

Sequences Review Homework

Name: _____

Determine whether the following sequences are arithmetic, geometric, or neither. Identify the common difference or common ratio. Then, if possible, write the explicit and recursive formulas for each.

1) 0, 1, 2, 3, 4 arithmetic $d=1$

$$a_n = n - 1$$

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

$$a_1 = 0$$

3) -9, -7, -5, -3, -1 arithmetic $d=2$

$$a_n = 2n - 11$$

$$a_n = a_{n-1} + 2$$

$$a_1 = -9$$

5) -20, -10, 0, 10, 20 arithmetic $d=10$

$$a_n = 10n - 30$$

$$a_n = a_{n-1} + 10$$

$$a_1 = -20$$

2) 4, 12, 36, 108 geometric $r=3$

$$a_n = 4 \cdot 3^{n-1}$$

$$a_n = a_{n-1} \cdot 3$$

$$a_1 = 4$$

4) 1, 2, 4, 8, 16 geometric $r=2$

$$a_n = 1 \cdot 2^{n-1}$$

$$a_n = a_{n-1} \cdot 2$$

$$a_1 = 1$$

6) -1, 1, -1, 1, -1 geometric $r=-1$

$$a_n = -1 \cdot (-1)^{n-1}$$

$$a_n = a_{n-1} \cdot -1$$

$$a_1 = -1$$

Given the first term and either the common difference or common ratio, write the explicit formula (find the n th term) and the term named in the problem.

7) $a_1 = -13$, $d = -7$

Find a_9

$$a_n = -13 + (n-1) \cdot -7$$

$$a_n = -7n - 6$$

$$a_9 = -7(9) - 6$$

$$a_9 = -69$$

8) $a_1 = -13$, $r = -7$

Find a_9

$$a_n = -13 \cdot (-7)^{n-1}$$

$$a_9 = -13 \cdot (-7)^8$$

$$a_9 = -74,942,413$$

9) Compare your answers in problems #9 and #10. What do you notice about them?

geometric sequences increase at a faster rate

10) $a_1 = -3$, $r = -3$

Find a_8

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

$$a_8 = -3 \cdot (-3)^7$$

$$a_8 = 6561$$

11) $a_1 = -18$, $d = 30$

Find a_{27}

$$a_n = -18 + (n-1) \cdot 30$$

$$a_n = 30n - 48$$

$$a_{27} = 30(27) - 48$$

$$a_{27} = 762$$

Find the common difference or common ratio, the explicit (formula), and the term named in the problem.

12) $-5, -1, 3, 7, \dots$ Find a_{14} $d=4$

$$a_n = -5 + (n-1)4$$

$$a_n = 4n - 9$$

$$a_{14} = 47$$

13) $2.5, 5, 10, 20, \dots$ Find a_{12} $r=2$

$$a_n = 2.5 \cdot 2^{n-1}$$

$$a_{12} = 5120$$

14) $39, 239, 439, 639, \dots$ Find a_{39} $d=200$

$$a_n = 39 + (n-1)200$$

$$a_n = 200n - 161$$

$$a_{39} = 7,639$$

15) $80, 20, 5, 1.25, \dots$ Find a_7 $r=\frac{1}{4}$

$$a_n = 80 \cdot \left(\frac{1}{4}\right)^{n-1}$$

$$a_7 = \frac{5}{256}$$

Use the explicit formula for arithmetic sequences to find the indicated variable.

16) Write an equation and find the 24th term in the sequence for which $a_1 = -27$, and $d = 3$

$$a_n = -27 + (n-1)3$$

$$a_{24} = 42$$

$$a_n = 3n - 30$$

17) What is the first term in the sequence for which $d = -3$ and $a_6 = 5$. $n=6$

$$5 = a_1 + (6-1) \cdot (-3)$$

$$5 = a_1 - 15$$

$$20 = a_1$$

18) Find d for the sequence for which $a_1 = -12$ and $a_{23} = 32$. $n=23$

$$32 = -12 + (23-1)d$$

$$32 = -12 + 22d$$

$$44 = 22d$$

$$2 = d$$

19) Find the value of a_1 and d . Given that $a_4 = 7$ and $a_{10} = -17$.

$$7 = a_1 + (4-1)d$$

$$-17 = a_1 + (10-1)d$$

$$7 = a_1 + 3d$$

$$-17 = a_1 + 9d$$

$$7 = a_1 + 3d$$

$$7 = a_1 + 3(-4)$$

$$-17 = a_1 + 9d$$

$$7 = a_1 - 12$$

$$24 = -6d$$

$$19 = a_1$$

$$-4 = d$$

* System of equations

$$\begin{matrix} a_1 = 19 \\ d = -4 \end{matrix}$$