

Name: Key
 Date: _____ Period: _____

Unit 6: Sequences

Notes: Arithmetic vs. Geometric Sequence Notes

How can you tell if a sequence is Arithmetic or Geometric? You must figure out if the group of terms has a common difference (arithmetic sequence) or a common ratio (geometric sequence). Circle your answers to each question.

1) **10, 20, 40, 80, ...**

A. Does it have a common difference or a common ratio?

$$\begin{array}{l} 20 - 10 = 10 \quad \frac{20}{10} = 2 \quad \frac{40}{20} = 2 \quad \frac{80}{40} = 2 \\ 40 - 20 = 20 \end{array}$$

B. Arithmetic or Geometric?

C. Find the next term: 160

$$80 \times 2 = 160$$

D. Write the explicit rule: $a_n = 10(2)^{n-1}$

$$a_n = a_1(r)^{n-1} \quad a_1 = 10, r = 2$$

E. Find the 8th term: 1280

$$a_8 = 10(2)^{8-1}$$

$$a_8 = 10(2)^7$$

2) **40, 200, 1000, 5000, ...**

A. Does it have a common difference or a common ratio?

$$\begin{array}{l} 200 - 40 = 160 \quad \frac{200}{40} = 5 \quad \frac{1000}{200} = 5 \quad \frac{5000}{1000} = 5 \\ 1000 - 200 = 800 \end{array}$$

B. Arithmetic or Geometric?

C. Find the next term: 25,000

$$5000 \times 5 = 25,000$$

D. Write the explicit rule: $a_n = 40(5)^{n-1}$

$$a_n = a_1(r)^{n-1} \quad a_1 = 40, r = 5$$

E. Find the 6th term: 125,000

$$a_6 = 40(5)^{6-1}$$

$$a_6 = 40(5)^5$$

3) **9, 10, 11, 12, ...**

A. Does it have a common difference or a common ratio?

$$\begin{array}{l} 10 - 9 = 1 \quad \frac{10}{9} = 1.\bar{1} \quad \frac{12}{11} = 1.\overline{09} \\ 11 - 10 = 1 \quad \frac{11}{10} = 1.1 \\ 12 - 11 = 1 \quad \frac{12}{10} = 1.2 \end{array}$$

B. Arithmetic or Geometric?

C. Find the next term: 13

$$12 + 1 = 13$$

D. Write the explicit rule: $a_n = 9 + 1(n-1)$ → $a_n = n + 8$

$$a_n = a_1 + d(n-1) \quad a_1 = 9, d = 1$$

E. Find the 20th term: 28

$$a_{20} = 20 + 8$$

$$a_n = 9 + 1(n-1)$$

$$a_n = 9 + n - 1$$

$$a_n = n + 8$$

4) 16, 64, 256, 1024, ...

A. Does it have a common difference or a common ratio?

$$\begin{aligned} 64 - 16 &= 48 & \frac{64}{16} &= 4 & \frac{256}{64} &= 4 & \frac{1024}{256} &= 4 \\ 256 - 64 &= 192 \end{aligned}$$

B. Arithmetic or Geometric?

C. Find the next term: 4096

$$1024 \times 4 = 4096$$

D. Write the explicit rule: $a_n = 16(4)^{n-1}$

$$a_1 = 16 \quad r = 4$$

E. Find the 10th term: 4194304

$$a_{10} = 16(4)^{10-1}$$

$$a_{10} = 16(4)^9$$

5) -2, -5, -8, -11, ...

A. Does it have a common difference or a common ratio?

$$\begin{aligned} -5 - (-2) &= -3 & \frac{-5}{-2} &= 2.5 & \frac{-8}{-5} &= 1.6 \\ -8 - (-5) &= -3 \\ -11 - (-8) &= -3 \end{aligned}$$

B. Arithmetic or Geometric?

C. Find the next term: -14

$$-11 - 3 = -14$$

D. Write the explicit rule: $a_n = -3n + 1$

$$a_1 = -2 \quad d = -3$$

E. Find the 13th term: -38

$$a_{13} = -3(13) + 1$$

$$a_n = -2 + 3(n-1)$$

$$a_n = -2 - 3n + 3$$

$$a_n = -3n + 1$$

6) 6, 10, 14, 18, ...

A. Does it have a common difference or a common ratio?

$$\begin{aligned} 10 - 6 &= 4 & \frac{10}{6} &= 1.6 & \frac{14}{10} &= 1.4 \\ 14 - 10 &= 4 \\ 18 - 14 &= 4 \end{aligned}$$

B. Arithmetic or Geometric?

C. Find the next term: 22

$$18 + 4 = 22$$

D. Write the explicit rule: $a_n = 4n + 2$

$$a_1 = 6 \quad d = 4$$

E. Find the 25th term: 102

$$a_{25} = 4(25) + 2$$

$$a_n = 6 + 4(n-1)$$

$$a_n = 6 + 4n - 4$$

$$a_n = 4n + 2$$

7) 8, 3, -2, -7, ...

A. Does it have a common difference or a common ratio?

$$3 - 8 = -5$$

$$-2 - 3 = -5$$

$$-7 - (-2) = -5$$

$$\frac{3}{8} = 0.375$$

$$\frac{-2}{3} = -0.\bar{6}$$

B. Arithmetic or Geometric?

C. Find the next term: -12

$$-7 - 5 = -12$$

D. Write the explicit rule: $a_n = -5n + 13$

$$a_1 = 8 \quad d = -5$$

E. Find the 50th term: -237

$$a_{50} = -5(50) + 13$$

$$a_n = 8 + -5(n-1)$$

$$a_n = 8 - 5n + 5$$

$$a_n = -5n + 13$$