

# Lesson 11-2

## Arithmetic Sequences

<p><b>Lesson Objective</b></p> <p>▼ Identifying and generating arithmetic sequences</p>	<p><b>NAEP 2005 Strand:</b> Algebra</p> <p><b>Topic:</b> Patterns, Relations, and Functions</p> <p><b>Local Standards:</b> _____</p>
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### Vocabulary and Key Concepts

#### Arithmetic Sequence Formulas

**Formula**

$$a_1 = \text{a given value}, a_n = a_{n-1} + d$$

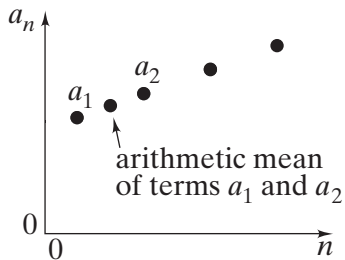
**Formula**

$$a_n = a_1 + (n - 1)d$$

In these formulas,  $a_n$  is the  $n$ th term,  $a_1$  is the first term,  $n$  is the number of the term, and  $d$  is the common difference.

In an arithmetic sequence, \_\_\_\_\_

A common difference is \_\_\_\_\_



The arithmetic mean of any two numbers is \_\_\_\_\_

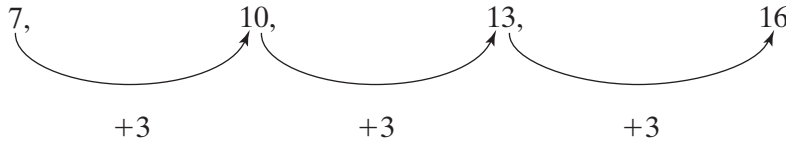
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**Examples**

**1 Identifying an Arithmetic Sequence** Is the given sequence arithmetic?

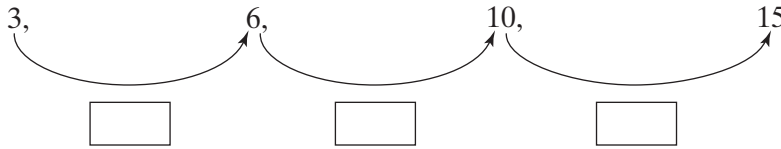
a. 7, 10, 13, 16, ...



$10 - 7 = \square$     $13 - 10 = \square$     $16 - 13 = \square$

The common difference is  $\square$ . This  $\square$  an arithmetic sequence.

b. the sequence of dots in the triangles shown below



$6 - 3 = \square$     $10 - 6 = \square$     $15 - 10 = \square$

There is no common difference. This  $\square$  an arithmetic sequence.

**2 Saving Money** Suppose you have already saved \$75 toward the purchase of a new CD player and speakers. You plan to save at least \$12 a week from money you earn at a part-time job. In all, what is the minimum amount you will have saved after 26 weeks?

Find the 27th term of the sequence 75, 87, 99, ...

$a_n = a_1 + (n - 1)d$

Use the explicit formula.

$a_{27} = \square + (\square - \square)(\square)$

Substitute  $a_1 = \square$ ,  $n = \square$ , and  $d = \square$ .

$= 75 + (\square)(\square)$

Subtract within parentheses.

$= 75 + \square$

Multiply.

$= \square$

Simplify.

After 26 weeks, you will have saved a minimum of \$  $\square$ .

**3 Using the Arithmetic Mean** Find the missing term of the arithmetic sequence  
 50, , 92.

arithmetic mean =  $\frac{\text{ } + \text{ }}{\text{ }}$  **Write the average.**

=  $\frac{\text{ }}{\text{ }}$  **Simplify the numerator.**

=  $\text{ }$  **Divide.**

The missing term is  $\text{ }$ .

**Quick Check**

1. Is the given sequence arithmetic? If so, identify the common difference.

a. 2, 5, 7, 12, ...

b. 48, 45, 42, 39, ...

2. a. Refer to the formula in Example 2. Why was it necessary to find the value of the 27th term, not the 26th term?

b. Use the explicit formula to find the 25th term in the sequence 5, 11, 17, 23, 29, ...

3. a. Find the missing term of the arithmetic sequence 24, , 57.

b. Write an expression that shows the arithmetic mean of  $a_6$  and  $a_7$ .

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