F.IF.A.3: Sequences 2

1 The first four terms of the sequence defined by $a_1 = \dfrac{1}{2}$ and $a_{n+1} = 1 - a_n$ are

1) $\dfrac{1}{2}, \dfrac{1}{2}, \dfrac{1}{2}, \dfrac{1}{2}$

2) $\dfrac{1}{2}, 1, 1\dfrac{1}{2}, 2$

3) $\dfrac{1}{2}, \dfrac{1}{4}, \dfrac{1}{8}, \dfrac{1}{16}$

4) $\dfrac{1}{2}, 1\dfrac{1}{2}, 2\dfrac{1}{2}, 3\dfrac{1}{2}$

2 The first four terms of the sequence with $a_1 = 40$ and $a_n = \dfrac{3}{4} a_{n-1}$ are

1) $30, 22, 17, 13$

2) $40, 30, 22\dfrac{1}{2}, 16\dfrac{7}{8}$

3) $40, 30, 22, 17$

4) $30, 22\dfrac{1}{2}, 16\dfrac{7}{8}, 12\dfrac{21}{33}$

3 A recursively defined sequence is shown below.
$$a_1 = 5$$
$$a_{n+1} = 2a_n - 7$$
The value of a_4 is

1) -9
2) -1
3) 8
4) 15

4 A sequence is defined recursively by
$$a_1 = -2$$
$$a_n = 3a_{n-1} + 1$$
What is the value of a_4?

1) -41
2) -14
3) 22
4) 67

5 If a sequence is defined recursively as $a_1 = -3$ and $a_n = -3a_{n-1} - 2$, then a_4 is

1) -107
2) -95
3) 55
4) 67

6 If $a_1 = 6$ and $a_n = 3 + 2(a_{n-1})^2$, then a_2 equals

1) 75
2) 147
3) 180
4) 900

7 If $a_n = n\left(a_{n-1}\right)$ and $a_1 = 1$, what is the value of a_5?

1) 5
2) 20
3) 120
4) 720

8 What is the third term of the recursive sequence below?
$$a_1 = -6$$
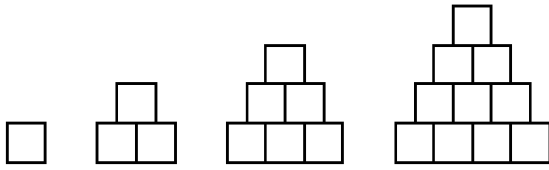$$a_n = \dfrac{1}{2} a_{n-1} - n$$

1) $-\dfrac{11}{2}$

2) $-\dfrac{5}{2}$

3) $-\dfrac{1}{2}$

4) -4

9 A sequence of blocks is shown in the diagram below.

This sequence can be defined by the recursive function $a_1 = 1$ and $a_n = a_{n-1} + n$. Assuming the pattern continues, how many blocks will there be when $n = 7$?
1) 13
2) 21
3) 28
4) 36

10 A function is defined as $a_n = a_{n-1} + \log_{n+1}(n-1)$, where $a_1 = 8$. What is the value of a_3?
1) 8
2) 8.5
3) 9.2
4) 10

11 What is the fourth term of the sequence defined by
$$a_1 = 3xy^5$$
$$a_n = \left(\frac{2x}{y}\right)a_{n-1}?$$
1) $12x^3y^3$
2) $24x^2y^4$
3) $24x^4y^2$
4) $48x^5y$

12 Find the third term in the recursive sequence $a_{k+1} = 2a_k - 1$, where $a_1 = 3$.

13 Given the recursive formula:
$$a_1 = 3$$
$$a_n = 2(a_{n-1} + 1)$$

State the values of a_2, a_3, and a_4 for the given recursive formula.

14 Write the first five terms of the recursive sequence defined below.
$$a_1 = 0$$
$$a_n = 2(a_{n-1})^2 - 1, \text{ for } n > 1$$

15 Use the recursive sequence defined below to express the next three terms as fractions reduced to lowest terms.
$$a_1 = 2$$
$$a_n = 3(a_{n-1})^{-2}$$

16 Find the first four terms of the recursive sequence defined below.
$$a_1 = -3$$
$$a_n = a_{(n-1)} - n$$

F.IF.A.3: Sequences 2
Answer Section

1 ANS: 1   REF: 081520a2

2 ANS: 2

$\frac{3}{4}(40) = 30; \frac{3}{4}(30) = 22.5; \frac{3}{4}(22.5) = 16.875$

REF: 081608a2

3 ANS: 1

$a_2 = 2(5) - 7 = 3 \ \ a_3 = 2(3) - 7 = -1 \ \ a_4 = 2(-1) - 7 = -9$

REF: 012023ai

4 ANS: 1

$a_2 = 3(-2) + 1 = -5 \ \ a_3 = 3(-5) + 1 = -14 \ \ a_3 = 3(-14) + 1 = -41$

REF: 082220ai

5 ANS: 4

$a_2 = -3(-3) - 2 = 7 \ \ a_3 = -3(7) - 2 = -23 \ \ a_4 = -3(-23) - 2 = 67$

REF: 062224ai

6 ANS: 1

$a_2 = 3 + 2(6)^2 = 75$

REF: 081919ai

7 ANS: 3

$a_2 = n(a_{2-1}) = 2 \cdot 1 = 2, a_3 = n(a_{3-1}) = 3 \cdot 2 = 6, a_4 = n(a_{4-1}) = 4 \cdot 6 = 24, a_5 = n(a_{2-1}) = 5 \cdot 24 = 120$

REF: 061824ai

8 ANS: 1

$a_2 = \frac{1}{2}(-6) - 2 = -5$

$a_3 = \frac{1}{2}(-5) - 3 = -\frac{11}{2}$

REF: 011623a2

9 ANS: 3

1, 3, 6, 10, 15, 21, 28, ...

REF: 081715ai

10 ANS: 2

$a_2 = 8 + \log_{2+1} 1 = 8 + 0 = 8$

$a_3 = 8 + \log_{3+1} 2 = 8 + \dfrac{1}{2} = 8.5$

REF: 062221aii

11 ANS: 3

$a_4 = 3xy^5 \left(\dfrac{2x}{y} \right)^3 = 3xy^5 \left(\dfrac{8x^3}{y^3} \right) = 24x^4 y^2$

REF: 061512a2

12 ANS:

$a_1 = 3.$ $a_2 = 2(3) - 1 = 5.$ $a_3 = 2(5) - 1 = 9.$

REF: 061233a2

13 ANS:

$a_2 = 2(3+1) = 8$ $a_3 = 2(8+1) = 18$ $a_4 = 2(18+1) = 38$

REF: 061931ai

14 ANS:

$0, -1, 1, 1, 1$

REF: 081832ai

15 ANS:

$a_2 = 3(2)^{-2} = \dfrac{3}{4}$ $a_3 = 3\left(\dfrac{3}{4} \right)^{-2} = \dfrac{16}{3}$ $a_4 = 3\left(\dfrac{16}{3} \right)^{-2} = \dfrac{27}{256}$

REF: 011537a2

16 ANS:

$-3, -5, -8, -12$

REF: fall0934a2