$$

$$20) \sum_{n=1}^5 \frac{10}{n}$$

$$21) \sum_{k=1}^6 \frac{300}{k}$$

$$22) \sum_{n=0}^5 (20 - n)$$

$$23) \sum_{k=1}^5 (200 - k^2)$$

$$24) \sum_{n=2}^8 n$$

$$25) \sum_{n=3}^9 \frac{1}{n}$$

$$26) \sum_{a=1}^7 \frac{a}{a+1}$$

**Rewrite each series using sigma notation.**

$$27) 1 + 4 + 9 + 16 + 25$$

$$28) 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$$

$$29) \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \frac{1}{243} + \frac{1}{729}$$

$$30) 5 + 10 + 15 + 20 + 25$$

$$31) \frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6}$$

$$32) 5 + 25 + 125 + 625 + 3125$$

## Sequences and Series

Find the next three terms in each sequence.

1) 1, 3, 6, 10, 15, ...

21, 28, 36

2) -4, -8, -16, -32, -64, ...

-128, -256, -512

Find the first four terms in each sequence.

3)  $a_n = 3 \cdot 4^{n-1}$

3, 12, 48, 192

4)  $a_n = -\frac{6}{n+3}$

 $-\frac{3}{2}, -\frac{6}{5}, -1, -\frac{6}{7}$ 

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

$a_1 = 0.4$

0.4, -2, 10, -50

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

$a_1 = 3$

3, 9, 27, 81

Find the tenth term in each sequence.

7)  $a_n = -\frac{15}{n}$

$a_{10} = -\frac{3}{2}$

8)  $a_n = a_{n-1} + n$

$a_1 = -8$

$a_{10} = 46$

Determine if each sequence converges or diverges.

9) -30, -14, -6, -2, 0, ...

Converges

10) 8, 108, 208, 308, 408, ...

Diverges

11)  $a_n = \frac{6}{n+3}$

Converges

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

Diverges

13)  $a_n = a_{n-1} \cdot 2$

$a_1 = 3$

Diverges

14)  $a_n = \frac{2 + a_{n-1}}{2}$

$a_1 = -30$

Converges

**Rewrite each series as a sum.**

$$15) \sum_{n=1}^4 (20 - n^2)$$

$$19 + 16 + 11 + 4$$

$$16) \sum_{n=1}^4 (n + 600)$$

$$601 + 602 + 603 + 604$$

$$17) \sum_{m=1}^4 \frac{1}{3^m}$$

$$\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81}$$

$$18) \sum_{a=1}^6 \frac{a^2 + 1}{a}$$

$$2 + \frac{5}{2} + \frac{10}{3} + \frac{17}{4} + \frac{26}{5} + \frac{37}{6}$$

**Evaluate each series.**

$$19) \sum_{m=5}^{11} (m + 400)$$

$$2856$$

$$20) \sum_{n=1}^5 \frac{10}{n}$$

$$\frac{137}{6}$$

$$21) \sum_{k=1}^6 \frac{300}{k}$$

$$735$$

$$22) \sum_{n=0}^5 (20 - n)$$

$$105$$

$$23) \sum_{k=1}^5 (200 - k^2)$$

$$945$$

$$24) \sum_{n=2}^8 n$$

$$35$$

$$25) \sum_{n=3}^9 \frac{1}{n}$$

$$\frac{3349}{2520}$$

$$26) \sum_{a=1}^7 \frac{a}{a+1}$$

$$\frac{1479}{280}$$

**Rewrite each series using sigma notation.**

$$27) 1 + 4 + 9 + 16 + 25 \quad \sum_{m=1}^5 m^2$$

$$28) 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} \quad \sum_{k=1}^5 \frac{1}{k}$$

$$29) \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \frac{1}{243} + \frac{1}{729} \quad \sum_{k=1}^6 \frac{1}{3^k}$$

$$30) 5 + 10 + 15 + 20 + 25 \quad \sum_{n=1}^5 5n$$

$$31) \frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} \quad \sum_{a=1}^5 \frac{a}{a+1}$$

$$32) 5 + 25 + 125 + 625 + 3125 \quad \sum_{a=1}^5 5^a$$