

# Algebra 1

Chapter 4

Section 4-7

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## Sequences

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

*An arithmetic sequence is a sequence whose terms have a common difference (the terms are the same distance apart).*

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## Patterns

Find the next three terms of each pattern.  
If possible, identify a common difference.

11, 13, 15, 17, 19, 21  $d=+2$

-1, 2, -4, 8, -16, 32, -64, 128  $\times(-2) \rightarrow$  not a common diff.

21, 15, 9, 3, -3, -9  $d=-6$

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## Recursive Formulas

Notation:  $A(n)$   $\xrightarrow{\text{input}}$   $\left\{ \begin{array}{l} n \text{ is the number of the term} \\ A \text{ is the sequence} \end{array} \right.$   
*output*  $\underbrace{\hspace{2cm}}$

Sequence: 10, 14, 18, 22, 26, ...

- What is  $A(\underline{1})$ ?  $A(1)$  is 1st term  $\rightarrow 10$
- What is the common difference,  $d$ ?  $+4$
- How do you find each  $A(n)$  in the sequence?

$A(n-1)$  is term before  $A(n)$

To find  $A(n)$  we add 4 to  $A(n-1)$

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## Recursive Formula

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

$A(1)$  is the 1st term of the sequence

Each term depends on previous term

$$\text{EX: } \underline{A(4)} = \underline{A(3)} + \underline{6}$$

(to find the forth term, add 6 to the third term)

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Find the first five terms of the sequence

$$A(1) = 2$$

$$d = 11$$

2, 13, 24, 35, 46

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Find the 29th term of the sequence

$$A(28) = 220$$

$$d = 11$$

$$\begin{aligned} A(29) &= A(28) + 11 \\ &= 220 + 11 = 231 \end{aligned}$$

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Write Each Recursive Formula

[A in terms of n]

$$25, 22, 19, 16, \dots \quad d = -3 \quad A(n) = A(n-1) - 3$$

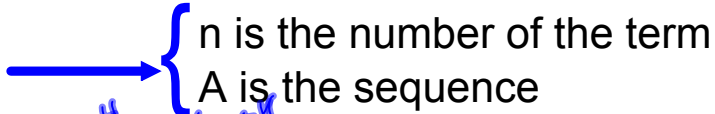
$$-1, -4, -7, -10, \dots \quad d = -3 \quad A(n) = A(n-1) - 3$$

$$\begin{array}{c} \begin{array}{ccc} \overset{-11}{\curvearrowright} & \overset{-11}{\curvearrowright} & \overset{-11}{\curvearrowright} \\ \downarrow & \downarrow & \downarrow \\ 21, & 10, & -1, & -12, \dots \end{array} \\ A(n) = A(n-1) - 11 \end{array}$$

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## Explicit Formulas

A way to find terms in a sequence without knowing every previous term.

Notation:  $A(n)$  

Sequence: 10, 14, 18, 22, 26, ...



- What is  $A(1)$ ? 10
- What is the common difference,  $d$ ? +4
- How is each  $A(n)$  related to the first term?

Add "d" | less than  
# of term

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## Explicit Formula

$$\underline{A(n) = A(1) + (n-1) \cdot d}$$

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Find the 8th and 31st terms of the sequence

$$A(1) = 2$$

$$d = 11$$

$$A(n) = A(1) + (n-1) \cdot d$$

$$A(8) = A(1) + (8-1) \cdot d$$

$$= 2 + 7 \cdot 11$$

$$= 2 + 77$$

$$A(8) = 79$$

$$A(31) = A(1) + (31-1) \cdot d$$

$$= 2 + 30 \cdot 11$$

$$= 2 + 330$$

$$A(31) = 332$$

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### Online Auction

Andre is bidding in an online auction for a new pencil. His bids have been \$4.80, \$5.60, and \$6.40. Determine the pattern of his bids. Then write an explicit formula describing the pattern of his bids. Use this formula to predict the amount of his 9th bid.

$$\textcircled{1} d = .80$$

$$\textcircled{2} A(n) = A(1) + (n-1)d$$

$$A(9) = 4.80 + (9-1) \cdot .80$$

$$4.80 + 8 \cdot .80$$

$$4.80 + 6.40$$

$$A(9) = 11.20$$

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