PRACTICE & PROBLEM SOLVING

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Practice Tutorial

Additional Exercises Available Online

UNDERSTAND

12. Use Structure Write an arithmetic sequence with at least four terms, and describe it using both an explicit and recursive definition.

13. Error Analysis Alex says the common difference for an arithmetic sequence is always negative because of the definition of *difference*. Why is he wrong? Write an arithmetic sequence to show he is wrong.

14. Use Structure A company will pay Becky $120 for her first sale. For each sale after that, they will pay an extra $31.50 per sale. So, she will make $151.50 for the second sale, $183 for the third sale, and so on. How many sales will Becky have to make to earn at least $2,000?

15. Higher Order Thinking Felipe and Gregory are given the arithmetic sequence $-1, 6, 13, \ldots$. Gregory wrote the explicit definition $a_n = -1 + 7(n - 1)$ for the sequence. Felipe wrote the definition as $a_n = 7n - 8$. Which one of them is correct? Explain.

16. Model With Mathematics Suppose you are building 10 steps with 8 concrete blocks in the top step and 80 blocks in the bottom step. If the number of blocks in each step forms an arithmetic sequence, find the total number of concrete blocks needed to build the steps.

17. Model With Mathematics With her half-marathon quickly approaching, Talisa decides to train every day up to the day of the race. She plans to run 2 mi the first day and 3.2 mi the fifth day.

a. What is the explicit definition for this sequence?

b. Which day of training will she run the distance of a half-marathon (13 mi)?

PRACTICE

Are the following sequences arithmetic? If so, what is the common difference? What is the next term in the sequence? SEE EXAMPLE 1

18. 10, 20, 30, 40, . . .

19. 97, 86, 75, 64, . . .

20. 1, 4, 9, 16, . . .

21. 3, 7, 11, 15, . . .

Translate between the recursive and explicit definitions for each sequence. SEE EXAMPLE 2

22. $a_n = \begin{cases} 2, n = 1 \\ a_{n-1} + 2, n > 1 \end{cases}$

23. $a_n = -2 + 7(n - 1)$

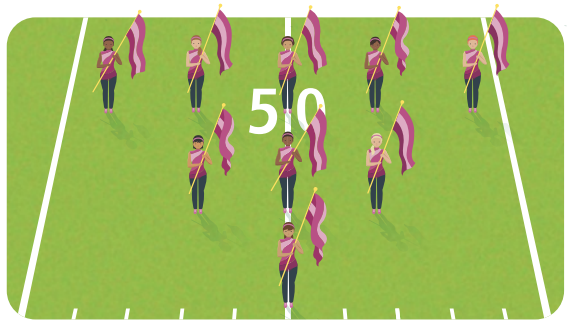
24. $a_n = \frac{1}{8}(n - 1)$

25. $a_n = \begin{cases} -4, n = 1 \\ a_{n-1} - 4, n > 1 \end{cases}$

26. The members of a school's color guard begin their performance in a pyramid formation. The first row has 1 member, and the third row has 5 members. SEE EXAMPLE 3

a. What is the explicit definition for this sequence?

b. How many members are in the eighth row?



Find the sum of an arithmetic series with the given number of terms, a_1, and a_n. SEE EXAMPLE 4

27. 10 terms, $a_1 = 4$, $a_{10} = 31$

28. 15 terms, $a_1 = 17$, $a_{15} = 129$

What is the sum of each of the following series? SEE EXAMPLE 5

29. $\sum_{n=1}^{11} (3 + 2n)$

30. $\sum_{n=1}^{12} \left(\frac{n}{2} - 9\right)$

31. The number of seats in each row of an auditorium increases as you go back from the stage. The front row has 24 seats, the second row has 29 seats, and the third row has 34 seats. If there are 35 rows, how many seats are in the auditorium? SEE EXAMPLE 6

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Mixed Review Available Online

APPLY

32. Make Sense and Persevere A piece of tile artwork is in the shape of a triangle. The top row has 1 tile, the second row has 2 tiles, and the third row has 3 tiles. If there are 14 rows of tiles, how many tiles were used to make the artwork?

33. Model With Mathematics A race car driver travels 34 ft in the first second of a race. If the driver travels 3.5 additional feet each subsequent second, how many feet did the driver travel in 52 s?

34. Construct Arguments A school board committee has decided to spend its annual technology budget this year on 90 student laptops and plans to buy 40 new laptops each year from now on.

a. The school board decided that each student in the school should have access to a laptop in the next ten years. If there are 500 students, will the technology coordinator meet this goal? Explain.

b. What are some pros and cons of buying student laptops in this manner? If you could change the plan, would you? If so, how would you change it?

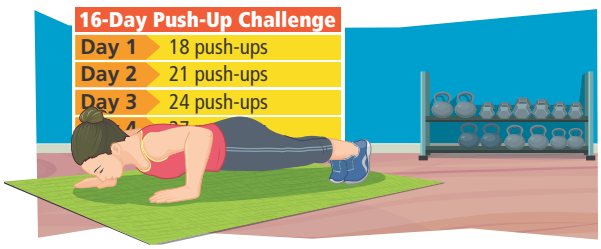
35. Make Sense and Persevere On October 1, Nadia starts a push-up challenge by doing 18 push-ups. On October 2, she does 21 push-ups. On October 3, she does 24 push-ups. She continues until October 16, when she does the final push-ups in the challenge.

a. Write an explicit definition to model the number of push-ups Nadia does each day.

b. Write a recursive definition to model the number of push-ups Nadia does each day.

c. How many push-ups will Nadia do on October 16?

d. What is the total number of push-ups Nadia does from October 1 to October 16?



ASSESSMENT PRACTICE

36. Which of the following are also numbers in the arithmetic sequence 4, 11, 18, 25, 32, . . . ? Write the numbers in the correct box.

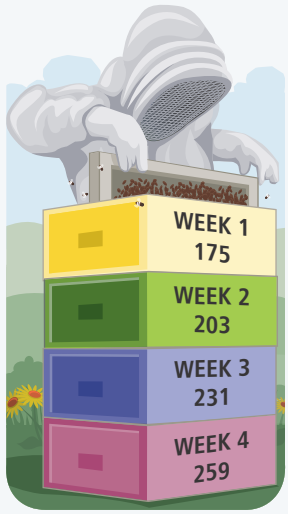
60 68 75 39 81

In the sequence	Not in the sequence

37. SAT/ACT Tamika is selling magazines door to door. On her first day, she sells 12 magazines, and she intends to sell 5 more magazines per day than on the previous day. If she meets her goal and sells magazines for a total of 10 days, how many magazines would she sell?

Ⓐ 314 Ⓑ 345 Ⓒ 415 Ⓓ 474 Ⓔ 505

38. Performance Task The chart shows the population of Edgar's beehive over the first four weeks. Assume the population will continue to grow at the same rate.



Part A Write an explicit definition for the sequence.

Part B If Edgar's bees have a mass of 1.5 g each, what will the total mass of all his bees be in 12 wk?

Part C When the colony reaches 1,015 bees, Edgar's beehive will not be big enough for all of them. In how many weeks will the bee population be too large?