

TOPIC: ARITHMETIC SEQUENCES

Intro to Arithmetic Sequences

- ◆ If the terms of a sequence ____ or _____ by the same amount each time, we call it an **arithmetic sequence**.
- The **common difference** d is the difference between any two consecutive terms (ex. $a_1 - a_2$ or $a_3 - a_1$).

New Arithmetic Sequences

$\{2, \underbrace{6, 10, 14, \underline{\hspace{2cm}}, \underline{\hspace{2cm}}, \dots}\}$

$d = \frac{\underline{\hspace{2cm}}}{a_2} - \frac{\underline{\hspace{2cm}}}{a_1} =$

EXAMPLE

Find the common difference of the arithmetic sequence and then use it to find the next two terms.

$$a_1 = 10; a_2 = 8$$

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PRACTICE

Find the common difference of the following sequence.

(A)

$$-9, -4, 1, 6, \dots$$

(B)

$$\frac{7}{4}, \frac{5}{4}, \frac{3}{4}, \frac{1}{4}$$

PRACTICE

Write the first 5 terms of the arithmetic sequence, given the first term and the common difference.

(A)

$$a_1 = -12; \quad d = -5$$

(B)

$$a_1 = \frac{3}{2}; \quad d = \frac{1}{4}$$

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General Term of an Arithmetic Sequence

- ◆ Recall: The terms of an arithmetic sequence have a common difference d between any two consecutive terms.
- The general (n th) term a_n of an arithmetic sequence is based on _____ (the _____ term) & _____.

New **General Term of Arithmetic Sequences**

$$a_n = \underline{\quad} + (\underline{\quad}) \cdot \underline{\quad}$$
$$\{2, 6, 10, 14 \dots\}$$
$$a_n =$$
$$a_{20} =$$

EXAMPLE

Write a formula for the general or n th term for each arithmetic sequence.

(A)
 $a_1 = 8; d = -6$

(B)
 $a_1 = 2; a_5 = 14$

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PRACTICE

Write a general formula for the arithmetic sequence given.

(A)

$$-5, -12, -19, -26, \dots$$

(B)

$$\frac{1}{2}, \frac{5}{6}, \frac{7}{6}, \frac{3}{2}, \dots$$

PRACTICE

Find the indicated term of each arithmetic sequence.

(A)

$$a_n = 7 + 3(n - 1)$$

Find a_{12} .

(B)

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

Find a_6 .

EXAMPLE

For the arithmetic sequence given below, find the indicated term.

$$a_5 = -12$$

$$a_{15} = 18$$

Find a_9 .

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EXAMPLE

How many terms are in the arithmetic sequence?

4, 9, 14, 19, ... 94

EXAMPLE

A school play sold 120 tickets on opening night. Each following night, ticket sales increased by 25 tickets. After 10 nights, how many tickets were sold on the final night?