F-BF.A: Skills Practice Problems

2.1 #7-12

Use each scenario to complete the table of values and calculate the unit rate of change.

7. Miguel is riding his bike to lacrosse practice at a rate of 7 miles per hour.

	Independent Quantity	Dependent Quantity
Quantity	Time	Distance
Units	hours	miles
Expression	t	$7t$
	0	0
	0.5	3.5
	1	7
	1.5	10.5
	2	14

(0.5, 3.5) and (1, 7)

$\frac{7 - 3.5}{1 - 0.5} = \frac{3.5}{0.5}$

$= \frac{7}{1}$

The unit rate of change is 7.

8. Jada is walking to school at a rate of 2 miles per hour.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
Expression		
	0.25	
	0.5	
	1	
	1.25	
	1.5	

9. Noah is stuffing envelopes with invitations to the school's Harvest Festival. He stuffs 4 envelopes each minute.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
Expression		
	5	
	10	
	15	
	20	
	25	

10. Terell plays on the varsity basketball team. He averages 12 points per game.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
Expression		
	1	
	3	
	5	
	7	
	9	

11. The volleyball boosters sell bags of popcorn during the varsity matches to raise money for new uniforms. Each bag of popcorn costs $3.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
Expression		
	5	
	10	
	15	
	20	
	25	

2.2 #1-6

Complete the table to represent each problem situation.

1. A hot air balloon cruising at 1000 feet begins to ascend. It ascends at a rate of 200 feet per minute.

	Independent Quantity	Dependent Quantity
Quantity	Time	Height
Units	minutes	feet
	0	1000
	2	1400
	4	1800
	6	2200
	8	2600
Expression	t	$200t + 1000$

2. A bathtub contains 10 gallons of water. The faucet is turned on and fills the tub at a rate of 5.25 gallons per minute.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
	0	
	1	
	3	
		36.25
		46.75
Expression		

3. A helicopter flying at 4125 feet begins its descent. It descends at a rate of 550 feet per minute.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
	0	
	1	
	2	
		2475
		1925
Expression		

4. A fish tank filled with 12 gallons of water is drained. The water drains at a rate of 1.5 gallons per minute.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
	0	
	1	
	3	
		4.5
		1.5
Expression		

5. A submarine is traveling at a depth of −300 feet. It begins ascending at a rate of 28 feet per minute.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
	0	
	2	
	4	
		−132
		−76
Expression		

6. A free-diver is diving from the surface of the water at a rate of 15 feet per minute.

	Independent Quantity	Dependent Quantity
Quantity		
Units		
	0	
	1	
	2	
		−45
		−60
Expression		

3.4 #1-6

Write a linear function in two different ways to represent each problem situation.

1. Mei paints and sells ceramic vases for $35 each. Each month she typically breaks 3 vases in the kiln. Write a linear function that represents the total amount Mei earns each month selling vases taking into account the value of the vases she breaks.
   $f(x) = 35(x - 3)$
   $f(x) = 35x - 105$

2. Isabel makes and sells fruit pies at her bakery for $12.99 each. Each month she gives away 4 pies as samples. Write a linear function that represents the total amount Isabel earns each month selling fruit pies taking into account the value of the pies she gives away as samples.

3. Mattie sells heads of lettuce for $1.99 each from a roadside farmer's market stand. Each week she loses 2 heads of lettuce due to spoilage. Write a linear function that represents the total amount Mattie earns each week selling heads of lettuce taking into account the value of the lettuce she loses due to spoilage.

4. Carlos prints and sells T-shirts for $14.99 each. Each month 5 T-shirts are misprinted and cannot be sold. Write a linear equation that represents the total amount Carlos earns each month selling T-shirts taking into account the value of the T-shirts that cannot be sold.

5. Odell prints and sells posters for $20 each. Each month 1 poster is misprinted and cannot be sold. Write a linear equation that represents the total amount Odell earns each month taking into account the value of the poster that cannot be sold.

6. Emilio builds and sells homemade wooden toys for $40 each. Each month he donates 3 toys to a children's hospital. Write a linear equation that represents the total amount Emilio earns each month selling toys taking into account the toys he donates.

4.2 #41-50

Write the explicit AND recursive formulas for each.

41. 4, 8, 12, 16, . . .

42. 2, 4, 7, 11, . . .

43. 3, 12, 48, 192, . . .

44. 9, -18, 36, -72, . . .

45. 1.1, 1.11, 1.111, 1.1111, . . .

46. 4, -8, -20, -32, . . .

47. 7.5, 11.6, 15.7, 19.8, . . .

48. 1, -4, 9, -16, . . .

49. 5, -20, 80, -320, . . .

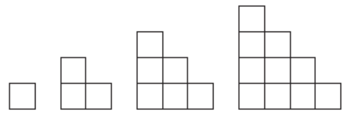
50. 9.8, 5.6, 1.4, -2.8, . . .

4.1 #7-16

Write a numeric sequence to represent each given pattern or situation.

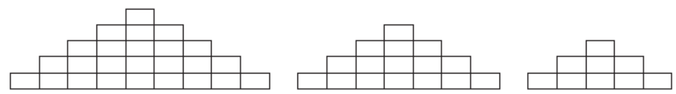
7. The school cafeteria begins the day with a supply of 1000 chicken nuggets. Each student that passes through the lunch line is given 5 chicken nuggets. Write a numeric sequence to represent the total number of chicken nuggets remaining in the cafeteria's supply after each of the first 6 students pass through the line. Include the number of chicken nuggets the cafeteria started with.
   1000, 995, 990, 985, 980, 975, 970

8. Write a numeric sequence to represent the number of squares in each of the first 7 figures of the pattern.



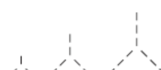
9. Sophia starts a job at a restaurant. She deposits $40 from each paycheck into her savings account. There was no money in the account prior to her first deposit. Write a numeric sequence to represent the amount of money in the savings account after Sophia receives each of her first 6 paychecks.

10. Write a numeric sequence to represent the number of blocks in each of the first 5 figures of the pattern.



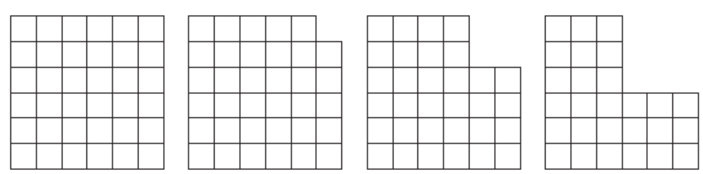
11. Kyle is collecting canned goods for a food drive. On the first day he collects 1 can. On the second day he collects 2 cans. On the third day he collects 4 cans. On each successive day, he collects twice as many cans as he collected the previous day. Write a numeric sequence to represent the total number of cans Kyle has collected by the end of each of the first 7 days of the food drive.

12. Write a numeric sequence to represent the number of line segments in each of the first 7 figures of the pattern.



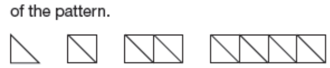
13. For her 10th birthday, Tameka's grandparents give her a set of 200 stamps. For each birthday after that, they give her a set of 25 stamps to add to her stamp collection. Write a numeric sequence consisting of 7 terms to represent the number of stamps in Tameka's collection after each of her birthdays starting with her 10th birthday.

14. Write a numeric sequence to represent the number of squares in each of the first 6 figures of the pattern.



15. Leonardo uses 3 cups of flour in each cake he bakes. He starts the day with 50 cups of flour. Write a numeric sequence to represent the amount of flour remaining after each of the first 7 cakes Leonardo bakes. Include the amount of flour Leonardo started with.

16. Write a numeric sequence to represent the number of triangles in each of the first 7 figures of the pattern.



4.3 #1-10

Determine each unknown term in the given arithmetic sequence using the explicit formula.

1. Determine the 20th term of the sequence 1, 4, 7, . . .

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

$a_{20} = 1 + 3(20 - 1)$

$a_{20} = 1 + 3(19)$

$a_{20} = 1 + 57$

$a_{20} = 58$

2. Determine the 30th term of the sequence −10, −15, −20, . . .

3. Determine the 25th term of the sequence 3.3, 4.4, 5.5, . . .

4. Determine the 50th term of the sequence 100, 92, 84, . . .

5. Determine the 42nd term of the sequence 12.25, 14.50, 16.75, . . .

6. Determine the 28th term of the sequence –242, –251, –260, . . .

7. Determine the 34th term of the sequence −76.2, −70.9, −65.6, . . .

8. Determine the 60th term of the sequence 10, 25, 40, . . .

9. Determine the 57th term of the sequence 672, 660, 648, . . .

10. Determine the 75th term of the sequence −200, −100, 0, . . .

4.3 #21-28

Determine whether each sequence is arithmetic or geometric. Then, use the appropriate recursive formula to determine the unknown term(s) in the sequence.

21. 4, 8, 16, 32, __64__, . . .

The sequence is geometric.

$g_n = g_{n-1} \cdot r$

$g_5 = g_4 \cdot 2$

$g_5 = 32 \cdot 2$

$g_5 = 64$

22. 16, 30, 44, 58, ________, . . .

23. 2, −6, 18, ________, 162, ________, . . .

24. 7.3, 9.4, 11.5, ________, 15.7, ________, . . .

25. 320, 410, 500, ________, ________, . . .

26. 7, 21, 63, ________, 567, ________, . . .

27. −68, −83, −98, ________, ________, ________, . . .

28. −5, 20, −80, ________, ________, ________, . . .

4.3 #11-20

Determine each unknown term in the given geometric sequence using the explicit formula. Round the answer to the nearest hundredth when necessary.

11. Determine the 10th term of the sequence 3, 6, 12, . . .

$g_n = g_1 \cdot r^{n-1}$

$g_{10} = 3 \cdot 2^{10-1}$

$g_{10} = 3 \cdot 2^9$

$g_{10} = 3 \cdot 512$

$g_{10} = 1536$

12. Determine the 15th term of the sequence 1, −2, 4, . . .

13. Determine the 12th term of the sequence 5, 15, 45, . . .

14. Determine the 16th term of the sequence 9, 18, 36, . . .

15. Determine the 20th term of the sequence 0.125, −0.250, 0.500, . . .

16. Determine the 18th term of the sequence 3, 9, 27, . . .

17. Determine the 14th term of the sequence −4, 8, −16, . . .

18. Determine the 10th term of the sequence 0.1, 0.5, 2.5, . . .

19. Determine the 12th term of the sequence 4, 5, 6.25, . . .

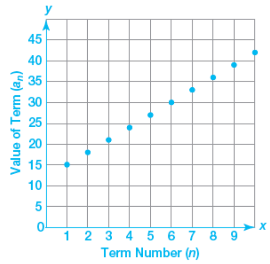
20. Determine the 10th term of the sequence 5, −25, 125, . . .

4.4 #1-10

Complete the table for each given sequence then graph each sequence on the coordinate plane.

1. $a_n = 15 + 3(n - 1)$

Term Number (n)	Value of Term (a_n)
1	15
2	18
3	21
4	24
5	27
6	30
7	33
8	36
9	39
10	42



2. $g_n = 3 \cdot 2^{n-1}$

Term Number (n)	Value of Term (g_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

3. $a_n = 50 + (-8)(n - 1)$

Term Number (n)	Value of Term (a_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

4. $g_n = 3 \cdot (-2)^{n-1}$

Term Number (n)	Value of Term (g_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

5. $a_n = -24 + 6(n - 1)$

Term Number (n)	Value of Term (a_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

6. $g_n = -1 \cdot 2^{n-1}$

Term Number (n)	Value of Term (g_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

7. $a_n = 75 + 25(n - 1)$

Term Number (n)	Value of Term (a_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

8. $g_n = 32{,}000 \cdot (0.5)^{n-1}$

Term Number (n)	Value of Term (g_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

9. $a_n = 400 + (-80)(n - 1)$

Term Number (n)	Value of Term (a_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

10. $g_n = 2 \cdot (-3)^{n-1}$

Term Number (n)	Value of Term (g_n)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

5.1 #1-6

Write a function to represent each problem situation.

1. Nami deposits $500 into a simple interest account. The interest rate for the account is 3%. Write a function that represents the balance in the account as a function of time *t*.
   $P(t) = P_0 + (P_0 \cdot r)t$
   $P(t) = 500 + (500 \cdot 0.03)t$
   $P(t) = 500 + 15t$

2. Carmen deposits $1000 into a simple interest account. The interest rate for the account is 4%. Write a function that represents the balance in the account as a function of time *t*.

3. Emilio deposits $250 into a simple interest account. The interest rate for the account is 2.5%. Write a function that represents the balance in the account as a function of time *t*.

4. Vance deposits $1500 into a simple interest account. The interest rate for the account is 5.5%. Write a function that represents the balance in the account as a function of time *t*.

5. Perry deposits $175 into a simple interest account. The interest rate for the account is 4.25%. Write a function that represents the balance in the account as a function of time *t*.

6. Julian deposits $5000 into a simple interest account. The interest rate for the account is 2.75%. Write a function that represents the balance in the account as a function of time *t*.

5.1 #19-24

Write a function to represent each problem situation.

19. Ronna deposits $500 into a compound interest account. The interest rate for the account is 4%.
    $P(t) = P_0 \cdot (1 + r)^t$
    $P(t) = 500 \cdot (1 + 0.04)^t$
    $P(t) = 500 \cdot 1.04$

20. Leon deposits $250 into a compound interest account. The interest rate for the account is 6%.

21. Chen deposits $1200 into a compound interest account. The interest rate for the account is 3.5%.

22. Serena deposits $2700 into a compound interest account. The interest rate for the account is 4.25%.

23. Shen deposits $300 into a compound interest account. The interest rate for the account is 1.75%.

24. Lea deposits $450 into a compound interest account. The interest rate for the account is 5.5%.

5.2 #7-12

Waynesburg has a population of 16,000. Its population is increasing at a rate of 1.5%. The function $P(t) = 16{,}000 \cdot 1.015^t$ represents the population as a function of time. Determine the population after each given number of years. Round your answer to the nearest whole number.

7. 1 year
   $P(t) = 16{,}000 \cdot 1.015^t$
   $P(1) = 16{,}000 \cdot 1.015^1$
   $P(1) = 16{,}240$
   The population after 1 year will be 16,240.

8. 3 years

9. 5 years

10. 10 years

11. 20 years

12. 50 years

5.1 #7-12

Sherwin deposits $500 into a simple interest account. The interest rate for the account is 3.75%. The function $P(t) = 500 + 18.75t$ represents the balance in the account as a function of time. Determine the account balance after each given number of years.

7. 3 years
   $P(t) = 500 + 18.75t$
   $P(3) = 500 + 18.75(3)$
   $P(3) = 556.25$
   In 3 years, the account balance will be $556.25.

8. 2 years

9. 10 years

10. 15 years

11. 50 years

12. 75 years

5.1 #25-30

Cisco deposits $500 into a compound interest account. The interest rate for the account is 3.25%. The function $P(t) = 500 \cdot 1.0325^t$ represents the balance in the account as a function of time. Determine the account balance after each given number of years.

25. 2 years
    $P(t) = 500 \cdot 1.0325^t$
    $P(2) = 500 \cdot 1.0325^2$
    $P(2) \approx 533.03$
    In 2 years, the account balance will be $533.03.

26. 4 years

27. 15 years

28. 20 years

29. 50 years

30. 65 years

5.2 #1-6

Write a function that represents each population as a function of time.

1. Blueville has a population of 7000. Its population is increasing at a rate of 1.4%.
   $P(t) = P_0 \cdot (1 + r)^t$
   $P(t) = 7000 \cdot (1 + 0.014)^t$
   $P(t) = 7000 \cdot 1.014^t$

2. Youngstown has a population of 12,000. Its population is increasing at a rate of 1.2%.

3. Greenville has a population of 8000. Its population is decreasing at a rate of 1.75%.

4. North Park has a population of 14,000. Its population is decreasing at a rate of 3.1%.

5. West Lake has a population of 9500. Its population is increasing at a rate of 2.8%.

6. Springfield has a population of 11,500. Its population is decreasing at a rate of 1.25%.