


9.2 Exercises

See CalcChat.com for tutorial help and worked-out solutions to odd-numbered exercises.

Vocabulary: Fill in the blanks.

- A sequence is _____ when the differences between consecutive terms are the same. This difference is the _____ difference.
- The n th term of an arithmetic sequence has the form $a_n =$ _____.
- When you know the n th term of an arithmetic sequence and you know the common difference of the sequence, you can find the $(n + 1)$ th term by using the _____ formula $a_{n+1} = a_n + d$.
- The formula $S_n = \frac{n}{2}(a_1 + a_n)$ gives the sum of a _____ with n terms.


Skills and Applications


Determining Whether a Sequence Is Arithmetic In Exercises 5–12, determine whether the sequence is arithmetic. If so, find the common difference.

- 1, 2, 4, 8, 16, . . .
- 4, 9, 14, 19, 24, . . .
- 10, 8, 6, 4, 2, . . .
- 80, 40, 20, 10, 5, . . .
- $\frac{5}{4}, \frac{3}{2}, \frac{7}{4}, 2, \frac{9}{4}, \dots$
- 6.6, 5.9, 5.2, 4.5, 3.8, . . .
- $1^2, 2^2, 3^2, 4^2, 5^2, \dots$
- $\ln 1, \ln 2, \ln 4, \ln 8, \ln 16, \dots$


Writing the Terms of a Sequence In Exercises 13–20, write the first five terms of the sequence. Determine whether the sequence is arithmetic. If so, find the common difference. (Assume that n begins with 1.)

- $a_n = 5 + 3n$
- $a_n = 100 - 3n$
- $a_n = 3 - 4(n - 2)$
- $a_n = 1 + (n - 1)n$
- $a_n = (-1)^n$
- $a_n = n - (-1)^n$
- $a_n = (2^n)n$
- $a_n = \frac{3(-1)^n}{n}$



Finding the n th Term In Exercises 21–30, find a formula for a_n for the arithmetic sequence.

- $a_1 = 1, d = 3$
- $a_1 = 15, d = 4$
- $a_1 = 100, d = -8$
- $a_1 = 0, d = -\frac{2}{3}$
- $4, \frac{3}{2}, -1, -\frac{7}{2}, \dots$
- 10, 5, 0, -5, -10, . . .
- $a_1 = 5, a_4 = 15$
- $a_1 = -4, a_5 = 16$
- $a_3 = 94, a_6 = 103$
- $a_5 = 190, a_{10} = 115$




Writing the Terms of an Arithmetic Sequence In Exercises 31–36, write the first five terms of the arithmetic sequence.

- $a_1 = 5, d = 6$
- $a_1 = 5, d = -\frac{3}{4}$
- $a_1 = 2, a_{12} = -64$
- $a_4 = 16, a_{10} = 46$
- $a_8 = 26, a_{12} = 42$
- $a_3 = 19, a_{15} = -1.7$


Writing the Terms of an Arithmetic Sequence In Exercises 37–40, write the first five terms of the arithmetic sequence defined recursively.

- $a_1 = 15, a_{n+1} = a_n + 4$
- $a_1 = 200, a_{n+1} = a_n - 10$
- $a_5 = 7, a_{n+1} = a_n - 2$
- $a_3 = 0.5, a_{n+1} = a_n + 0.75$




Using a Recursion Formula In Exercises 41–44, the first two terms of the arithmetic sequence are given. Find the missing term.

- $a_1 = 5, a_2 = -1, a_{10} =$ _____
- $a_1 = 3, a_2 = 13, a_9 =$ _____
- $a_1 = \frac{1}{8}, a_2 = \frac{3}{4}, a_7 =$ _____
- $a_1 = -0.7, a_2 = -13.8, a_8 =$ _____



Sum of a Finite Arithmetic Sequence In Exercises 45–50, find the sum of the finite arithmetic sequence.

- $2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20$
- $1 + 4 + 7 + 10 + 13 + 16 + 19$
- $-1 + (-3) + (-5) + (-7) + (-9)$
- $-5 + (-3) + (-1) + 1 + 3 + 5$
- Sum of the first 100 positive odd integers
- Sum of the integers from -100 to 30



Partial Sum of an Arithmetic Sequence In Exercises 51–54, find the n th partial sum of the arithmetic sequence for the given value of n .

- 8, 20, 32, 44, . . . , $n = 50$
- 6, -2, 2, 6, . . . , $n = 100$
- 0, -9, -18, -27, . . . , $n = 40$
- 75, 70, 65, 60, . . . , $n = 25$

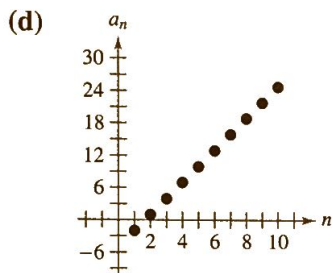
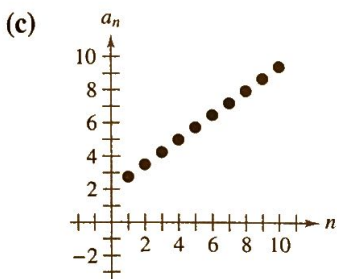
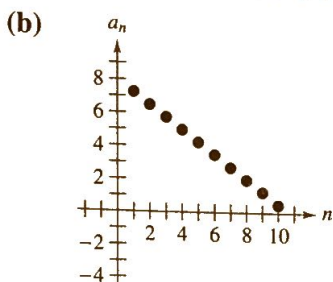
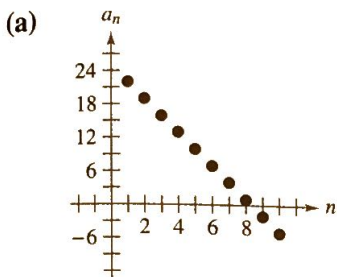


Finding a Sum In Exercises 55–60, find the partial sum.

55. $\sum_{n=1}^{50} n$
 57. $\sum_{n=1}^{500} (n + 8)$
 59. $\sum_{n=1}^{100} (-6n + 20)$

56. $\sum_{n=51}^{100} 7n$
 58. $\sum_{n=1}^{250} (1000 - n)$
 60. $\sum_{n=1}^{75} (12n - 9)$

Matching an Arithmetic Sequence with Its Graph In Exercises 61–64, match the arithmetic sequence with its graph. [The graphs are labeled (a)–(d).]



61. $a_n = -\frac{3}{4}n + 8$

62. $a_n = 3n - 5$

63. $a_n = 2 + \frac{3}{4}n$

64. $a_n = 25 - 3n$

Graphing the Terms of a Sequence In Exercises 65–68, use a graphing utility to graph the first 10 terms of the sequence. (Assume that n begins with 1.)

65. $a_n = 15 - \frac{3}{2}n$

66. $a_n = -5 + 2n$

67. $a_n = 0.2n + 3$

68. $a_n = -0.3n + 8$

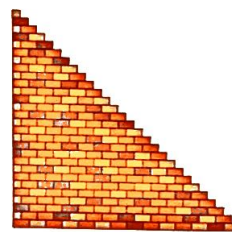
Job Offer In Exercises 69 and 70, consider a job offer with the given starting salary and annual raise.

(a) Determine the salary during the sixth year of employment. (b) Determine the total compensation from the company through six full years of employment.

Starting Salary	Annual Raise
69. \$32,500	\$1500
70. \$36,800	\$1750

71. Seating Capacity Determine the seating capacity of an auditorium with 36 rows of seats when there are 15 seats in the first row, 18 seats in the second row, 21 seats in the third row, and so on.

72. Brick Pattern A triangular brick wall is made by cutting some bricks in half to use in the first column of every other row (see figure). The wall has 28 rows. The top row is one-half brick wide and the bottom row is 14 bricks wide. How many bricks are in the finished wall?



73. Falling Object

- An object with negligible air resistance is dropped from the top of the Willis Tower in Chicago at a height of 1451 feet. During the first second of fall, the object falls 16 feet; during the second second, it falls 48 feet; during the third second, it falls 80 feet; during the fourth second, it falls 112 feet. Assuming this pattern continues, how many feet does the object fall in the first 7 seconds after it is dropped?



74. Prize Money A county fair is holding a baked goods competition in which the top eight bakers receive cash prizes. First place receives \$200, second place receives \$175, third place receives \$150, and so on.

- (a) Write the n th term (a_n) of a sequence that represents the cash prize received in terms of the place n the baked good is awarded.
- (b) Find the total amount of prize money awarded at the competition.

75. Total Sales An entrepreneur sells \$15,000 worth of sports memorabilia during one year and sets a goal of increasing annual sales by \$5000 each year for the next 9 years. Assuming that the entrepreneur meets this goal, find the total sales during the first 10 years of this business. What kinds of economic factors could prevent the business from meeting its goals?

76. Borrowing Money You borrow \$5000 from your parents to purchase a used car. The arrangements of the loan are such that you make payments of \$250 per month toward the balance plus 1% interest on the unpaid balance from the previous month.

- (a) Find the first year's monthly payments and the unpaid balance after each month.
- (b) Find the total amount of interest paid over the term of the loan.