Algebra II Sequences Review Name: Key

Write the first five terms of the sequence.

1. $a_n = n^2 - 3$

$-2, 1, 6, 13, 22$

2. $a_n = \frac{1}{3}a_{n-1} + 9$, $a_0 = 243$

$243, 90, 39, 22, \frac{49}{3}$

3. $f(n) = \frac{n}{3n+2}$

$\frac{1}{5}, \frac{1}{4}, \frac{3}{11}, \frac{2}{7}, \frac{5}{17}$

4. $a_n = a_{n-1} - a_{n-2}$, $a_1 = 3$ $a_2 = 1$

$3, 1, -2, -3, -1, 2$

5. $a_n = 2^{n-1}$

$1, 2, 4, 8, 16$

6. $a_n = a_{n-1} + 7$, $a_0 = 3$

$3, 10, 17, 24, 31$

For each sequence, write an *explicit* rule for the *n*th term. Tell whether the sequence is arithmetic, geometric, or neither.

7. $2, 4, 8, 16, 32, \ldots$

$\cdot 2 \cdot 2 \cdot 2 \cdot 2$

geometric

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

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

8. $\frac{4}{2}, \frac{8}{3}, \frac{12}{4}, \frac{16}{5}, \frac{20}{6} \ldots$

neither

$a_n = \frac{4n}{n+1}$

9. $3, 5, 7, 9, 11, \ldots$

$+2 +2 +2 +2$

arithmetic

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

$a_n = 3 + (n-1)(2)$ or $a_n = 2n + 1$

For each sequence, write a *recursive* rule for the *n*th term. Tell whether the sequence is arithmetic, geometric, or neither.

10. $10, 4, -2, -8, -14, \ldots$

$-6 -6 -6 -6$

arithmetic

$a_n = a_{n+1} - 6$

$a_1 = 10$

11. $-3, 15, -75, 375, \ldots$

$\cdot -5 \cdot -5 \cdot -5$

geometric

$a_n = -5(a_{n-1})$

$a_1 = -3$

12. $1, 3, 4, 7, 11, 18, \ldots$

$2 \; 1 \; 3 \; 4 \; 7$

neither

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

$a_1 = 1$

$a_2 = 3$

Write an explicit rule for each sequence below with the given conditions. Then find a_{10}.

13. $d = 5,\ a_5 = 33$

$a_5 = a_1 + (5-1)(5) = 33$

$a_1 + 20 = 33$

$a_1 = 13$

$a_n = 13 + (n-1)(5)$

14. $a_3 = 24,\ a_5 = 96$ (Geometric)

$a_5 = a_3 \cdot r^2 = 24 \cdot r^2 = 96$

$r^2 = 4$

$r = 2$

$24 = a_1 (2)^{3-1}$

$24 = a_1(4)$

$a_1 = 6$

$a_n = 6(2)^{n-1}$

15. $a_2 = 12,\ a_6 = 4$ (Arithmetic)

$d = \frac{4-12}{6-2} = \frac{-8}{4} = -2$

$a_2 = a_1 + (2-1)(-2) = 12$

$a_1 - 2 = 12$

$a_1 = 14$

$a_n = 14 + (n-1)(-2)$

16. $r = -3,\ a_3 = 54$

$a_3 = a_1(-3)^{3-1} = 54$

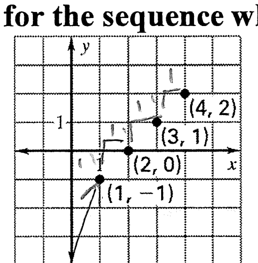
$a_1(9) = 54$

$a_1 = 6$

$a_1 = 6(-3)^{n-1}$

Write a rule for the sequence whose graph is shown.

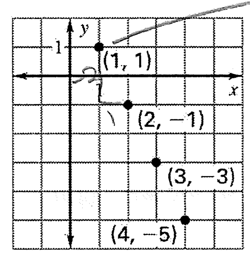
17.



$a_1 = -1 \quad d = 1$

$a_n = -1 + (n-1)(1)$ or $a_n = n - 2$

18.



$a_1 = 1$

$d = -2$

$a_n = 1 + (n-1)(-2)$ or $a_n = -2n + 3$

A triangular number is a number that belongs to the sequence that represents the number of objects that stack to form an equilateral triangle (as illustrated below).

$T_1 = 1$

$T_2 = 1 + 2$

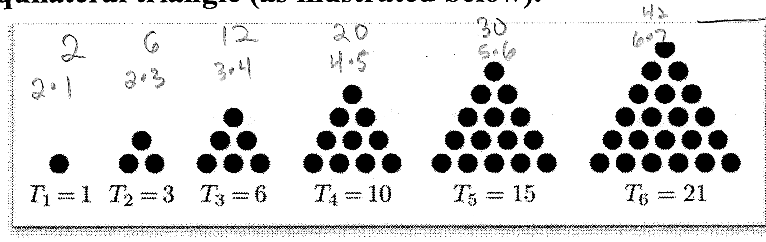
$T_3 = 3 + 3$

$T_4 = 6 + 4$

$T_5 = 10 + 5$

$T_6 = 15 + 6$

$T_n = T_{n-1} + n$



$2T_n = n(n+1)$

$T_n = \frac{n(n+1)}{2}$ or $\frac{n^2 - n}{2}$

19. Write either an explicit or recursive rule for the triangular numbers.

$T_n = T_{n-1} + n$

$T_1 = 1$

or

$T_n = \frac{n(n+1)}{2}$ or $T_n = \frac{n^2+n}{2}$

20. Find T_{20}.

$T_{20} = \frac{20(20+1)}{2}$

$T_{20} = 10(21) = 210$