

# Arithmetic Sequences

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## Vocabulary

#### Review

1. Circle the name of the next shape in the pattern at the right.

rectangle

circle

hexagon

octagon

 $\wedge$ 



Find the next number in each pattern

2.  $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{2}$ 

3. 6, 4, 2, 0,

**4.** 2, 10, 50, 250, 人25つ

## Vocabulary Builder

sequence (noun) see kwuns

Fibonacci sequence

0, 1, 1, 2, 3, 5, 8, 13, 21, ...

**Definition:** A **sequence** is an ordered list of numbers that often form a pattern. Each number in the list is called a *term* of the **sequence**.

**Example:** The Fibonacci sequence is a **sequence** of numbers where the first number is 0, the second number is 1, and each subsequent number is equal to the sum of the previous two numbers.

Origin: from the Latin word sequentia, which means "to follow"

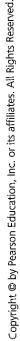
## **Our Vocabulary**

The following sets of numbers are sequences. Explain each pattern.

**5.** set of whole numbers greater than or equal to  $5: \{5, 6, 7, 8, 9, ...\}$ 

Starting at 5, we are going up by one each # in the set.

**6.** {40, 42, 44, 46, 48, ...}



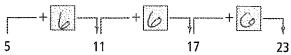
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## 다이리아(I) Extending Sequences

Got 18? Describe a pattern in the sequence 5, 11, 17, 23, .... What are the next two terms of the sequence?

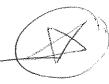
7. Complete the diagram. What number is added to each term?



**8.** Describe the pattern in the sequence.

9. Find the next two terms in the sequence.

5, 11, 17, 23, 29, 35,...





Bro의em 2) Identifying an Arithmetic Sequence

When a sequence.

Got it? Tell whether the sequence 8, 15, 22, 30, ... is arithmetic. If it is, what is the common difference?

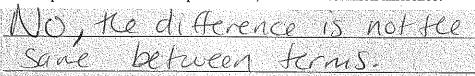
10. Complete the table.

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**11.** Do the consecutive terms have a common difference?

Yes (No )

12. Is the sequence an arithmetic sequence? If so, what is the common difference?

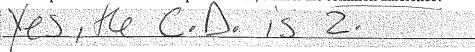


Got It? Tell whether the sequence 7, 9, 11, 13, ... is arithmetic. If it is, what is the common difference?

13. Complete the table.

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14. Is the sequence an arithmetic sequence? If so, what is the common difference?

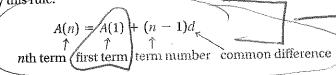


## ACTION )

## Key Concept Rule for an Arithmetic Sequence

The nth term of an arithmetic sequence with the first term A(1) and common difference d is given by this rule:

difference d is given by this rule:



17. The equation A(5) = 3 + (5 - 1)7 generates the fifth term in a sequence. Draw a line from each number in Column A to its description in Column B.

Column A

Column B

first term of the sequence

term number

common difference

Find: 3,5+10 tems.

Ex: A(n)=-z+(n-1)5

A(3)=-2+(3-1)5



## Reddian री Writing a Recursive Formula

Got 11? Write the recursive formula for the arithmetic sequence 3, 9, 15, 21,... What is the 9th term in the sequence? -2 + 10

**18.**  $A(1) = \frac{1}{2}$ 

$$A(2) = A(1) + = 3 + = 5$$

$$A(3) = A(2) + = + = 15$$

$$A(4) = A(3) + = + = 21$$

19. The recursive formula for the arithmetic sequence is  $A(n) = \frac{1}{n}$ 

**20.** 
$$A(5) = A(4) + = +$$

$$A(7) = A(6) + = + =$$

$$A(8) = A(7) + = +$$

$$A(9) \neq A(8) + = + =$$

A(3) = 8

$$A(5) = -2 + (5-1)5$$
 $-2 + (4)5$ 

$$A(5) = 18$$



## নিটোলের) Writing an Explicit Formula

Got 11? A subway pass has a starting value of \$100. After one ride, the value of the pass is \$98.25. After two rides, its value is \$96.50. After three rides, its value is \$94.75. Write a rule to represent the remaining value on the card as an arithmetic sequence. What is the value of the pass after 15 rides?

**21.** Describe how the values for A(n) are found.

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**22.** How many times is 1.75 subtracted from 100 when n = 1? What is the A(1) term?

a. How many times is 1.75 subtracted from 100 when n = 2?

What is the A(2) term?

b. How many times is 1.75 subtracted from 100 when n = 3?

What is the A(3) term?

c. How many times is 1.75 subtracted from 100 when n = 4?

What is the A(4) term?

d. How many times is 1.75 subtracted from 100 when n = n?

What is the A(n) term?

23. What is *n* for the term *after* 15 rides are used? Using the formula, what is the value of the pass after 15 rides?



#### Lesson Check • Do you UNDERSTAND?

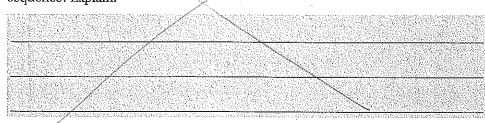
Reasoning Can you use the rule below to find the nth term of an arithmetic sequence with a first term A(1) and a common difference d? Explain.

$$A(n) = A(1) + nd - d$$

24. Use the Distributive Property to write an equivalent formula.

A(n) = A(1) + nd - d

**25.** Can you use the rule A(n) = A(1) + nd - d to find the *n*th term of an arithmetic sequence? Explain.





## **Math Success**

Check off the vocabulary words that you understand.

- sequence
- term of a sequence
- arithmetic sequence
- common difference

Rate how well you can understand arithmetic sequences.

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