e: Key | Date:

c: Arithmetic Sequences | Class:

n Ideas/Questions	Notes
Arithmetic Sequence	A sequence in which the difference between any two consecutive terms is constant.
Common Difference	The numerical difference, d, between any two consecutive terms.
Identifying an ~~Arithmetic~~ Sequence	***Determine whether the sequences are arithmetic sequences. If yes, identify the common difference.*** **1.** 1, 5, 9, 13, ... yes; $d=4$ **2.** 1, 3, 5, 8, ... NO **3.** 8, 6, 4, 2, ... yes; $d=-2$ **4.** -5, -8, -11, -14, ... yes; $d=-3$ **5.** 5, 10, 20, 40, ... NO **6.** 7, 6, 5, 4, ... yes; $d=-1$
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
Arithmetic Sequence Formula	**The n^{th} term of an arithmetic sequence can be found using the following formula:** $a_n = d(n-1) + a_1$ **d =** common difference **a_1 =** first term of sequence
Examples **Write the rule for the nth term, then find a_{19}.**	**10.** 7, 13, 19, 25, ... $d=6$, $a_1=7$ $a_n = 6(n-1)+7$ $= 6n-6+7$ $= 6n+1$ $a_{19} = 6(19)+1 = \boxed{115}$ **11.** 30, 26, 22, 18,... $d=-4$, $a_1=30$ $a_n = -4(n-1)+30$ $= -4n+4+30$ $= -4n+34$ $a_{19} = -4(19)+34 = \boxed{-42}$

Main Ideas/Questions	Notes	
$a_n = d(n-1) + a_1$	**12.** -11, -8, -5, -2 ... $d = 3$ $a_1 = -11$ $a_n = 3(n-1) - 11$ $= 3n - 3 - 11$ $= 3n - 14$ $a_{19} = 3(19) - 14 = \boxed{43}$	**13.** -2, 0, 2, 4, ... $d = 2$ $a_1 = -2$ $a_n = 2(n-1) - 2$ $= 2n - 2 - 2$ $= 2n - 4$ $a_{19} = 2(19) - 4 = \boxed{34}$
	14. -16, -21, -26, -31, ... $d = -5$ $a_1 = -16$ $a_n = -5(n-1) - 16$ $= -5n + 5 - 16$ $= -5n - 11$ $a_{19} = -5(19) - 11 = \boxed{-106}$	**15.** 101, 92, 83, 74, ... $d = -9$ $a_1 = 101$ $a_n = -9(n-1) + 101$ $= -9n + 9 + 101$ $= -9n + 110$ $a_{19} = -9(19) + 110 = \boxed{-61}$

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.

16, 48, 80, . . .

a. Write a formula to represent this sequence.

$d = 32$ $a_1 = 16$

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

$= 32n - 32 + 16 = 32n - 16$

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

$a_6 = 32(6) - 16$

$= \boxed{176\text{ ft}}$

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.

$d = -295.80$ $a_1 = 15265$

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

$= -295.80n + 295.80 + 15265$

$= -295.80n + 15560.8$

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

$a_{24} = -295.80(24) + 15560.8$

$= \boxed{\$8461.60}$

Name: ______________________________ **Unit 3:** Relations & Functions

Date: ________________________ **Bell:** _____ **Homework 5:** Arithmetic Sequences & Quiz 3-2 Review

** This is a 2-page document! **

Determine whether each sequence is an arithmetic sequence. If yes, identify the common difference.

1. 4, 7, 9, 12, ... NO

2. 15, 13, 11, 9, ... yes; $d=-2$

3. 7, 10, 13, 16, ... yes; $d=3$

4. -6, -5, -3, -1, ... NO

5. -13, -6, 1, 8, ... yes; $d=7$

6. -9, -14, -19, -24, ... yes; $d=-5$

Find the next three terms of each arithmetic sequence.

7. 3, 7, 11, 15, 19, 23, 27

8. 22, 20, 18, 16, 14, 12, 10

9. -13, -11, -9, -7, -5, -3, -1

10. -2, -5, -8, -11, -14, -17, -20

Write an equation to find the nth term of each sequence. Then find a_{24}

11. 1, 3, 5, 7, ...

$a_n = 2(n-1)+1$
$= 2n-2+1$
$= 2n-1$
$a_{24} = 2(24)-1 = \boxed{47}$

12. -1, -4, -7, -16, ...

$a_n = -3(n-1)-1$
$= -3n+3-1$
$= -3n+2$
$a_{24} = -3(24)+2 = \boxed{-70}$

13. -4, -9, -14, -19, ...

$a_n = -5(n-1)-4$
$= -5n+5-4$
$= -5n+1$
$a_{24} = -5(24)+1 = \boxed{-119}$

14. 7, 13, 19, 25, ...

$a_n = 6(n-1)+7$
$= 6n-6+7$
$= 6n+1$
$a_{24} = 6(24)+1 = \boxed{145}$

15. Charlie deposited \$115 in a savings account. Each week thereafter, he deposits \$35 into the account.

a. Write a formula to represent this sequence.

$a_n = 35(n-1)+115$
$= 35n-35+115$
$= 35n+80$

b. How much total money has Charlie deposited after 30 weeks?

$a_{30} = 35(30)+80$
$= \boxed{\$1130}$

16. As manager of the soccer team, Wendy is to hand out cups of water at practice. Each cup of water is 4 ounces. She begins practice with a 128-ounce cooler of water.

a. Write a formula to represent this sequence.

$a_n = -4(n-1)+128$
$= -4n+4+128$
$= -4n+132$

b. How much water is remaining after she hands out the 14th cup?

$a_{14} = -4(14)+132$
$= \boxed{76\ 0z}$

Name:	Class:
Topic: Geometric Sequences	Date:

Main Ideas/Questions	Notes
Geometric Sequences	A sequence of numbers in which the ratio (r) remains constant.
Common Ratio	Found by dividing each term by its previous term.
Identifying a Geometric Sequence	Determine whether the following represent geometric sequences. If yes, identify the common ratio. **1.** 2, 10, 50, 250, … yes; $r=5$ **2.** 135, 45, 15, 5, … yes; $r=\frac{1}{3}$ **3.** 6, 18, 24, 30, … no **4.** 7, -14, 28, -56, … yes; $r=-2$ **5.** 80, -40, 20, -10, … yes; $r=-\frac{1}{2}$ **6.** -9, -36, -144, -576, … yes; $r=4$
Continuing Geometric Sequences	Given the geometric sequence, find the next three terms. **7.** 7, -21, 63, -189, 567, -1701 **8.** 3072, 768, 192, 48, 12, 3 **9.** 8, 4, 2, 1, $\frac{1}{2}$, $\frac{1}{4}$ **10.** -5, -25, -125, -625, -3125, -15625
Geometric Sequence Formula	The n^{th} term of a geometric sequence can be found using the following formula: $a_1 =$ 1st term $r =$ ratio $a_n = a_1 \cdot r^{n-1}$
Examples Write the rule for the nth term, then find a_7.	**11.** 3, 9, 27, … $r=3$ $a_n = 3 \cdot 3^{n-1}$ $a_7 = 3 \cdot 3^{7-1}$ $= 3 \cdot 3^6$ $= \boxed{2{,}187}$ **12.** -4, 20, -100, … $r=-5$ $a_n = (-4) \cdot (-5)^{n-1}$ $a_7 = (-4) \cdot (-5)^{7-1}$ $= (-4) \cdot (-5)^6$ $= \boxed{-62500}$

Main Ideas/Questions	Notes	
$a_n = a_1 \cdot r^{n-1}$ a_7	**13.** 400, 200, 100, … $r = \frac{1}{2}$ $a_n = 400 \cdot (\frac{1}{2})^{n-1}$ $a_7 = 400 \cdot (\frac{1}{2})^6$ $= \boxed{6.25}$	**14.** 1, 5, 25, … $r = 5$ $a_n = 1 \cdot (5)^{n-1}$ $a_7 = 1 \cdot (5)^6$ $= \boxed{15{,}625}$
	15. -1, -4, -16, … $r = 4$ $a_n = -1 \cdot (4)^{n-1}$ $a_7 = -1 \cdot (4)^6$ $= \boxed{-4096}$	**16.** 729, -243, 81, … $r = -\frac{1}{3}$ $a_n = 729 \cdot (-\frac{1}{3})^{n-1}$ $a_7 = 729 \cdot (-\frac{1}{3})^6$ $= \boxed{1}$
	17. 6, -12, 24, … $r = -2$ $a_n = 6 \cdot (-2)^{n-1}$ $a_7 = 6 \cdot (-2)^6$ $= \boxed{384}$	**18.** 8, 12, 18, … $r = \frac{3}{2}$ $a_n = 8 \cdot (\frac{3}{2})^{n-1}$ $a_7 = 8 \cdot (\frac{3}{2})^6$ $= \boxed{91.125}$

Real Life Application

Year	Value ($)
1	10,000
2	8,000
3	6,400

The table to the left shows a car's value for 3 years after it is purchased.

19. Write a rule to represent the car's depreciation.

$a_n = 10000 \cdot (\frac{4}{5})^{n-1}$

20. What will be the value of the car after 10 years?

$a_{10} = 10000 \cdot (\frac{4}{5})^9$

$\boxed{= \$1{,}342.18}$

Summary: