Pre-Calculus Worksheet

Name: Key

#1 Intro Sequence & Arithmetic Sequence

Period: ____

Find the first five terms of the infinite sequence defined explicitly by each rule. NO DECIMALS.

1. $a_n = 3n+1$

$a_1 = 3(1)+1 = 4$

$a_2 = 3(2)+1 = 7$

$a_3 = 3(3)+1 = 10$

$a_4 = 3(4)+1 = 13$

$a_5 = 3(5)+1 = 16$

2. $a_n = 2^n$

2, 4, 8, 16, 32

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

$a_1 = 1(1-1)(1-2) = 0$

$a_2 = 2(2-1)(2-2) = 0$

$a_3 = 3(3-1)(3-2) = 6$

$a_4 = 4(4-1)(4-2) = 24$

$a_5 = 5(5-1)(5-2) = 60$

Find the 25th term of the sequence given by each rule. NO DECIMALS.

4. $a_n = \frac{1}{2}n$

$a_{25} = 12.5$

5. $a_n = \frac{2n}{n^2-4}$

$a_{25} = \frac{2(25)}{25^2-4}$

$a_{25} = \frac{50}{621}$

6. $a_n = (n-2)(n+3)$

$a_{25} = 644$

Determine whether the sequence is arithmetic. If so, find the common difference.

7. 10, 8, 6, 4, 2, ...

-2 -2 -2

$8-10 = -2$

$6-8 = -2$

$2-4 = -2$

yes

$d = -2$

8. 1, 2, 4, 8, 16, ...

9. 1, 3, 7, 12, 18, ...

2 4

NO

10. $\frac{5}{4}, \frac{3}{2}, \frac{7}{4}, 2, \frac{9}{4}, \ldots$

Find the next four terms of the arithmetic sequence given by each recursive formula. NO DECIMALS.

11. $a_1 = 6$

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

$a_2 = a_1 + 4 = 6 + 4 = 10$

$a_3 = a_2 + 4 = 10 + 4 = 14$

$a_4 = a_3 + 4 = 14 + 4$

$a_5 = a_4 + 4 = 18 + 4$

6, 10, 14, 18, 22

12. $a_1 = 4$

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

4, -3, -10, -17, -24

13. $a_1 = -8$

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

$a_2 = a_1 - 1$

$a_{1+1} = -8 - 1$

$= -9$

$a_3 =$ $n=2$

$a_{2+1} = a_2 - 2$

$= -9 - 2$

$a_4 = a_3 - 3$

$a_{3+1} = -11 - 3$

-8, -9, -11, -14,

Find a recursive formula for the sequence defined by the given explicit formula.

14. $a_n = 5n - 8$

$a_1 = -3$

$a_N = a_{N-1} + 5$

15. $a_n = 5 - 8n$

same

$a_1 = -3$

16. $a_n = \frac{1}{2}n$

$a_1 = \frac{1}{2}$

$a_N = a_{N-1} + \frac{1}{2}$

Write an explicit formula for the n^{th} term of the sequence. (Assume that n begins with 1.)

17. 1, 4, 7, 10, 13, ... $d=3$, $a_1=1$

$a_N = 1+3(N-1)$

18. 0, 3, 8, 15, 24, ...

$a_N = N^2 - 1$

19. 2, −4, 6, −8, 10, ...

$a_N = 2N(-1)^{(N-1)}$

Find the explicit formula for a_n given the arithmetic sequence. Then use the formula to find the a_{20} of the arithmetic sequence.

20. $a_1 = 100$ and $d = -8$

$a_N = 100 - 8(N-1)$

21. $4, \frac{3}{2}, -1, -\frac{7}{2}, \ldots$

$a_1 = 4$

$d = -2.5$

$a_N = 4 - 2.5(N-1)$

22. $a_1 = 5$ and $a_4 = 15$

$a_4 = a_1 + d(N-1)$

$15 = 5 + d(4-1)$

$10 = 3d$

$\frac{10}{3} = d$

$a_N = 5 + \frac{10}{3}(N-1)$

23. $a_3 = 94$ and $a_6 = 85$

$a_6 = a_3 + d(N-3)$

$85 = 94 = d(6-3)$

$-9 = 3d$

$-3 = d$

$a_3 = a_1 + d(N-1)$

$94 = a_1 + (-3)(3-1)$

$94 = a_1 - 6$

$100 = a_1$

$a_N = 100 - 3(N-1)$

24. −3, 4, 11, 18, ... $d=7$, $a_1=-3$

$a_N = -3 + 7(N-1)$

25. $a_5 = 27$ and $a_{11} = 75$

$a_{11} = a_5 + d(11-5)$

$75 = 27 + d(6)$

$48 = 6d$

$8 = d$

$a_5 = a_1 + 8(N-1)$

$27 = a_1 + 8(5-1)$

$27 = a_1 + 32$

$-5 = a_1$

$a_N = -5 + 8(N-1)$

Find the indicated number of arithmetic means between the pairs of numbers.

26. two arithmetic means between -27 and 33.

27, 29, 31, 33

$a_N = a_1 + d(N-1)$

$33 = 27 + d(4-1)$

$6 = 3d$

$2 = d$

27. four arithmetic means between -11 and 35.

11, 15.8, 20.6, 25.4, 30.2, 35

$a_6 = a_1 + d(N-1)$

$35 = 11 + d(6-1)$

$24 = 5d$

$4.8 = d$

28. one arithmetic means between -4/5 and 11/5.

$\frac{4}{5}, \frac{3}{2}, \frac{11}{5}$

$a_3 = a_1 + d(3-1)$

$\frac{11}{5} = \frac{4}{5} + d(2)$

$\frac{7}{5} = d(2)$

$\frac{7}{10} = d$

Find each:

29. How many terms are in the arithmetic sequence 44, 36, 28, ..., -380?

$a_N = 44 - 8(N-1)$

$d = -8$

$a_1 = 44$

$-380 = 44 - 8(N-1)$

$-424 = -8N + 8$

$-432 = -8N$

$54 = N$

54 terms

30. How many numbers between 50 and 500 are divisible by 7? 56 is the first

$a_N = 56 + 7(N-1)$

$d = 7$

$a_1 = 56$

$497 = 56 + 7N - 7$

$448 = 7N$

$N = 64$

64 factors of 7