

## Warm Up

September 26, 2018

- 1.) Write a linear function with a x-intercept of 2 and a y-intercept of -3.

$(0, -3)$

$$m = \frac{-3 - 0}{0 - 2} = \frac{-3}{-2} = \frac{3}{2}$$

$y = mx + b$   $(2, 0)$

$$y = \frac{3}{2}x - 3$$

- 2.) A function is shown in the table below.

Which interval had the smallest rate of change?

A.) 0 to 3 = 50

B.) 3 to 7 = 12.5

C.) 7 to 9 = 115

D.) 9 to 11 = 30

Slope

x	f(x)
0	1,750
3	1,900
7	1,950
9	2,180
11	2,240

# Arithmetic Sequences

**1, 3, 5, 7, 9, 11, 13, 15**



**2, 5, 8, 11, 14, 17, 20, 23**



# What is it?

Main Ideas/Questions	Notes
Arithmetic Sequence	a sequence in which the same number
	is repeatedly added or subtracted.

Common Difference	the number repeatedly added
	or subtracted; variable $d$

Identifying an Arithmetic Sequence	<p><b>Determine whether the sequences are arithmetic sequences. If yes, identify the common difference.</b></p> <div> <div>1. 1, 5, 9, 13, ...</div> <div>2. 1, 3, 5, 8, ...</div> <div>3. 8, 6, 4, 2, ...</div> <div>4. -5, -8, -11, -14, ...</div> <div>5. 5, 10, 20, 40, ...</div> <div>6. 7, 6, 5, 4, ...</div> </div>
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## One Step Further....

*Write a NEXT/NOW statement for the arithmetic sequences above.*

1.) 1, 5, 9, 13                      Arithmetic? Yes or NO  
Common Difference (d) = 4  
NEXT = NOW + 4

2.) 1, 3, 5, 8                      Arithmetic? Yes or NO  
Common Difference (d) = \_\_\_\_\_  
NEXT = \_\_\_\_\_

Continuing  
Arithmetic  
Sequences

*Given the arithmetic sequence, find the next three terms.*

7. 9, 13, 17, 21, 25, 29, 33

8. 5, 2, -1, -4, -7, -10, -13

9. -8, -2, 4, 10, 16, 22, 28

7.) NEXT = NOW + 4

8.) NEXT = NOW - 3

9.) NEXT = NOW + 6

# Arithmetic Sequences: THE EXPLICIT FORMULA

Arithmetic  
Sequence  
Formula

The  $n^{\text{th}}$  term of an arithmetic sequence can be found using the following formula:

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

$d =$  common  
diff.

$a_1 =$  first  
term

$n =$  desired  
term

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

Examples:

Examples  
Write the rule for  
the  $n^{\text{th}}$  term.  
then find  $a_{19}$ .

1 2 3 4  
10. 7, 13, 19, 25, ...

$$a_n = 7 + (n-1)(6)$$

$$a_n = 6(n-1) + 7$$

$$a_{19} = 6(19-1) + 7$$

$$a_{19} = 115$$

$d =$  \_\_\_\_\_

$a_1 =$  \_\_\_\_\_

$n =$  \_\_\_\_\_

$$a_n = 6n - 6 + 7$$

$$a_n = 6n + 1$$

11. 30, 26, 22, 18, ...

$$a_n = -4(n-1) + 30$$

$$a_n = 30 + (n-1)(-4)$$

$$a_{19} = -4(19-1) + 30$$

$$a_{19} = -42$$

$d =$  \_\_\_\_\_

$a_1 =$  \_\_\_\_\_

$n =$  \_\_\_\_\_

$$a_n = -4n + 4 + 30$$

$$a_n = -4n + 34$$

12. -11, -8, -5, -2 ...

d= \_\_\_\_\_

$a_1$  = \_\_\_\_\_

n= \_\_\_\_\_

13. -2, 0, 2, 4, ...

$$a_n = 2(n-1) - 2$$

$$a_n = 2n - 2 - 2$$

$$a_{19} = 34 \quad d = \underline{2} \quad a_n = 2n - 4$$

$$a_1 = \underline{-2}$$

$$n = \underline{19}$$

14. -16, -21, -26, -31, ...

$$a_n = -5n - 11$$

$$a_n = -5(n-1) - 16$$

$$d = \underline{-5}$$

$$a_1 = \underline{-16}$$

$$n = \underline{19}$$

$$a_{19} = -106$$

1	-16
2	-21
3	-26
4	-31

15. 101, 92, 83, 74, ...

d= \_\_\_\_\_

$a_1$  = \_\_\_\_\_

n= \_\_\_\_\_



## Explicit

### Explicit Formula

The formula for the EXPLICIT Arithmetic Sequence is

Where  $d$  is common difference of any 2 consecutive numbers.

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

Where  $a_1$  is the value of the 1<sup>st</sup> term.

Where  $n$  is the value of the first term.

Where  $n$  is the position or location of the  $n^{\text{th}}$  term.

Remember what it's used for: Finding the value of any term as long as you know the TERM POSITION or LOCATION.

Finding any term.

## Recursive

### Recursive Formula

If you know any term of an arithmetic sequence and you know the common difference of the sequence, you can find the next term.

$$a_n = a_{n-1} + d$$

→ NEXT = NOW + d

Finding next term.



### Real Life Applications

$$d = 32$$

$$a_1 = 16$$

$$d = 295.80$$

$$a_1 = 15265$$

## Real Life Applications

**16.** You visit the Grand Canyon and drop a penny off the edge of the cliff. The distance the penny will fall is 16 feet for the first second, 48 feet the next second, 80 feet the third second, and so on.

a. Write a formula to represent this sequence.

$$a_n = 32(n-1) + 16$$

$$a_n = 32n - 16$$

b. How far will the penny have traveled after 6 seconds?

$$a_n = 32(6) - 16 = 176 \text{ ft.}$$

**17.** The total bank loan for Sarah's new car is \$15,265. The bank automatically withdraws \$295.80 each month to pay off the car.

a. Write a formula to represent this sequence.

$$a_n = -295.80(n-1) + 15265$$

$$a_n = -295.80n + 15920.80$$

b. What will be the balance of the loan after 2 years?

$$a_n = -295.80(24) + 15920.80$$

$$a_n = \$8821.60$$