Sequences Review Classwork

1. Describe, using words, what each of these expressions mean.

1. a_1 First term
2. a_n Any term (or "current" term) (or nth term)
3. a_{n+1} Next term
4. $f(n - 1)$ Previous term
5. n The term number (position number)
6. $f(5)$ 5th term

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

"n" is the position number of a term.

"f(n)" is the actual value of the term

3. Write a Recursive Rule for The Fibonacci Sequence

1, 1, 2, 3, 5, 8, ... $\begin{cases} f(1)=1 \\ f(2)=1 \\ f(n)=f(n-2)+f(n-1) \end{cases}$

4. Find the indicated term of each sequence.

7th term: $-2, 22, -242, \ldots$ ($\cdot -11$, $\cdot -11$) $-2\cdot(-11)^6$ $\boxed{3{,}543{,}122}$

a_5: $a_1 = 3$, $a_n = a_{n-1} - 13$ $3-13(4)$ $\boxed{-49}$

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

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

	Explicit	Recursive
6, 2, -2, -6, -10, ...	$a_n = 6-4(n-1)$	$\begin{cases} a_1=6 \\ a_n=a_{n-1}-4 \end{cases}$

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

	Explicit	Recursive
2, 14, 98, 686, ...	$f(n)=2\cdot 7^{n-1}$	$\begin{cases} f(1)=2 \\ f(n)=7\cdot f(n-1) \end{cases}$

7. Critical Thinking:

What is the difference between recursive formulas and explicit formulas? Which would you want to use to find the 100th term?

A recursive formula only tells you how to get from one term to the next.
An explicit formula tells you how to get any term, given the term number.
You would want to use an explicit formula to find the 100th term.

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? 1st → 14th: 13 more days, +4 each day

$1 + 4(13)$

53 math problems

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

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

378 math problems

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 → Subtract 3 30 times → 150 − 90 = 60

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

$a_{42} = 60 + 3(41)$

$60 + 123$

$a_{42} = 183$

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.

25th = 50

27th = 100

$50 + \_ + \_ = 100 \rightarrow d = 25$

25th → 1st: Subtract 25 24 times

$25 \times 24 = 100 + 500 = 600$

$50 - 600 = -550$

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

Recursive: $\begin{cases} a_1 = -550 \\ a_n = a_{n-1} + 25 \end{cases}$

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.

$12 \times \_ \times \_ = 108 \rightarrow 12 \cdot 9 = 108$

$12 \cdot 3 \cdot 3 = 108$

$a_2 = 12 \rightarrow a_1 = 4$

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

Recursive: $\begin{cases} a_1 = 4 \\ a_n = 3 \cdot a_{n-1} \end{cases}$

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 $n \geq 1$.

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