Name _____ Date _____ Class _____

Find the first 5 terms of each sequence.

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

n	$2a_{n-1} - 3$	a_n
1		4
2	$2(4) - 3$	
3		
4		
5		

   a. The first term, a_1, is given. Make a table to record the terms. Substitute a_1 into the rule for a_n to find the second term. _____

   b. Continue using each term to find the next term. Complete the table.

   c. Write the five terms. _____

2. $a_1 = 2$, $a_n = (a_{n-1})^2$

_____

3. $a_1 = 2$, $a_n = 1 - 2(a_{n-1})$

_____

4. $a_1 = 1$, $a_n = (a_{n-1})^2 + 1$

_____

5. $a_1 = 1$, $a_n = (a_{n-1})(a_{n-1} + 1)$

_____

6. $a_1 = 5$, $a_n = 2(a_{n-1} - 2)$

_____

7. $a_1 = 243$, $a_n = \dfrac{a_{n-1}}{3}$

_____

8. $a_n = n - 2^n$

n	$n - 2^n$	a_n
1	$1 - 2^1$	
2		
3		
4		
5		

   a. Use the table. Substitute 1 for n and simplify to find the first term. _____

   b. Complete the table.

   c. Write the five terms. _____

9. $a_n = n(n + 1)$ _____

10. $a_n = n^2 - 2n$

_____

11. $a_n = 2^{n-2}$

_____

12. $a_n = 2 - n$

_____

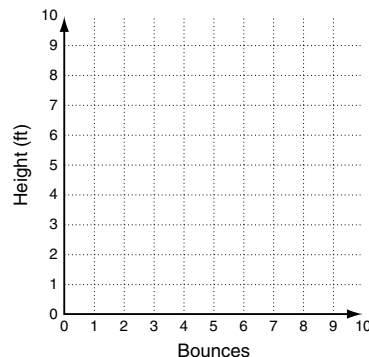**13.** $a_n = (5 - n)(n + 5)$

_____

Solve.

14. A ball is dropped and bounces to a height of 10 feet. The ball rebounds to 80% of its previous height.

   a. Graph the sequence.

   b. Describe the pattern.

_____

   c. To the nearest inch, find the height of the ball after its eighth bounce.

_____

Height (ft) vs. Bounces

3

Holt Algebra 2

Find the first 5 terms of each sequence.

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

n	$2a_{n-1} - 3$	a_n
1		4
2	$2(4) - 3$	5
3	$2(5) - 3$	7
4	$2(7) - 3$	11
5	$2(11) - 3$	19

  a. The first term, a_1, is given. Make a table to record the terms. Substitute a_1 into the rule for a_n to find the second term. ___**5**___
  b. Continue using each term to find the next term. Complete the table.
  c. Write the five terms. ___**4, 5, 7, 11, 19**___

2. $a_1 = 2$, $a_n = (a_{n-1})^2$

___**2, 4, 16, 256, 65,536**___

3. $a_1 = 2$, $a_n = 1 - 2(a_{n-1})$

___**2, −3, 7, −13, 27**___

4. $a_1 = 1$, $a_n = (a_{n-1})^2 + 1$

___**1, 2, 5, 26, 677**___

5. $a_1 = 1$, $a_n = (a_{n-1})(a_{n-1} + 1)$

___**1, 2, 6, 42, 1806**___

6. $a_1 = 5$, $a_n = 2(a_{n-1} - 2)$

___**5, 6, 8, 12, 20**___

7. $a_1 = 243$, $a_n = \dfrac{a_{n-1}}{3}$

___**243, 81, 27, 9, 3**___

8. $a_n = n - 2^n$

n	$n - 2^n$	a_n
1	$1 - 2^1$	−1
2	$2 - 2^2$	−2
3	$3 - 2^3$	−5
4	$4 - 2^4$	−12
5	$5 - 2^5$	−27

  a. Use the table. Substitute 1 for n and simplify to find the first term. ___**−1**___
  b. Complete the table.
  c. Write the five terms. ___**−1, −2, −5, −12, −27**___

9. $a_n = n(n + 1)$ ___**2, 6, 12, 20, 30**___

10. $a_n = n^2 - 2n$

___**−1, 0, 3, 8, 15**___

11. $a_n = 2^{n-2}$

___**0.5, 1, 2, 4, 8**___

12. $a_n = 2 - n$

___**1, 0, −1, −2, −3**___

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

___**24, 21, 16, 9, 0**___

Solve.

14. A ball is dropped and bounces to a height of 10 feet. The ball rebounds to 80% of its previous height.
  a. Graph the sequence.
  b. Describe the pattern.
  ___**Exponential**___
  c. To the nearest inch, find the height of the ball after its eighth bounce.
  ___**2 ft 1 in.**___
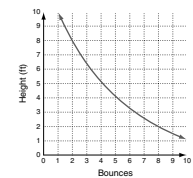
3 *Holt Algebra 2*

Find the first 5 terms of each sequence.

1. $a_1 = 1$, $a_n = 3(a_{n-1})$

___**1, 3, 9, 27, 81**___

2. $a_1 = 2$, $a_n = 2(a_{n-1} + 1) - 5$

___**2, 1, −1, −5, −13**___

3. $a_1 = -2$, $a_n = (a_{n-1})^2 - 1$

___**−2, 3, 8, 63, 3968**___

4. $a_1 = 1$, $a_n = 6 - 2(a_{n-1})$

___**1, 4, −2, 10, −14**___

5. $a_1 = -1$, $a_n = (a_{n-1} - 1)^2 - 3$

___**−1, 1, −3, 13, 141**___

6. $a_1 = -2$, $a_n = \dfrac{2 - a_{n-1}}{2}$

___**$2, 0, 1, \dfrac{1}{2}, \dfrac{3}{4}$**___

7. $a_n = (n - 2)(n + 1)$

___**−2, 0, 4, 10, 18**___

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

___**1, 6, 15, 28, 45**___

9. $a_n = n^3 - n^2$

___**0, 4, 18, 48, 100**___

10. $a_n = \left(\dfrac{1}{2}\right)^{n-3}$

___**$4, 2, 1, \dfrac{1}{2}, \dfrac{1}{4}$**___

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

___**1, −2, 4, −8, 16**___

12. $a_n = n^2 - 2n$

___**−1, 0, 3, 8, 15**___

Write a possible explicit rule for the nth term of each sequence.

13. 8, 16, 24, 32, 40, … ___**$a_n = 8n$**___

14. 0.1, 0.4, 0.9, 1.6, 2.5, … ___**$a_n = 0.1n^2$**___

15. 3, 6, 11, 18, 27, … ___**$a_n = n^2 + 2$**___

16. $\dfrac{3}{2}, \dfrac{3}{4}, \dfrac{3}{8}, \dfrac{3}{16}, \dfrac{3}{32}, \dots$

___**$a_n = 3\left(\dfrac{1}{2}\right)^n$**___

17. −2, 1, 4, 7, 10, … ___**$a_n = 3n - 5$**___

18. 5, 1, 0.2, 0.04, 0.008, … ___**$a_n = 5(0.2)^{n-1}$**___

Solve.

19. Find the number of line segments in the next two iterations. ___**31, 63**___

20. Jim charges $50 per week for lawn mowing and weeding services. He plans to increase his prices by 4% each year.
  a. Graph the sequence.
  b. Describe the pattern.
  ___**Exponential**___
  c. To the nearest dollar, how much will he charge per week in 5 years?
  ___**$61 per week**___
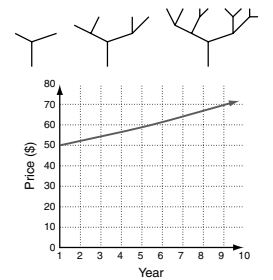
4 *Holt Algebra 2*

Find the first 5 terms of each sequence.

1. $a_1 = -3$, $a_n = (a_{n-1} + 2)^3$

___**−3; −1; 1; 27; 24,389**___

2. $a_1 = 2$, $a_n = \dfrac{1 - a_{n-1}}{a_{n-1}}$

___**$2, -\dfrac{1}{2}, -3, -\dfrac{4}{3}, -\dfrac{7}{4}$**___

3. $a_1 = 1$, $a_n = \dfrac{n}{a_{n-1} + 1}$

___**$1, 1, \dfrac{3}{2}, \dfrac{8}{5}, \dfrac{25}{13}$**___

4. $a_n = n - 2^{n-3}$

___**$\dfrac{3}{4}, \dfrac{3}{2}, 2, 2, 1$**___

5. $a_n = (n - 1)^n$

___**0, 1, 8, 81, 1024**___

6. $a_n = n^2 - 2^n$

___**−1, 0, 1, 0, −7**___

Write a possible explicit rule for the nth term of each sequence.

7. 1, 5, 9, 13, 17, … ___**$a_n = 4n - 3$**___

8. 0.8, 1.6, 3.2, 6.4, 12.8, … ___**$a_n = 0.4(2)^n$**___

9. 1.5, 3, 4.5, 6, 7.5, … ___**$a_n = \dfrac{3}{2}n$**___

10. 19.5, 18, 15.5, 12, 7.5, … ___**$a_n = 20 - 0.5n^2$**___

11. $2, \dfrac{10}{3}, \dfrac{14}{3}, 6, \dfrac{22}{3}, \dots$ ___**$a_n = \dfrac{4}{3}n + \dfrac{2}{3}$**___

12. $\dfrac{25}{16}, \dfrac{5}{4}, 1, \dfrac{4}{5}, \dfrac{16}{25}, \dots$ ___**$a_n = \left(\dfrac{4}{5}\right)^{n-3}$**___

13. 10, 7, 2, −5, −14, … ___**$a_n = 11 - n^2$**___

14. 1, 0.2, 0.03, 0.004, … ___**$a_n = n(0.1)^{n-1}$**___

15. 0, 9, 24, 45, 72, … ___**$a_n = 3n^2 - 3$**___

Solve.

16. The vertex of each square is the midpoint of the next larger square. The area of the center square is 1 square unit.
  a. What are the areas of the next 4 squares?
  ___**2, 4, 8, 16**___
  b. Write an explicit rule for the areas.
  ___**$a_n = 2^{n-1}$**___
  c. What is the area of the eighth square?
  ___**128 square units**___
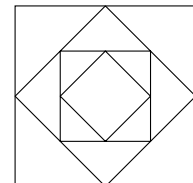
17. A grocer stacks oranges in a square pyramid. Each orange sits on the 4 oranges below it. So, the top layer has 1 orange and the layer below it has 4 oranges. The layer below that has 9 oranges. The total number of oranges required for 1 layer is 1. The total number of oranges required for 2 layers is 5. The total number of oranges required for 3 layers is 14.
  a. Write a recursive formula for the sequence.
  ___**$a_n = n^2 + a_{n-1}$**___
  b. How many oranges are required for 10 layers?
  ___**385 oranges**___

5 *Holt Algebra 2*

A **sequence** is an ordered set of numbers. Each number is called a **term**.
A **recursive formula** is a rule that tells you how to write the terms of a sequence, using the preceding terms of the sequence.

Find the first five terms of the sequence with $a_1 = 4$ and $a_n = 3a_{n-1} - 2$.

> a_{n-1} comes before a_n.

a_1 denotes the first term in the sequence.

a_n denotes the nth term in the sequence

Recursive formula

Make a table to list the terms in the sequence.

Term number → n Term value → a_n

n	$a_n = 3a_{n-1} - 2$	a_n
1	Given: $a_1 = 4$	4
2	$a_2 = 3a_{2-1} - 2$ $= 3a_1 - 2$ $= 3(4) - 2 = 10$	10
3	$a_3 = 3a_2 - 2$ $= 3(10) - 2 = 28$	28
4	$a_4 = 3a_3 - 2$ $= 3(28) - 2 = 82$	82
5	$a_5 = 3a_4 - 2$ $= 3(82) - 2 = 244$	244

Notice how the previous term is used each time to compute the next term.

The first five terms are 4, 10, 28, 82, and 244.

Find the first five terms of each sequence.

1. $a_1 = -8$, $a_n = a_{n-1} + 3$

$a_2 = a_1 + 3 = -8 + 3 =$ ___**−5**___
$a_3 = a_2 + 3 =$ ___**−2**___
$a_4 =$ ___**1**___
$a_5 =$ ___**4**___

2. $a_1 = 2$, $a_n = -5a_{n-1}$

$a_2 = -5a_1 = -5(2) =$ ___**−10**___
$a_3 = -5a_2 =$ ___**50**___
$a_4 =$ ___**−250**___
$a_5 =$ ___**1250**___

3. $a_1 = 6$, $a_n = 2a_{n-1} - 1$

___**$a_2 = 11$**___
___**$a_3 = 21$**___
___**$a_4 = 41$**___
___**$a_5 = 81$**___

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

___**$a_2 = -4$**___
___**$a_3 = -16$**___
___**$a_4 = -64$**___
___**$a_5 = -256$**___

6 *Holt Algebra 2*