

Arithmetic Sequences

Name: _____

Homework

| | | | |
|--|-----------------------------|--|-----------------------------|
| Explicit Formula: $a_n = a_1 + (n - 1)(d)$ | | Recursive Formula: $a_1 = \#$ $a_n = a_{n-1} + d$ | |
| a_n = the nth term in the sequence | d = the common difference | a_n = the nth term in the sequence | d = the common difference |
| a_1 = the 1 st term in the sequence | n = the term number | a_1 = the 1 st term in the sequence | n = the term number |

Write the recursive formula for the given sequences and then give the next 3 terms in the sequence.

1. 12, 22, 32, 42, ...

Explicit Formula

$$a_n = 12 + (n-1)10$$

$$a_n = 10n + 2$$

$$a_1 = 12$$

$$d = 10$$

Next three terms: $52, 62, 72$

Recursive Formula

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

$$a_1 = 12$$

2. 4, -1, -6, -11, ...

Explicit Formula

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

$$a_n = -5n + 9$$

$$a_1 = 4$$

$$d = -5$$

Next three terms: $-16, -21, -26$

Recursive Formula

$$a_n = a_{n-1} - 5$$

$$a_1 = 4$$

3. 20, 13, 6, -1, ...

Explicit Formula

$$a_n = 20 + (n-1)(-7)$$

$$a_n = -7n + 27$$

$$a_1 = 20$$

$$d = -7$$

Next three terms: $-8, -15, -22$

Recursive Formula

$$a_n = a_{n-1} - 7$$

$$a_1 = 20$$

Given the recursive formula below list the first five terms. Then write the Explicit formula.

4. $a_1 = 2$ and $a_n = 3 + a_{n-1}$

$2, 5, 8, 11, 14$

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

$$a_n = 3n - 1$$

6. $a_1 = 3$ and $a_n = a_{n-1} - 4$

$3, -1, -5, -9, -13$

$$a_n = 3 + (n-1)(-4)$$

$$a_n = -4n + 7$$

5. $a_1 = 3$ and $a_n = 6 + a_{n-1}$

$3, 9, 15, 21, 27$

$$a_n = 3 + (n-1)6$$

$$a_n = 6n - 3$$

7. $a_1 = 6$ and $a_n = a_{n-1} - 2$

$6, 4, 2, 0, -2$

$$a_n = 6 + (n-1)(-2)$$

$$a_n = -2n + 8$$

Write the recursive and explicit formula given a term in the sequence and the common difference.

8. $a_{40} = 20, d = 3$

$$20 = a_1 + (40-1)3$$

$$20 = a_1 + 117$$

$$-97 = a_1$$

$$a_n = -97 + (n-1)3$$

$$a_n = 3n - 100$$

$$a_n = a_{n-1} + 3$$

$$a_1 = -97$$

9. $a_{82} = 27, d = 4$

$$27 = a_1 + (82-1)4$$

$$27 = a_1 + 324$$

$$-297 = a_1$$

$$a_n = -297 + (n-1)4$$

$$a_n = 4n - 301$$

$$a_n = a_{n-1} + 4$$

$$a_1 = -297$$

10. $a_{53} = 14, d = -2$

$$14 = a_1 + (53-1)-2$$

$$14 = a_1 - 104$$

$$118 = a_1$$

$$a_n = 118 + (n-1)-2$$

$$a_n = -2n + 120$$

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

$$a_1 = 118$$

11. $a_{61} = 33, d = -\frac{1}{2}$

$$33 = a_1 + (61-1)-\frac{1}{2}$$

$$33 = a_1 - 30$$

$$63 = a_1$$

$$a_n = 63 + (n-1)-\frac{1}{2}$$

$$a_n = -\frac{1}{2}n + 63.5$$

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

$$a_1 = 63$$

Applications – Write a recursive or explicit formula to help you solve each of the following situations.

12. Elliot borrowed \$370 from his parents. He will pay them back at the rate of \$60 per month. How long will it take for him to pay his parents back? $a_n = 0$

$$a_1 = 370 \quad d = -60$$

$$a_n = 370 + (n-1)-60$$

$$a_n = -60n + 430$$

$$0 = -60n + 430$$

$$\frac{-430}{-60} = \frac{-60n}{-60}$$

$$n = 7.17$$

8 months

13. Suppose you participate in a bike-a-thon for charity. The charity starts with \$1100 in donations. Each participant must raise at least \$35 in pledges. What is the minimum amount of money raise if there are 75 participants? (In other words, what is the 75th term?)

$$a_1 = 1100 \quad d = 35$$

$$n = 75$$

$$a_n = 1100 + (n-1)35$$

$$a_n = 35n + 1065$$

$$a_{75} = 35(75) + 1065$$

$$a_{75} = \$3690$$

14. Find the value of a_1 and d . Given that $a_2 = -2$ and $a_8 = -20$.

$$-2 = a_1 + (2-1)d$$

$$-20 = a_1 + (8-1)d$$

$$-2 = a_1 + d$$

$$-20 = a_1 + 7d$$

$$-2 = a_1 + d$$

$$\begin{array}{r} -2 = a_1 - 3 \\ +3 \quad +3 \\ \hline 1 = a_1 \end{array}$$

$$\begin{array}{r} -20 = a_1 - 21 \\ +21 \quad +21 \\ \hline 1 = a_1 \end{array}$$

$$a_1 = 1$$

$$d = -3$$

$$\begin{array}{r} -2 = a_1 + d \\ -20 = a_1 + 7d \\ \hline 18 = -6d \end{array}$$

$$18 = -6d$$

$$-3 = d$$