

# PAP Algebra 2

## Arithmetic Sequences

Sequence—an ordered set of numbers

- Each number is a term of the sequence.
- May be finite or infinite.

1, 3, 5, 7, ...      25, 20, 15, 10, 5

Arithmetic sequence—a pattern is formed by adding or subtracting the same value, called the common difference to create the next term

arithmetic sequences

sequences

Determine whether each sequence could be arithmetic. If so, find the common difference and the next term.

6, 10, 14, 18, 22, ... Arithmetic  $d=4$   
 $+4$   $+4$       26

5, -6, -17, -28, -39, ... Arithmetic  $d=-11$   
 -50

1, 1, 2, 2, 3, ... Not Arithmetic

-4, 12, 28, 44, 60, ... Arithmetic  $d=16$   
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-2, 2, -2, 2, -2, ...

examples

**Find a term in a sequence:**

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

$a_n$ :  $n^{\text{th}}$  term  
 $a_1$ : 1<sup>st</sup> term  
 $n$ : number of terms  
 $d$ : common difference

$n^{\text{th}}$  term

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

Find the requested term of each arithmetic sequence.

6, 12, 18, 24, ... Find the 10<sup>th</sup> term.

$$a_{10} = 6 + (10-1)(6) \quad a_{10} = 60$$

$$= 6 + (9)(6)$$

$$= 6 + 54$$

7, -1, -9, -17, ... Find the 16<sup>th</sup> term.

$$a_{16} = 7 + (16-1)(-8) \quad a_{16} = -113$$

$$= 7 + (15)(-8)$$

$$= 7 + -120$$

0.5, 1.0, 1.5, 2.0, ... Find the 21<sup>st</sup> term.

$$a_{21} = 0.5 + (21-1)(.5) \quad a_{21} = 10.5$$

$$= 0.5 + (20)(.5)$$

$$= 0.5 + 10$$

examples

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

Find the missing terms in each arithmetic sequence.

5, 18, 31, 44, 57, 70

$$70 = 5 + (6-1)d$$

$$70 = 5 + 5d$$

$$65 = 5d$$

$$13 = d$$

2.5, 1.8, 1.1, 0.4

$$0.4 = 2.5 + (4-1)d$$

$$0.4 = 2.5 + 3d$$

$$-2.1 = 3d$$

$$-0.7 = d$$

examples

Find the 1<sup>st</sup> and 20<sup>th</sup> term of the arithmetic sequence.

$a_4 = 27$  and  $a_{10} = -21$       (4, 27) (10, -21)

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

$$27 = a_1 + (4-1)(-8)$$

$$27 = a_1 + (3)(-8)$$

$$27 = a_1 - 24$$

$$+24 \quad +24$$

$$\boxed{51 = a_1}$$

$$\text{Slope} = \frac{-21-27}{10-4} = \frac{-48}{6} = -8 = d$$

$$a_{20} = 51 + (20-1)(-8)$$

$$a_{20} = 51 + (19)(-8)$$

$$a_{20} = 51 + -152$$

$$\boxed{a_{20} = -101}$$

examples

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

In an arithmetic sequence beginning with 8 and ending with 216, how many integers are divisible by 4?

$a_1 = 8$     $a_n = 216$     $d = 4$     $n =$

$$216 = 8 + (n-1)(4)$$

$$216 = 8 + 4n - 4$$

$$216 = 4n + 4$$

$$212 = 4n$$

$$\boxed{53 = n}$$

examples

**Conclusion**

1. What is an arithmetic sequence?
2. Will you need to memorize this formula?  
*+ or - common difference*
3. Questions???  
*yes*

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**Assignment**

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