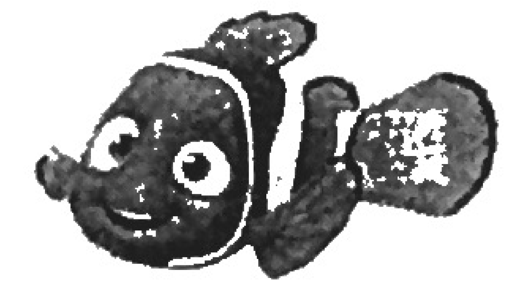
Name: Answer Key Per: ________ Date: ____________

Serafino ▪ Algebra II

8-1 General Sequences – Introduction



Classwork

So far we've learned arithmetic and geometric sequences Some sequences, however, aren't arithmetic or geometric models… they just follow a pattern. We love them anyway.

GET TERMS IN A SEQUENCE, GIVEN A FORMULA:

Just plug in term numbers, starting with n = 1. Write the first five terms in each sequence. Use the first lines to plug in, and the second set to write final, simplified terms. Then, get the 10th term.

1. $a_n = n^2 + 1$

$1+1$ 2^2+1 3^2+1 4^2+1 5^2+1

1	2	3	4	5
2	5	10	17	26

2. $a_n = \frac{n}{6}$

$\frac{1}{6}$ $\frac{2}{6}$ $\frac{3}{6}$ $\frac{4}{6}$ $\frac{5}{6}$

1	2	3	4	5
$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{5}{6}$

3. $a_n = \frac{n^3}{2}$

$\frac{1}{2}$ $8/2$ $27/2$ $64/2$ $125/2$

1	2	3	4	5
$\frac{1}{2}$	4	$\frac{27}{2}$	32	$\frac{125}{2}$

4. $a_n = \frac{n^2}{n+3}$

$\frac{1}{4}$ $\frac{4}{5}$ $\frac{9}{6}$ $\frac{16}{7}$ $\frac{25}{8}$

1	2	3	4	5
$\frac{1}{4}$	$\frac{4}{5}$	$\frac{3}{2}$	$\frac{16}{7}$	$\frac{25}{8}$

5. $a_n = \frac{3(2)^{n-1}}{-n+10}$

$\frac{3}{9}$ $\frac{6}{8}$ $\frac{12}{7}$ $\frac{24}{6}$ $\frac{48}{5}$

1	2	3	4	5
$\frac{1}{3}$	$\frac{3}{4}$	$\frac{12}{7}$	4	$\frac{48}{5}$

6. $a_n = n(n-1)$

$1(1-1)$ $2(2-1)$ $3(3-1)$ $4(4-1)$ $5(5-1)$

1	2	3	4	5
0	2	6	12	20

7. $a_n = 2(n!)$

$2(1!)$ $2(2!)$ $2(3!)$ $2(4!)$ $2(5!)$

1	2	3	4	5
2	4	12	48	240

8. $a_n = \frac{n+6}{5n-2}$

$\frac{7}{3}$ $\frac{8}{8}$ $\frac{9}{13}$ $\frac{10}{18}$ $\frac{11}{23}$

1	2	3	4	5
$\frac{7}{3}$	1	$\frac{9}{13}$	$\frac{5}{9}$	$\frac{11}{23}$

9. $a_n = \frac{n+6}{3n-2}$

$\frac{7}{1}$ $\frac{8}{4}$ $\frac{9}{7}$ $\frac{10}{10}$ $\frac{11}{13}$

1	2	3	4	5
7	2	$\frac{9}{7}$	1	$\frac{11}{13}$

10. $a_n = \frac{1(-1)^{n-1}}{-n+100}$

$\frac{1}{99}$ $\frac{-1}{98}$ $\frac{1}{97}$ $\frac{-1}{96}$ $\frac{1}{95}$

1	2	3	4	5
$\frac{1}{99}$	$\frac{-1}{98}$	$\frac{1}{97}$	$\frac{-1}{96}$	$\frac{1}{95}$

GET THE FORMULA FOR A SEQUENCE, GIVEN THE TERMS:

It's also possible to obtain the formula from the sequence by observing patterns. Some are obvious, some take some fiddling around. Just play and see if you can figure them out. ☺

Some helpful tricks I've learned along the way: 1. Try to relate each term to the term number 2. Try to relate each term to the term before/after it. 3. Try to think about the numerator and denominator as separate sequences. 4. Try to "unsimplify" any fractions to get common denominators. 5. Remember you can use the "constant degree difference" to get degree!

11. 1, 8, 27, 64, 125

1 2 3 4 5

$a_n = n^3$

16. 2, 6, 12, 20, 30 $n^2 \ldots$

1 2 3 4 5

$1\cdot2$ $2\cdot3$ $3\cdot4$ $4\cdot5$ $5\cdot6$

$a_n = n(n+1)$

12. $\frac{1}{6}$, $\frac{2}{7}$, $\frac{3}{8}$, $\frac{4}{9}$, $\frac{1}{2}$ $\frac{5}{10}$

1 2 3 4 5

$a_n = \frac{n}{n+5}$

17. $\frac{1}{4}$, $\frac{2}{9}$, $\frac{3}{16}$, $\frac{4}{25}$, $\frac{5}{36}$

2^2 3^2 4^2 5^2 6^2

1 2 3 4 5

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

$a_n = dn + c$ $3n+1$

13. $\frac{4}{11}$, $\frac{7}{22}$, $\frac{10}{33}$, $\frac{13}{44}$, $\frac{16}{55}$

1 2 3 4 5

$a_n = \frac{3n+1}{11n}$

18. 2^2 4^2 6^2 8^2 10^2

4, 16, 36, 64, 100

1 2 3 4 5

$a_n = (2n)^2$ or $a_n = 4n^2$

14. $\frac{1}{2}$ $\frac{3}{6}$, $\frac{2}{3}$ $\frac{4}{6}$, $\frac{5}{6}$, 1 $\frac{6}{6}$

1 2 3 4

$a_n = \frac{n+2}{6}$

19. $\frac{5}{1}$, $\frac{10}{11}$, $\frac{20}{21}$, $\frac{40}{31}$, $\frac{80}{41}$

1 2 3 4 5

$a_n = \frac{5(2)^{n-1}}{10n+1}$

15. $\frac{9}{5}$, $\frac{11}{3}$, $\frac{13}{1}$, $-\frac{15}{1}$, $-\frac{17}{3}$

$+2$ $+2$ $+2$ $+2$

-2 -2 -2 -2

1 2 3 4 5

$a_n = \frac{2n+7}{-2n+7}$

20. 11, 120, 1,300, 14,000

1 2 3 4

$a_n = (10+n)10^{n-1}$