

Name: Key
 Date: _____ Period: _____

Unit 6: Sequences

Practice: Arithmetic vs. Geometric Sequences

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

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

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

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

Are the following sequences arithmetic or geometric? If they are arithmetic, stated the value of d . If they are geometric, state the value of r .

- 6, 12, 18, 24, ... type: arithmetic d or r: 6
 $12 - 6 = 6$ $24 - 18 = 6$ $\frac{12}{6} = 2$ $\frac{18}{12} = \frac{3}{2}$
 $18 - 12 = 6$
- 6, 11, 16, ... type: arithmetic d or r: 5
 $11 - 6 = 5$ $\frac{11}{6} = 1.\overline{83}$ $\frac{16}{11} = 1.\overline{45}$
 $16 - 11 = 5$
- 2, 14, 98, 686, ... type: geometric d or r: 7
 $14 - 2 = 12$ $\frac{14}{2} = 7$ $\frac{98}{14} = 7$ $\frac{686}{98} = 7$
 $98 - 14 = 84$
- 160, 80, 40, 20, ... type: geometric d or r: $\frac{1}{2}$
 $80 - 160 = -80$ $\frac{80}{160} = \frac{1}{2}$ $\frac{40}{80} = \frac{1}{2}$ $\frac{20}{40} = \frac{1}{2}$
 $40 - 80 = -40$
- 40, -25, -10, 5, ... type: arithmetic d or r: 15
 $-25 - (-40) = 15$ $5 - (-10) = 15$ $\frac{-25}{-40} = \frac{5}{8}$ $\frac{-10}{-25} = \frac{2}{5}$
 $-10 - (-25) = 15$
- 7, -21, 63, -189, ... type: geometric d or r: -3
 $-21 - 7 = -28$ $\frac{-21}{7} = -3$ $\frac{63}{-21} = -3$ $\frac{-189}{63} = -3$
 $63 - (-21) = 84$

For the following sequences, find a_1 and d and state the formula for the general term.

- 10, -4, 2, 8, 14, ... $a_1 = \underline{-10}$ $d = \underline{6}$ Formula: $a_n = -10 + 6(n-1)$
 $-4 - (-10) = 6$ $a_n = -10 + 6n - 6$
 $a_n = \underline{6n - 16}$
- 10, 8, 6, 4, ... $a_1 = \underline{10}$ $d = \underline{-2}$ Formula: $a_n = 10 + -2(n-1)$
 $8 - 10 = -2$ $a_n = 10 - 2n + 2$
 $a_n = \underline{-2n + 12}$
- 36, 31, 26, 21, ... $a_1 = \underline{36}$ $d = \underline{-5}$ Formula: $a_n = 36 + -5(n-1)$
 $31 - 36 = -5$ $a_n = 36 - 5n + 5$
 $a_n = \underline{-5n + 41}$

10. Use the formula from #9 to find the seventh term and the 20th term.

$$a_n = -5n + 41$$

$$a_7 = -5(7) + 41$$

$$a_{20} = -5(20) + 41$$

$$a_7 = 6$$

$$a_{20} = -59$$

For the following sequences, find a_1 and r and state the formula for the general term.

11. 4, 20, 100, 5000, ...

$$a_1 = 4$$

$$r = 5$$

$$\text{Formula: } a_n = 4(5)^{n-1}$$

$$\frac{20}{4} = 5$$

12. 3, -6, 12, -24, 48, ...

$$a_1 = 3$$

$$r = -2$$

$$\text{Formula: } a_n = 3(-2)^{n-1}$$

$$\frac{-6}{3} = -2$$

13. 1, 3, 9, 27, ...

$$a_1 = 1$$

$$r = 3$$

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

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

14. Use the formula from question #13 to find the value of the fifth term and the twelfth term.

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

$$a_5 = 1(3)^{5-1}$$

$$a_{12} = 1(3)^{12-1}$$

$$a_5 = 1(3)^4$$

$$a_{12} = 1(3)^{11}$$

$$a_5 = 81$$

$$a_{12} = 531,441$$