Key

Sequences Review Classwork

1. **Describe, using words, what each of these expressions mean.**
   1. a_1 the first term
   2. a_n the nth term / current term
   3. a_{n+1} the next term
   4. $f(n-1)$ the previous term
   5. n the position in the sequence
   6. $f(5)$ the fifth term

2. **What is the difference between "n " and "f(n)"? Explain**

   n is the position in the sequence

   f(n) is the value of the term

3. **Write a Recursive Rule for The Fibonacci Sequence**

   1, 1, 2, 3, 5, 8, ...

   $a_1 = 1$

   $a_2 = 1$

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

4. **Find the indicated term of each sequence.**

   7th term: -2, 22, -242, ... $-2(-11)^6 = -3,543,122$

   a_5: $a_1 = 3,\ a_n = a_{n-1} - 13$ 3 −10 −23 −36 −49

   a_4 : $a_n = \frac{n^2}{32}$ $a_4 = \frac{4^2}{32}$ $a_4 = \frac{16}{32} = \frac{1}{2}$

5. **Write the explicit and recursive formula for this sequence using subscript notation.**

   6, 2, -2, -6, -10, ...

   Recursive: $a_1 = 6$, $a_n = a_{n-1} - 4$ | Recursive: $a_1 = 6$, $a_{n+1} = a_n - 4$ | Explicit: $a_n = 6 - 4(n-1)$

6. **Write the explicit and recursive formula for this sequence using function notation.**

   2, 14, 98, 686, ...

   Recursive: $f(1) = 2$, $f(n) = f(n-1) \cdot 7$ | Recursive: $f(1) = 2$, $f(n+1) = f(n) \cdot 7$ | Explicit: $f(n) = 2(7)^{n-1}$

7. **Critical Thinking:**
   What is the difference between recursive formulas and explicit formulas? Which would you want to use to find the 100th term?

   Recursive formulas you need to find all of the previous terms before the term you're looking for

   Explicit formulas you can plug in for n and find the term you're looking for.

   You would want to use the explicit formula to find the 100th term because you wouldn't want to find 99 terms ~~before~~ before when using the recursive rule

8. Ben does one math problem on January 1st, 2017. He does five math problems on January 2nd, 2017, and nine math problems on January 3rd, 2017. The pattern continues in an arithmetic sequence. How many math problems did he do on January 14th?

$1 + 4(13) = 53$

1 5 9 13 17 21 25
29 33 37 41 45 49 53

How many math problems did he do **total** in the first two weeks of 2017?

378

9. If the 31st term of an **arithmetic sequence** is 150, and each consecutive term has a common difference of 3, find the explicit formula for the sequence. What is the 42nd term?

31st
$150 - 3(30) = 60$ for the first term

$a_n = 60 + 3(n-1)$

$a_{42} = 183$

10. If the 25th term of an arithmetic sequence is 50 and the 27th term is 100, write an explicit and recursive formula for the sequence.

$a_n = -550 + 25(n-1)$

$a_1 = -550$
$a_n = a_{n-1} + 25$

25th 26th 27th
50 75 100
+25 +25

11. If the 2nd term of a **geometric sequence** is **12** and the 4th term of a geometric sequence is **108**, write an explicit and recursive formula for the sequence.

1st 2nd 3rd 4th
4 12 36 108
÷3 ×3 ×3

$\frac{108}{12} = 9$

Recursive
$a_1 = 4$
$a_n = a_{n-1} \cdot 3$

Explicit
$a_n = 4(3)^{n-1}$

12. The first term in a sequence is 8. Consecutive terms in the sequence have a common difference. The fourth term in the sequence is 17.

Select the function, $f(n)$, that represents this sequence for $n \geq 1$.

1st 2nd 3rd 4th
8 11 14 17
+3 +3 +3

A. $f(1) = 8$
$f(n+1) = f(n) - 3$

B.* $f(1) = 8$
$f(n+1) = f(n) + 3$

C. $f(1) = 8$
$f(n+1) = \frac{9}{4} f(n)$

D. $f(1) = 8$
$f(n+1) = \frac{17}{8} f(n)$