

1. Write the first five terms of the sequence whose general term,  $a_n$ , is given as

$$a_n = -6n - 2.$$

$$a_1 = \underline{\hspace{2cm}}$$

$$a_2 = \underline{\hspace{2cm}}$$

$$a_3 = \underline{\hspace{2cm}}$$

$$a_4 = \underline{\hspace{2cm}}$$

$$a_5 = \underline{\hspace{2cm}}$$

2. Write the first five terms of the sequence whose general term,  $a_n$ , is given as  $a_n = (-1)^n(5n)$ .

$$a_1 = \underline{\hspace{2cm}}$$

$$a_2 = \underline{\hspace{2cm}}$$

$$a_3 = \underline{\hspace{2cm}}$$

$$a_4 = \underline{\hspace{2cm}}$$

$$a_5 = \underline{\hspace{2cm}}$$

3. Write the first 4 terms of the sequence.

$$a_1 = 4, \quad a_n = 6 \cdot a_{n-1} + 3, \quad \text{for } n > 1$$

What is the first term?

$$a_1 = \underline{\hspace{2cm}}$$

What is the second term?

$$a_2 = \underline{\hspace{2cm}}$$

What is the third term?

$$a_3 = \underline{\hspace{2cm}}$$

What is the fourth term?

$$a_4 = \underline{\hspace{2cm}}$$

4. Find the first four terms of the recursively defined sequence.

$$a_1 = 3, \quad a_2 = 3, \quad a_{k+1} = a_k + a_{k-1}$$

$$a_3 = \underline{\hspace{2cm}}$$

$$a_4 = \underline{\hspace{2cm}}$$

5. Evaluate the series.

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


---

$$\sum_{i=1}^4 (2i + 5) = \underline{\hspace{2cm}}$$


---

6. Evaluate the series.

$$\sum_{j=1}^6 (-1)^j j$$


---

$$\sum_{j=1}^6 (-1)^j j = \underline{\hspace{2cm}}$$


---

7. Evaluate the series.

$$\sum_{i=3}^6 (12 - 4i)$$


---

$$\sum_{i=3}^6 (12 - 4i) = \underline{\hspace{2cm}} \text{ (Type an integer or a simplified fraction.)}$$


---

8. Use the summation properties and rules to evaluate the series.

$$\sum_{i=1}^{80} 5$$


---

$$\sum_{i=1}^{80} 5 = \underline{\hspace{2cm}} \text{ (Simplify your answer.)}$$


---

9. Use the summation properties to evaluate the following series.

$$\sum_{i=1}^4 (5i + 5)$$


---

$$\sum_{i=1}^4 (5i + 5) = \underline{\hspace{2cm}}$$


---

10. Use summation notation to write the series.

$$\frac{1}{3(1)} + \frac{1}{3(2)} + \frac{1}{3(3)} + \cdots + \frac{1}{3(8)}$$


---

The summation notation for the series is  $\sum_{i=1}^{\hspace{1cm}} \underline{\hspace{1cm}}$ .

---

11. Use summation notation to write the series.

$$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \cdots + \frac{1}{256}$$

The summation notation for the series is  $\sum_{i=1}^{\quad}$  \_\_\_\_\_. (Simplify your answers.)

12. Fill in the blank to correctly complete the following sentence.

In an arithmetic sequence, each term after the first differs from the preceding term by a fixed constant called the common

(1) \_\_\_\_\_

(1) ☐ difference.

☐ sum.

13. Find the common difference for the sequence  $-7, 2, 11, 20, \dots$

The common difference for the sequence  $-7, 2, 11, 20, \dots$  is \_\_\_\_\_.

14. For the arithmetic sequence having  $a_1 = -7$  and  $d = -6$ , find the term  $a_7$ .

The term  $a_7 =$  \_\_\_\_\_.

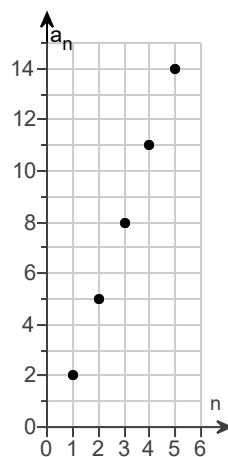
15. Write the fifth term of the sequence whose general term,  $a_n$ , is given as  $a_n = 7n - 9$ .

$a_5 =$  \_\_\_\_\_

16. The figure shows the graph of a finite arithmetic sequence. Determine the domain and range of the sequence.

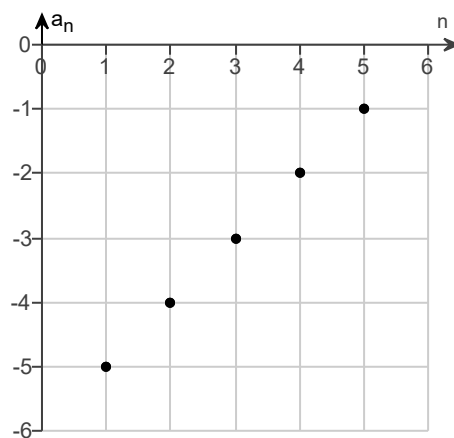
The domain of the sequence is {\_\_\_\_\_}.  
(Use a comma to separate answers as needed.)

The range of the sequence is {\_\_\_\_\_}.  
(Use a comma to separate answers as needed.)



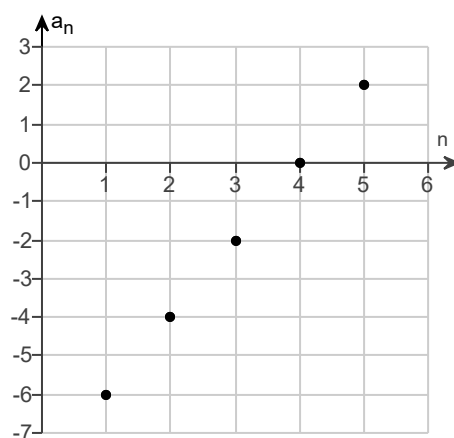
17. The figure shows the graph of a finite arithmetic sequence. What is the first term?

The first term of the finite arithmetic sequence shown in the graph is  $a_1 =$  \_\_\_\_\_.



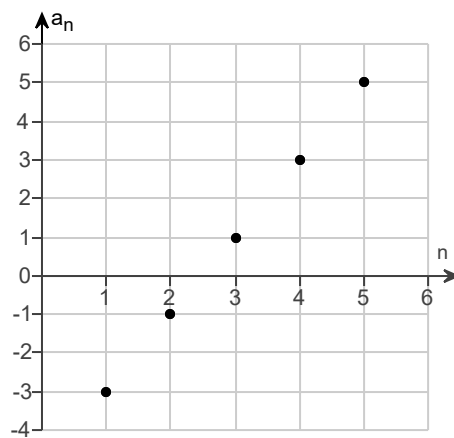
18. The figure shows the graph of a finite arithmetic sequence. What is the common difference?

The common difference of the finite arithmetic sequence shown in the graph is  $d =$  \_\_\_\_\_.



19. The figure shows the graph of a finite arithmetic sequence. Write a formula for the  $n$ th term of the sequence.

The  $n$ th term of the sequence is given by  $a_n =$  \_\_\_\_\_.  
(Simplify your answer.)



20. Find the common difference  $d$  for the arithmetic sequence.

$-7, -11, -15, -19, \dots$

$d =$  \_\_\_\_\_

21. Find the common difference  $d$  for the arithmetic sequence.

$6, 13, 20, 27, \dots$

$d =$  \_\_\_\_\_

22. Find the first four terms of the arithmetic sequence whose first term is  $-2$  and whose common difference is  $-8$ .

What is the first term?

$$a_1 = \underline{\hspace{2cm}}$$

What is the second term?

$$a_2 = \underline{\hspace{2cm}}$$

What is the third term?

$$a_3 = \underline{\hspace{2cm}}$$

What is the fourth term?

$$a_4 = \underline{\hspace{2cm}}$$

23. Find the first four terms of the arithmetic sequence.

$$a_1 = -8, d = -3$$

What is the first term?

$$a_1 = \underline{\hspace{2cm}}$$

What is the second term?

$$a_2 = \underline{\hspace{2cm}}$$

What is the third term?

$$a_3 = \underline{\hspace{2cm}}$$

What is the fourth term?

$$a_4 = \underline{\hspace{2cm}}$$

24. Find  $a_8$  and  $a_n$  for the arithmetic sequence.

$$4, 7, 10, \dots$$

$$a_8 = \underline{\hspace{2cm}}$$

$$a_n = \underline{\hspace{2cm}}$$

(Type your answer in the form  $bn + a$ .)

25. For the arithmetic sequence, find  $a_{11}$  and  $a_n$  when  $a_1 = 3$  and  $a_4 = -9$ .

$$a_{11} = \underline{\hspace{2cm}}$$

$$a_n = \underline{\hspace{2cm}}$$

(Type your answer in the form  $bn + a$ .)

26. In an arithmetic sequence  $a_7 = 8$  and  $a_{13} = 13$ . Determine  $a_1$ .

$a_1 =$  \_\_\_\_\_  
(Type an integer or a simplified fraction.)

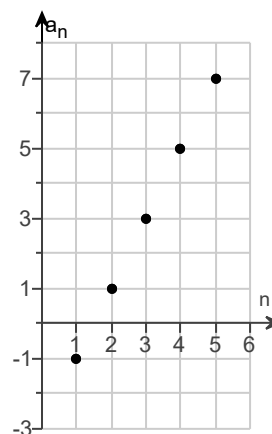
27. Find a formula for the  $n$ th term of the finite arithmetic sequence shown in the graph. Then state the domain and range of the sequence.

Choose the correct formula for  $a_n$ .

- ☐  $a_n = 3n - 2$ 
☐  $a_n = 2n - 3$   
☐  $a_n = 2n + 3$ 
☐  $a_n = 2n - 2$

The domain of the sequence is {\_\_\_\_\_}.  
(Use a comma to separate answers as needed.)

The range of the sequence is {\_\_\_\_\_}.  
(Use a comma to separate answers as needed.)



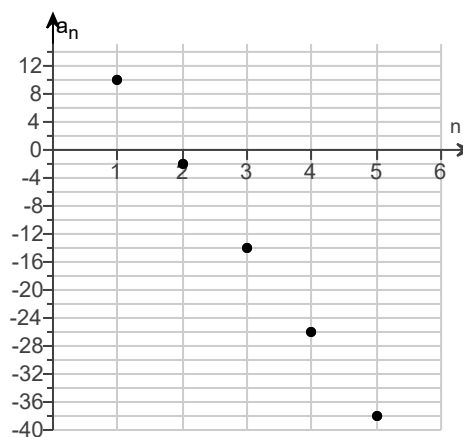
28. Find a formula for the  $n$ th term of the finite arithmetic sequence shown in the graph. Then state the domain and range of the sequence.

Choose the correct formula for  $a_n$ .

- ☐  $a_n = 22n + 22$   
☐  $a_n = -12n + 22$   
☐  $a_n = -12n - 12$   
☐  $a_n = 22n - 12$

The domain is {\_\_\_\_\_}.  
(Use a comma to separate answers as needed.)

The range is {\_\_\_\_\_}.  
(Use a comma to separate answers as needed.)



29. Find the sum of the first 10 terms of the arithmetic sequence.

4, 10, 16, 22, ...

What is the sum of the first 10 terms? \_\_\_\_\_

30. Find the sum of the first 14 terms for the following arithmetic sequence.

$a_4 = 7$ ,  $a_6 = 13$

The sum of the first 14 terms is \_\_\_\_\_.

31. Find the sum of the first 218 natural numbers.

$S_{218} =$  \_\_\_\_\_

32. Find the sum described below.

The sum of the first 130 positive odd integers.

The sum of the first 130 positive odd integers is \_\_\_\_\_.

33. Evaluate the sum.

$$\sum_{i=1}^3 (i+6)$$

$$\sum_{i=1}^3 (i+6) = \underline{\hspace{2cm}}$$

(Simplify your answer.)

34. Find the sum of this arithmetic series.

$$\sum_{i=1}^{250} i$$

$$\sum_{i=1}^{250} i = \underline{\hspace{2cm}}$$

(Simplify your answer. Type an integer or a fraction.)

35. Select the correct choice that completes the sentence below.

In a geometric sequence, each term after the first is obtained by multiplying the preceding term by a fixed nonzero real number called the common (1) \_\_\_\_\_

- (1) ☐ ratio.  
☐ factor.  
☐ difference.

36. Find the common ratio for the sequence.

- 250, - 50, - 10, - 2, ...

$r = \underline{\hspace{2cm}}$   
(Type an integer or a simplified fraction.)

37. Enter the correct answer that completes the sentence below.

For the geometric sequence having  $a_1 = 3$  and  $r = 3$ , the term  $a_7 = \underline{\hspace{2cm}}$ .

38. Enter the correct answer that completes the sentence below.

For the geometric sequence having  $a_n = 49 \left( \frac{1}{7} \right)^{n-1}$ , the term  $a_4 = \underline{\hspace{2cm}}$ .  
(Simplify your answer.)

39. Check whether the sequence is arithmetic, geometric, or neither. If the sequence is geometric, find the common ratio  $r$ . If the sequence is arithmetic, find the common difference  $d$ .

2, 14, 98, 686, 4802,...

What type of sequence is 2, 14, 98, 686, 4802,...

- ☐ geometric  
☐ neither  
☐ arithmetic

The (1) \_\_\_\_\_ is \_\_\_\_\_.

- (1) ☐ common difference  $d$   
☐ common ratio  $r$

40. Determine whether the sequence is arithmetic, geometric, or neither. If the sequence is arithmetic, give its common difference  $d$ . If the sequence is geometric, give its common ratio  $r$ .

$7, \frac{7}{2}, 0, -\frac{7}{2}, -7, \dots$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The sequence is geometric with a common ratio of \_\_\_\_\_.  
(Type an integer or a fraction.)  
☐ B. The sequence is arithmetic with a common difference of \_\_\_\_\_.  
(Type an integer or a fraction.)  
☐ C. The sequence is neither geometric nor arithmetic.

41. Determine whether the given sequence is arithmetic, geometric, or neither. If the sequence is arithmetic, find the common difference; if it is geometric, find the common ratio.

1, 4, 8, 11, ...

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The sequence is arithmetic with a common difference of \_\_\_\_\_.  
(Type an integer or a fraction.)  
☐ B. The sequence is geometric with a common ratio of \_\_\_\_\_.  
(Type an integer or a fraction.)  
☐ C. The sequence is neither geometric or arithmetic.



42. Check whether the sequence is arithmetic, geometric, or neither. If the sequence is geometric, find the common ratio  $r$ . If the sequence is arithmetic, find the common difference  $d$ .

$$36, 18, 9, \frac{9}{2}, \frac{9}{4}, \dots$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The sequence is geometric with a common ratio of \_\_\_\_\_.  
(Type an integer or a fraction.)
- ☐ B. The sequence is arithmetic with a common difference of \_\_\_\_\_.  
(Type an integer or a fraction.)
- ☐ C. The sequence is neither geometric nor arithmetic.

43. Find  $a_n$  and  $a_3$  for the following geometric sequence.

$$a_1 = 6, r = -3$$

$$a_n = \underline{\hspace{2cm}} (\underline{\hspace{2cm}})^{n-1}$$

$$a_3 = \underline{\hspace{2cm}}$$

44. Find  $a_n$  and  $a_5$  for the geometric sequence.

$$-6, -12, -24, -48, \dots$$

$$a_n = \underline{\hspace{2cm}}$$

$$a_5 = \underline{\hspace{2cm}}$$

45. Find  $a_5$  and  $a_n$  for the following geometric sequence.

$$6, -3, \frac{3}{2}, -\frac{3}{4}, \dots$$

$$a_5 = \underline{\hspace{2cm}}$$

(Simplify your answer.)

$$a_n = \underline{\hspace{2cm}}$$

(Simplify your answer.)

46. Find  $a_1$  and  $r$  for the following geometric sequence.

$$a_2 = -2, a_5 = -54$$

$$a_1 = \underline{\hspace{2cm}}$$

$$r = \underline{\hspace{2cm}}$$

47. Find  $r$  and  $a_1$  for the geometric sequence with  $a_4 = 2$  and  $a_9 = \frac{1}{16}$ .

$r =$  \_\_\_\_\_ (Simplify your answer. Type an integer or a fraction.)

$a_1 =$  \_\_\_\_\_ (Simplify your answer. Type an integer or a fraction.)

48. Determine the sum of the first 6 terms of the geometric sequence.

2, 4, 8, ...

$S_6 =$  \_\_\_\_\_

49. Use the formula for  $S_n$  to find the sum of the first five terms of the geometric sequence.

$30, -10, \frac{10}{3}, -\frac{10}{9}, \dots$

The sum of the first five terms is \_\_\_\_\_.  
(Simplify your answer. Type an integer or a fraction.)

50. Find the sum.

$$\sum_{j=1}^5 16 \left( \frac{1}{2} \right)^j$$

$$\sum_{j=1}^5 16 \left( \frac{1}{2} \right)^j = \underline{\hspace{2cm}}$$

(Simplify your answer. Type an integer or a fraction.)

51. Under what conditions does the sum of an infinite geometric series exist?

Choose the correct answer below.

- ☐ A. The sum exists if  $|r| < 1$ .  
☐ B. The sum exists if  $|r| > 1$ .  
☐ C. The sum exists if  $r = 1$ .

52. Find  $r$  for the infinite geometric sequence. Determine whether the sum will converge.

5, 20, 80, 320, ...

$r =$  \_\_\_\_\_  
(Type an integer or a simplified fraction.)

Will the sum converge?

- ☐ Yes  
☐ No

53. Find  $r$  for the infinite geometric sequence. Determine whether the sum will converge.

$-54, -18, -6, -2, \dots$

$r =$  \_\_\_\_\_

(Type an integer or a simplified fraction.)

Will the sum converge?

- ☐ Yes  
☐ No

54. Find the sum of the infinite geometric series.

$$1 + \frac{1}{5} + \frac{1}{25} + \frac{1}{125} + \dots$$

$S =$  \_\_\_\_\_ (Simplify your answer.)

55. Find the sum, if it converges.

$$\frac{1}{5} - \frac{1}{25} + \frac{1}{125} - \dots$$

The sum is \_\_\_\_\_.

(Type an integer or a simplified fraction.)

56. Find the sum, if it converges.

$$\sum_{i=1}^{\infty} 7 \left( \frac{7}{10} \right)^{i-1}$$

The sum is \_\_\_\_\_.

(Type an integer or a simplified fraction.)

57. Each person has two parents, four grandparents, eight great-grandparents, and so on. What is the total number of ancestors a person has, going back five generations? nine generations?

Going back five generations, a person has \_\_\_\_\_ ancestors.

Going back nine generations, a person has \_\_\_\_\_ ancestors.

58. You are offered a 6-week summer job and are asked to select one of the following salary options.

**Option 1** \$10,000 for the first day with a \$10,000 raise each day for the remaining 29 days (that is, \$20,000 for day 2, \$30,000 for day 3, and so on)

**Option 2** 1¢ for the first day with the pay doubled each day (that is, 2¢ for day 2, 4¢ for day 3, and so on)

Which option would you choose?

Which option pays better?

- ☐ Option 1  
☐ Option 2

59. Fill in the blank to correctly complete the sentence.

The value of  $0!$  is \_\_\_\_\_.

---

60. Select the correct choice that completes the sentence below.

In the expansion of  $(x + y)^{18}$ , the number of terms is (1) \_\_\_\_\_

- (1) ☐ twenty.  
☐ seventeen.  
☐ eighteen.  
☐ nineteen.
- 

61. Select the correct choice that completes the sentence below.

In the expansion of  $(x + y)^2$ , the first term is (1) \_\_\_\_\_ and the last term is (2) \_\_\_\_\_

- |                                 |                                 |
|---------------------------------|---------------------------------|
| (1) <input type="radio"/> $y^3$ | (2) <input type="radio"/> $x^2$ |
| <input type="radio"/> $x^2$     | <input type="radio"/> $y^3$     |
| <input type="radio"/> $y^2$     | <input type="radio"/> $y^2$     |
| <input type="radio"/> $x^3$     | <input type="radio"/> $x^3$     |
- 

62. Fill in the blank to correctly complete the sentence.

The sum of the exponents on  $x$  and  $y$  in any term of the expansion of  $(x + y)^{10}$  is \_\_\_\_\_.

---

63. Fill in the blank to correctly complete the sentence.

The second term in the expansion of  $(p + q)^{18}$  is \_\_\_\_\_.

---

64. Evaluate.

$$\frac{9!}{5! 4!}$$

$$\frac{9!}{5! 4!} = \underline{\hspace{2cm}}$$

---

65. Simplify.

$$\binom{9}{5}$$

$$\binom{9}{5} = \underline{\hspace{2cm}}$$

---

66. Evaluate.

$$\begin{pmatrix} 42 \\ 42 \end{pmatrix}$$

---

$$\begin{pmatrix} 42 \\ 42 \end{pmatrix} = \underline{\hspace{2cm}}$$

---

67. Evaluate the expression.

$$\begin{pmatrix} 9n + 1 \\ 9n \end{pmatrix}$$

---

$$\begin{pmatrix} 9n + 1 \\ 9n \end{pmatrix} = \underline{\hspace{2cm}} \text{ (Simplify your answer.)}$$

---

68. Evaluate  ${}_{15}C_2$ .

$${}_{15}C_2 = \underline{\hspace{2cm}}$$

(Simplify your answer. Type an integer or a fraction.)

---

69. Evaluate  ${}_{94}C_{92}$ .

$${}_{94}C_{92} = \underline{\hspace{2cm}}$$

(Simplify your answer. Type an integer or a fraction.)

---

70. Use the formula for  ${}_nC_r$  to evaluate the given expression.

$${}_6C_0$$

---

$${}_6C_0 = \underline{\hspace{2cm}} \text{ (Type an integer or a simplified fraction.)}$$

---

71. Use the formula for  ${}_nC_r$  to evaluate the given expression.

$${}_{16}C_1$$

---

$${}_{16}C_1 = \underline{\hspace{2cm}} \text{ (Type an integer or a simplified fraction.)}$$

---

72. Write the binomial expansion for the expression  $(m + n)^4$ .

Choose the correct expansion below.

- ☐ A.  $m^4 + 4m^3n + 6m^2n^2 + 4mn^3 + n^4$
- ☐ B.  $m^4 + n^4$
- ☐ C.  $m^4 + 4m^3n + 16m^2n^2 + 4mn^3 + n^4$
- ☐ D.  $m^4 + m^3n + m^2n^2 + mn^3 + n^4$
-

73. Use the binomial theorem to expand the expression.

$$(m - n)^5$$

Choose the correct expansion.

- ☐ A.  $m^5 - 5m^4n + 10m^3n^2 - 10m^2n^3 + 5mn^4 - n^5$
- ☐ B.  $m^5 + 5m^4n + 10m^3n^2 + 10m^2n^3 + 5mn^4 + n^5$
- ☐ C.  $m^5 - 10m^4n + 5m^3n^2 - 5m^2n^3 + 10mn^4 - n^5$
- ☐ D.  $m^5 - n^5$

74. Write the binomial expansion for  $(x + 2y)^4$ .

$$(x + 2y)^4 = \underline{\hspace{2cm}}$$

75. Write the binomial expansion for the following expression.

$$(2x - 3p)^6$$

$$(2x - 3p)^6 = \underline{\hspace{2cm}}$$

76. Write the fifteenth term of the binomial expansion of  $(v - w^2)^{22}$ .

The fifteenth term is  $\underline{\hspace{2cm}}$ .