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Date _____
Algebra II

Recursive and Explicit Sequence Practice

Write an equation for each of the following sequences explicitly and recursively

1. 329.6, 376.8, 424, 471.2,…

$376.8 - 329.6 = 47.2$
$424 - 376.8 = 47.2$
$471.2 - 424 = 47.2$

$a_n = a_1 + (n-1)d$
$a_n = 329.6 + (n-1)47.2$
$a_1 = 329.6$
$a_n = a_{n-1} + 47.2$

2. 120, 192, 307.2, 491.52

$\frac{192}{120} = 1.6$
$\frac{307.2}{192} = 1.6$
$\frac{491.52}{307.2} = 1.6$

$a_n = a_1(r)^{n-1}$
$a_n = 120(1.6)^{n-1}$
$a_1 = 120$
$a_n = 1.6a_{n-1}$

3. 5400, 4050, 3037.5, 2278.125

$\frac{4050}{5400} = .75$
$\frac{3037.5}{4050} = .75$
$\frac{2278.125}{3037.5} = .75$

$a_n = a_1(r)^{n-1}$
$a_n = 5400(.75)^{n-1}$
$a_1 = 5400$
$a_n = .75a_{n-1}$

4. 5205.20, 4208.15, 3211.1, 2214.05

$4208.15 - 5205.20 = -997.05$
$3211.1 - 4208.15 = -997.05$
$2214.05 - 3211.1 = -997.05$

$a_1 = 5205.20$
$a_n = a_{n-1} - 997.05$
$a_n = a_1 + (n-1)d$
$a_n = 5205.20 + (n-1)(-997.05)$

5. 51024, 51669.27, 52314.54, 52959.81

$51669.27 - 51024 = 645.27$
$52314.54 - 51669.27 = 645.27$
$52959.81 - 52314.54 = 645.27$

$a_1 = 51024$
$a_n = a_{n-1} + 645.27$
$a_n = a_1 + (n-1)d$
$a_n = 51024 + (n-1)645.27$

6. 197.56, 217.32, 239.05, 262.96

$\frac{217.32}{197.56} = 1.1$
$\frac{239.05}{217.32} = 1.1$
$\frac{262.96}{239.05} = 1.1$

$a_1 = 197.56$
$a_n = 1.1a_{n-1}$
$a_n = a_1(r)^{n-1}$
$a_n = 197.56(1.1)^{n-1}$

Write each of the following equations recursively:

7. $f(n)=16\left(\frac{1}{2}\right)^{n-1}$

$a_1=16$

$r=\frac{1}{2}$

$f(1)=16$

$f(n)=\frac{1}{2}f(n-1)$

8. $a_n=8(2)^{n-1}$

$a_1=8$

$r=2$

$a_1=8$

$a_n=2a_{n-1}$

9. $f(n)=9+(n-1)3$

$a_1+(n-1)d$

$a_1=9$

$d=3$

$f(1)=9$

$f(n)=f(n-1)+3$

✓

10. $a_n=4n-3$

$a_1=4(1)-3$

$a_1=1$

$d=4$

$a_1=1$

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

✓

Write each of the following equations explicitly:

11. $a_n=-2a_{n-1}$, $a_1=12$

$a_1=12$

$r=-2$

$a_n=a_1(r)^{n-1}$

$a_n=12(-2)^{n-1}$

12. $a_n=a_{n-1}-7$, $a_1=-4$

$a_n=a_1+(n-1)d$

$a_n=-4+(n-1)(-7)$

$a_1=-4$

$d=-7$

13. $f(n)=f(n-1)+4$, $f(1)=-1$

$f(1)=-1$

$d=4$

$f(n)=f(1)+(n-1)d$

$f(n)=-1+(n-1)(4)$

14. $f(n)=-\frac{1}{2}f(n-1)$, $f(1)=12$

$f(1)=12$

$r=-\frac{1}{2}$

$f(n)=f(1)(r)^{n-1}$

$f(n)=12\left(-\frac{1}{2}\right)^{n-1}$

need a_1 and d → guess and check

15. An arithmetic sequence has a 5th term of 19 and an 8th term of 28. Write an equation for the sequence.

$19 \overset{+3}{\rightarrow} 22 \overset{+3}{\rightarrow} 25 \overset{+3}{\rightarrow} 28$

$5 \quad 6 \quad 7 \quad 8$

$7 \quad 10 \quad 13 \quad 16$

$1 \quad 2 \quad 3 \quad 4$

$a_1 = 7$

$d = 3$

$a_n = a_1 + (n-1)d$

$a_n = 7 + (n-1)3$

$a_1 = 7$

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

need a_1 and d

16. In an arithmetic sequence, $a_4 = 19$ and $a_7 = 31$. Determine a formula for a_n, the n^{th} term of this sequence.

$a_1 = 7$

$d = 4$

$19 \overset{+4}{\rightarrow} 23 \overset{+4}{\rightarrow} 27 \overset{+4}{\rightarrow} 31$

$4 \quad 5 \quad 6 \quad 7$

$7 \quad 11 \quad 15$

$1 \quad 2 \quad 3$

$a_n = a_1 + (n-1)d$

$a_n = 7 + (n-1)4$

$a_1 = 7$

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

need a_1 and r

17. A geometric sequence has a 4th term of 4 and a 6th term of 36. Write an equation for the sequence.

$4 \overset{\cdot 3}{\rightarrow} 12 \overset{\cdot 3}{\rightarrow} 36$

$4 \quad 5 \quad 6$

$\frac{4}{27} \quad \frac{4}{9} \quad \frac{4}{3}$

$1 \quad 2 \quad 3$

$a_1 = \frac{4}{27}$

$r = 3$

$a_n = a_1(r)^{n-1}$

$a_n = \frac{4}{27}(3)^{n-1}$

$a_1 = \frac{4}{27}$

$a_n = 3a_{n-1}$

need a_1 and r

18. In a geometric sequence, $a_4 = 12$ and $a_7 = 96$. Determine a formula for a_n, the n^{th} term of this sequence.

$a_1 = \frac{3}{2}$

$r = 2$

$12 \overset{\cdot 2}{\rightarrow} 24 \overset{\cdot 2}{\rightarrow} 48 \overset{\cdot 2}{\rightarrow} 96$

$4 \quad 5 \quad 6 \quad 7$

$\frac{3}{2} \quad 3 \quad 6$

$1 \quad 2 \quad 3$

$a_n = a_1(r)^{n-1}$

$a_n = \frac{3}{2}(2)^{n-1}$

$a_1 = \frac{3}{2}$

$a_n = 2a_{n-1}$

19. The first two terms in a sequence are 4 and 8.

I. The common ratio is 2 $\frac{a_2}{a_1} = \frac{8}{4} = 2$ ✓

II. The common difference is 4 $a_2 - a_1 = 8 - 4 = 4$ ✓

Which of the following is true?

1) Both I and II
2) Neither I or II
3) I only
4) II only

20. The eighth and tenth terms of a sequence are 64 and 100. If the sequence is either arithmetic or geometric, the ninth term cannot be

1) -82
2) -80
3) 80
4) 82

1) 64 -82 100

$\frac{100}{-82} = -1.219...$ $100 - 82 = 182$ ✗

$\frac{-82}{64} = -1.28...$ $-82 - 64 = -146$ ✗

2) 64 -80 100

$\frac{100}{-80} = \frac{-80}{64} = -1.25$ ✓

3) 64 80 100

$\frac{100}{80} = \frac{80}{64} = 1.25$ ✓

4) 64 82 100

$82 - 64 = 18$

$100 - 82 = 18$ ✓

Write a recursive formula for the following sequences

21. 3, 8, 23, 68, …

$\cdot 3, -1$

$a_1 = 3$

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

22. 100, 60, 40, 30, …

$\cdot \frac{1}{2}, +10$

$a_1 = 100$

$a_n = \frac{1}{2}a_{n-1} + 10$

$\cdot 2, +1$

23. While experimenting with her calculator, Candy creates the sequence 4, 9, 19, 39, 79, ...
Write a recursive formula for Candy's sequence. Determine the eighth term in Candy's sequence.

$a_1 = 4$

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

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

$a_5 = 79$

$a_6 = 2(79) + 1$

$a_6 = 159$

$a_7 = 2(159) + 1$

$a_7 = 319$

$a_8 = 2(319) + 1$

$a_8 = 639$