

Sequences Practice Worksheet

Name Answer Key Class Period _____

Arithmetic Sequences: A sequence of terms that have a common difference between them.

Formula: $a_n = a_1 + (n-1) \cdot d$ where a_1 is the first number in the sequence and d is the common difference.

Geometric Sequences: A sequence of terms that have a common ratio between them.

Formula: $a_n = a_1(r)^{n-1}$ where a_1 is the first number in the sequence and r is the common ratio.

Are the following sequences, arithmetic, geometric, or neither?

*If they are arithmetic, state the value of d . *If they are geometric, state r .

- | | | |
|--------------------------|-------------------------|---|
| 1. 6, 12, 18, 24, ... | type: <u>arithmetic</u> | (d or r: <u>$d = 6$</u>) |
| 2. 6, 11, 17, ... | type: <u>neither</u> | d or r: _____ |
| 3. 2, 14, 98, 686, ... | type: <u>geometric</u> | d or r: <u>7</u> |
| 4. 160, 80, 40, 20, ... | type: <u>geometric</u> | d or r: <u>$\frac{1}{2}$</u> |
| 5. -40, -25, -10, 5, ... | type: <u>arithmetic</u> | (d or r: <u>15</u>) |
| 6. 7, -21, 63, -189, ... | type: <u>geometric</u> | d or r: <u>-3</u> |

For the following sequences, find a_1 and d and state the formula for the general term. Don't forget to simplify!

- | | | | |
|---------------------------|--------------------|-----------------|-------------------------------|
| 7. -10, -4, 2, 8, 14, ... | $a_1 =$ <u>-10</u> | $d =$ <u>6</u> | Formula: $a_n = -10 + 6(n-1)$ |
| 8. 10, 8, 6, 4, ... | $a_1 =$ <u>10</u> | $d =$ <u>-2</u> | Formula: $a_n = 10 - 2(n-1)$ |
| 9. 36, 31, 26, 21, ... | $a_1 =$ <u>36</u> | $d =$ <u>-5</u> | Formula: $a_n = 36 - 5(n-1)$ |

10. Use the formula from question #9 to find the value of a_7 and a_{20} .

$$a_n = 36 - 5(n-1)$$

$$\begin{aligned} a_7 &= 36 - 5(7-1) \\ &= 36 - 5(6) \\ &= 6 \end{aligned}$$

$$\begin{aligned} a_{20} &= 36 - 5(20-1) \\ &= 36 - 5(19) \\ &= -59 \end{aligned}$$

For the following sequences, find a_1 and r and state the formula for the general term. Don't forget to simplify!

11. 1, 3, 9, 27, ...

$a_1 = 1$

$r = 3$

Formula: $a_n = 1(3)^{n-1}$

12. 12, 6, 3, 1.5, ...

$a_1 = 12$

$r = \frac{1}{2}$

Formula: $a_n = 12(.5)^{n-1}$

13. 9, -3, 1, -1/3, ...

$a_1 = 9$

$r = -\frac{1}{3}$

Formula: $a_n = 9(-\frac{1}{3})^{n-1}$

14. Use the formula from question #13 to find the value of a_4 and a_{12} .

$$\begin{aligned} a_4 &= 9\left(-\frac{1}{3}\right)^{4-1} \\ &= 9\left(-\frac{1}{3}\right)^3 \\ &= -\frac{1}{3} \end{aligned}$$

$$\begin{aligned} a_{12} &= 9\left(-\frac{1}{3}\right)^{12-1} \\ &= 9\left(-\frac{1}{3}\right)^{11} \\ &= -.0000508052634 \end{aligned}$$

Decide if each of the following scenarios describes an arithmetic or geometric sequence. Then, write the formula for the sequence.

15. A student comes to school with the flu and infects three other students within an hour before going home. Each newly infected student passes the virus to three new students in the next hour. This pattern continues until all students in the school are infected with the virus.

1, 3, 9, 27, ... Type: geometric Formula: $a_n = 3(3)^{n-1}$
 $a_1 = 3$
 $r = 3$

16. Round 1 of a tennis tournament starts with 128 players. After each round, half the players have lost and are eliminated from the tournament. Therefore, in round 2 there are 64 players, in round 3 there are 32 players and so on.

128, 64, 32, ... Type: geometric Formula: $a_n = 64\left(\frac{1}{2}\right)^{n-1}$
 $a_1 = 64$
 $r = \frac{1}{2}$

17. Paul has \$680 in a savings account. He makes a deposit after he receives each paycheck. After one month he has \$758 in the account. The next month the balance is \$836. The balance after the third month is \$914.

758, 836, 914, ... Type: arithmetic Formula: $a_n = 758 + 78(n-1)$
 $a_1 = 758$
 $d = 78$

18. The table shows the number of country club members for four years after it began.

Time(yrs)	0	1	2	3	4
Members	100	200	300	400	500

Type: arithmetic Formula: $a_n = 200 + 100(n-1)$

$a_1 = 200$

$d = 100$

linear: ROC 100

yint 100

$y = 100 + 100x$

$a_n = 100 + 100n$