

Extra Practice 1A**Lesson 1.1: Patterns in Division**

- Which numbers are divisible by 5? By 8? How do you know?
a) 3075 b) 272 c) 520
d) 377 e) 2736 f) 5695
g) 1087 h) 3120 i) 2372
- Write a 5-digit number that is divisible by 4.
Is your number divisible by 8? How do you know?
- Which numbers are divisible by 4? By 10?
How do you know?
a) 2502 b) 224 c) 985
d) 9070 e) 3292 f) 10 200
g) 34 928 h) 10 000 i) 2382
- Use the digits 0 to 9. Replace the \square in each number to make a number which is divisible by 8. Find as many answers as you can.
a) $77\square6$ b) $12\square12$ c) $43\square336$
- Sadie and May discuss divisibility.
Sadie says "1970 is divisible by 5 and by 10.
 $5 \times 10 = 50$, so 1970 is also divisible by 50."
May says "83 020 is divisible by 2 and by 4.
 $2 \times 4 = 8$, so 83 020 is also divisible by 8."
Are Sadie and May correct? Why or why not?
- Explain why any number with 0 in both the tens and ones places is divisible by 4. Is such a number also divisible by 2? By 8?
Explain your thinking.

Extra Practice 2A**Lesson 1.2: More Patterns in Division**

- Which numbers are divisible by 3? By 9?
How do you know?
a) 179 b) 2124 c) 2452
d) 5589 e) 49 425 f) 2683
g) 89 352 h) 16 701 i) 137 368
- Use a Carroll diagram.
Which numbers are divisible by 5? By 9? By neither 5 nor 9?
3780 243 2055 216 42 155 29 655 1929 3660
- Use the digits 0 to 9. Replace the \square in each number to make a number divisible by 9. Find as many answers as you can.
a) $5\square 2$ b) $497\square$ c) $2\square 384$
- I am a 3-digit number that has a 3 in the hundreds place.
I am divisible by 5, and 9, but not by 2.
What number am I?
- Write three 4-digit numbers that are divisible by 6.
How did you choose the numbers?
- Suppose you have 36 apples to share.
You must share the apples equally with everyone in the class.
How many apples will each person get, in each case?
a) There are 18 people in the class.
b) There are 9 people in the class.
c) There are 6 people in the class.
d) There are 0 people in the class.

Extra Practice 3A**Lesson 1.3: Algebraic Expressions**

- Write an algebraic expression for each statement.
 - Three times a number
 - Six more than a number
 - Ten less than a number
 - A number divided by five
 - Seven times a number less than twenty
 - Eight more than four times a number
 - Five less than two times a number
- Write each algebraic expression in words.
 - $2n$
 - $4 + n$
 - $5n - 25$
- Evaluate each expression for $n = 8$.
 - $6n$
 - $n + 9$
 - $\frac{n}{4}$
 - $1 + 3n$
 - $3n - 7$
 - $25 - 2n$
- A student earns \$8/h delivering leaflets. How much money does the student earn in:
 - $3h$
 - $7h$
 - t hours
- Which algebraic expression can be used to describe each phrase?
Circle the correct answer.

a) A number increased by 3	$3n$	$n - 3$	$n + 3$
b) Three less than two times a number	$3 - 2n$	$2n - 3$	$\frac{n}{2} - 3$
c) One less than a number divided by 3	$1 - \frac{n}{3}$	$\frac{n}{3}$	$\frac{n}{3} - 1$
- Suggest a real-life situation that could be represented by each relation.
 - $2n$ is related to n
 - $n + 3$ is related to n

Extra Practice 4A**Lesson 1.4: Relationships in Patterns**

1. Let n represent any term number.
Write a relationship for each number pattern.

a)

Term Number	1	2	3	4	5
Term	0	1	2	3	4

b)

Term Number	1	2	3	4	5
Term	4	8	12	16	20

c)

Term Number	1	2	3	4	5
Term	2	5	8	11	14

2. There are n students in the room. Write a relation for each statement.
- The total number of chairs, if there are 6 more chairs than students.
 - The total number of shoes, if each student has 1 pair.
 - The total number of hats, if there are 6 fewer hats than students.
3. A regular octagon has 8 equal sides. Write a relation for the perimeter of a regular octagon of side length s . What is the perimeter of a regular octagon with side length 17 cm?
4. Suggest a real-life situation that could be represented by each relation.
- $n + 4$ is related to n
 - $30 + 5n$ is related to n
 - $6n + 5$ is related to n
 - $2n + 1$ is related to n
5. The cost of printing a yearbook is \$200 plus \$8 for each book printed.
- Write a relation for the total cost of printing b books.
 - What is the total cost of printing 50 books?
6. Write a relation for the pattern rule for each number pattern.
Let n represent any term number.
- 3, 6, 9, 12, ...
 - 3, 4, 5, 6, ...
 - 2, 4, 6, 8, ...
 - 5, 10, 15, 20, ...
 - 6, 7, 8, 9, ...
 - 6, 11, 16, 21, ...

Extra Practice 5A**Lesson 1.5: Patterns and Relationships in Tables**

Copy and complete each table.

Explain how the Output number is related to the Input number.

1.

Input n	Output $7n$
1	
2	
3	
4	
5	

2.

Input n	Output $n + 5$
1	
2	
3	
4	
5	

3.

Input n	Output $2n$
1	
2	
3	
4	
5	

4.

Input n	Output $2n - 1$
1	
2	
3	
4	
5	

Use algebra.

Write a relation for each Input/Output table.

5.

Input n	Output
1	6
2	12
3	18
4	24
5	30

6.

Input n	Output
1	4
2	7
3	10
4	13
5	16

7.

Input n	Output
1	2
2	5
3	8
4	11
5	14

8.

Input n	Output
1	2
2	7
3	12
4	17
5	22

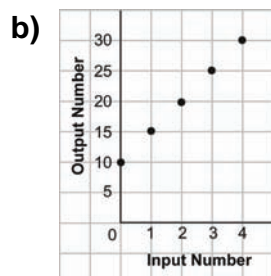
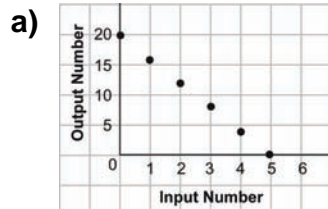
Extra Practice 6A

Lesson 1.6: Graphing Relations

1. a) Copy and complete this Input/Output table to show how $2n + 1$ is related to n .
- b) Graph the relation.
How did you choose the scale on the vertical axis?
- c) How does the graph illustrate the relation?
- d) Suggest a real-life situation that the graph could represent.

Input n	Output $2n + 1$
1	
2	
3	
4	
5	

2. Ben earns \$6/h baby-sitting.
He is saving his earnings to buy an MP3 player that costs \$360.
 - a) Write a relation to show how Ben's savings are related to the number of hours he baby-sits.
 - b) Make a table to show the amount of savings after baby-sitting for 10, 20, 30, 40, and 50 hours.
 - c) Draw a graph to show the relation.
Describe the graph.
 - d) Use your graph. How much will Ben have saved after baby-sitting for 60 h?
3. Describe a real-life situation that each graph below could represent.



4. Use the relation $5n - 4$ is related to n .
 - a) Make an Input/Output table for values of n from 1 to 5.
 - b) Graph the relation.
 - c) Describe a real-life situation that could be represented by this relation.

Extra Practice 7A**Lesson 1.7: Reading and Writing Equations**

- Write an equation for each sentence.
 - Five more than a number is 11.
 - Six less than a number is 10.
 - Four more than three times a number is 22.
 - A number divided by 4 equals 7.
- Write an equation for each sentence.
 - The perimeter of a regular pentagon with side length s , in centimetres, is 40 cm.
 - Alex's age eight years from now will be 20.
 - The cost of 2 sandwiches at \$3 each and three drinks at x dollars each is \$12.
- Write a sentence for each equation.
 - $5 + n = 8$
 - $3n - 2 = 19$
 - $\frac{n}{5} = 2$
 - $4n + 2 = 18$
- Follow the steps to write each equation.
Let n represent the number.
 - Think of a number: _____
Multiply the number by 3: _____
Subtract 5: _____
The result is 13. What is the equation?

 - Think of a number: _____
Divide the number by 2: _____
Add 7: _____
The result is 12. What is the equation?

- Match each equation with the correct sentence.
 - $n - 4 = 8$
 - $4n + 4 = 8$
 - $\frac{n}{4} = 8$
 - Four more than four times a number is 8
 - Four less than a number is 8
 - A number divided by 4 is 8

Extra Practice 8A**Lesson 1.8: Solving Equations Using Algebra Tiles**

1. Write an equation for each sentence.
Solve each equation.
Verify each solution.
 - a) Five more than a number is seven.
 - b) Two less than a number is eight.
 - c) One more than three times a number is thirteen.
 - d) Three less than two times a number is five.

2. Alisha thinks of a number. She doubles the number, and then adds 4. Her result is fourteen.
 - a) Write an equation to represent this situation.
 - b) Solve the equation to find Alisha's number.

3. Solve each equation.
 - a) $x + 5 = 9$
 - b) $7 + y = 9$
 - c) $2a = 8$
 - d) $3b = 18$

4. For each equation in question 3, identify a constant term, the numerical coefficient, and the variable.

5. Write an equation to represent each situation.
Solve each equation.
Verify each solution.
 - a) Jon has 6 marbles. This is 4 less than Mary.
How many marbles does Mary have?
 - b) If Lynne saves 5 more stamps, she will have 20.
How many stamps does Lynne have?
 - c) If Jan doubles the number of CD's she has, she will have 12.
How many CD's does Jan have?
 - d) In 3 years time, Alec will be 12. How old is Alec now?

Extra Practice Sample Answers

Extra Practice 1A

Lesson 1.1

- A number is divisible by 5 if the ones digit is 0 or 5.
So, the numbers divisible by 5 are 3075, 520, 5695, and 3120.
A number is divisible by 8 if the number represented by the last 3 digits is divisible by 8.
So, the numbers divisible by 8 are 272, 520, 2736, and 3120.
- I chose 68 216. A number is divisible by 4 if the number represented by the last 2 digits is divisible by 4.
So, I chose a 2-digit number, 16, that was a multiple of 4.
I then picked the first 3 digits randomly.
The number 68 216 is divisible by 8, since the number represented by the last 3 digits, 216, is divisible by 8.
- A number is divisible by 4 if the number represented by the last two digits is divisible by 4.
So, the numbers divisible by 4 are 224, 3292, 10 200, 34 928, and 10 000.
A number is divisible by 10 if the ones digit is 0.
So, the numbers divisible by 10 are 9070, 10 200, and 10 000.
- To be divisible by 8, the number represented by the last 3 digits must be divisible by 8.
The hundreds digit is 7 and the ones digit is 6.
So, the tens digit could be a 3 or a 7.
The tens digit is 1 and the ones digit is 2.
So, the hundreds digit could be 1, 3, 5, 7, or 9.
The hundreds digit is 3, the tens digit is 3, and the ones digit is 6.
So, the thousands digit could be any digit.
- No, Sadie and May are not correct, because 5 and 10 have a common factor of 5, while 2 and 4 have a common factor of 2. All numbers divisible by 10 are divisible by 5, but not all numbers divisible by 10 are divisible by 50. All numbers divisible by 4 are divisible by 2, but not all numbers divisible by 4 are also divisible by 8. The number 1970 is divisible by both 10 and 5, but it is not divisible by 50. The number 83 020 is divisible by 2 and 4, but not by 8.
- A number with a zero in both the tens and ones places is a multiple of 100. The number 4 is a factor of 100; therefore it is also a factor of all multiples of 100.
The number 2 is a factor of 4; therefore it is also a factor of all multiples of 4.
The number 8 is not a factor of 4; therefore not all multiples of four are also multiples of 8.
The number 8 is not a factor of 100; therefore it may not be a factor of a number with a zero in both the tens and ones places.

Extra Practice 2A

Lesson 1.2

- A number is divisible by 3 if the sum of the digits is divisible by 3.
So, the numbers divisible by 3 are 2124, 49 425, 89 352, and 16 701.
A number is divisible by 9 if the sum of the digits is divisible by 9.
So, the numbers divisible by 9 are 2124, and 89352.
- | | Divisible by 5 | Not Divisible by 5 |
|---------------------------|-----------------------|---------------------------|
| Divisible by 9 | 3780, 29655 | 243, 216 |
| Not Divisible by 9 | 2055, 42 155, 3660 | 1929 |
- To be divisible by 9, the sum of the digits must be divisible by 9.
The sum of 5, and 2 is 7, so for the sum of all 3 digits to be divisible by 9, the final sum must be 9, and the tens digit must be 2.
The sum of 4, 9, and 7 is 20, so for the sum of all 4 digits to be divisible by 9, the final sum must be 27, and the ones digit must be 7.
The sum of 2, 3, 8, and 4 is 17, so for the sum of all 5 digits to be divisible by 9, the final sum must be 18, and the thousands digit must be 1.

4. To be divisible by 5, the ones digit must be 0 or 5.
 To be divisible by 2, the number must be even, but since this number is not divisible by 2, it must be an odd number.
 So, the ones digit must be 5, which makes the number odd, as 0 would make the number even.
 To be divisible by 9, the sum of the digits must be divisible by 9.
 The sum of 3, and 5 is 8, so for the sum of all 3 digits to be divisible by 9, the final sum must be 9, and the tens digit must be 1.
 So, the number is 315.
5. I chose 4230, 5184, and 3066.
 A number is divisible by 6 if the number is divisible by both 2 and 3.
 A number is divisible by 2 if it is even.
 So, first I chose the ones digits to be a random even number.
 A number is divisible by 3 if the sum of the digits is divisible by 3.
 So, I then chose the first 3 digits of the numbers such that the sum of all 4 digits was a multiple of 3.
6. a) 2 apples
 b) 4 apples
 c) 6 apples
 d) I cannot share apples equally among no one.

Extra Practice 3A

Lesson 1.3

1. a) $3n$ b) $n + 6$ c) $n - 10$
 d) $\frac{n}{5}$ e) $20 - 7n$ f) $4n + 8$
 g) $2n - 5$
2. a) Two times a number
 b) Four more than a number
 c) Twenty five less than five times a number
3. a) $6 \times 8 = 48$ b) $8 + 9 = 17$
 c) $\frac{8}{4} = 2$ d) $1 + 3 \times 8 = 25$
 e) $3 \times 8 - 7 = 17$
 f) $25 - 2 \times 8 = 9$
4. a) \$24 b) \$56 c) \$8
5. a) $n + 3$ b) $2n - 3$ c) $\frac{n}{3} - 1$
6. a) The total number of shoes if there are n people.
 b) The total number of balls a clown is juggling at a birthday party, if he starts with 3 balls and has n children each throw him one additional ball.

Extra Practice 4A

Lesson 1.4

1. a) $n - 1$ is related to n
 b) $4n$ is related to n
 c) $3n - 1$ is related to n
2. a) $n + 6$ b) $2n$ c) $n - 6$
3. 8s related to s
 An octagon with side length 17 cm has perimeter 136 cm.

4. a) The number of people in the restaurant if there are 4 employees working and n customers.
 b) The cost of renting a pony for a birthday party if there is a flat fee of \$30 plus \$5 per hour, n .
 c) The number of books in a classroom if there are 5 already in the class and n students bring in 6 more each.
 d) The number of nickels a student will have if they exchange n dimes for nickels and then find one more nickel on the ground.
5. a) $8b + 200$ is related to b b) \$600
 6. a) $3n$ b) $n + 2$ c) $2n$
 d) $5n$ e) $n + 5$ f) $5n + 1$

Extra Practice 5A

Lesson 1.5

1.

Input n	Output $7n$
1	7
2	14
3	21
4	28
5	35
2.

Input n	Output $n + 5$
1	6
2	7
3	8
4	9
5	10
3.

Input n	Output $2n$
1	2
2	4
3	6
4	8
5	10
4.

Input n	Output $2n - 1$
1	1
2	3
3	5
4	7
5	9

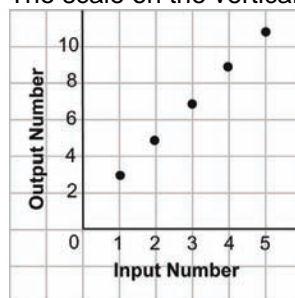
5. $6n$ 6. $3n + 1$
 7. $3n - 1$ 8. $5n - 3$

Extra Practice 6A

Lesson 1.6

1. a)

Input n	Output $2n + 1$
1	3
2	5
3	7
4	9
5	11
- b) The scale on the vertical axis goes up by a factor of 2 per line.



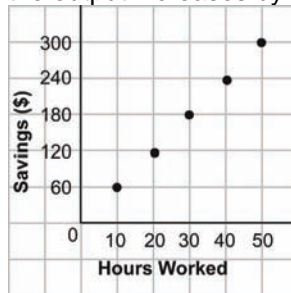
- c) The points on the graph lie on a straight line going up to the right. As the input increase by 1, the output increases by 2.
- d) The cost of returning a late book to the library if they charge \$1 as a base fee, plus \$2 for each extra week, n .

2. a) $6n$ is related to n

b)

Hours	Savings
10	60
20	120
30	180
40	240
50	300

c) The points on the graph lie on a straight line going up to the right. As the input increases by 10, the output increases by 60.



d) After baby-sitting for 60 h, Ben will have earned \$360.

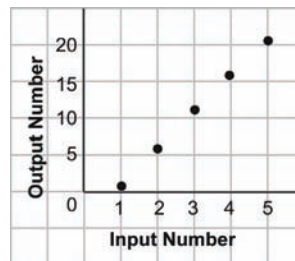
3. a) The money someone has left if they start with \$20 and buy n hamburgers which cost \$4 each.

b) The cost to rent a skating rink for a party if there is a base cost of \$10 and an additional cost of \$4 each for renting n pairs of skates.

4. a)

Input n	Output $5n - 4$
1	1
2	6
3	11
4	16
5	21

b)



c) The cost of buying n pies if they cost \$5 each and you have a coupon to save \$4 on your purchase.

Extra Practice 7A

Lesson 1.7

1. a) Let n represent the number. The equation is $n + 5 = 11$

b) Let n represent the number. The equation is $n - 6 = 10$

c) Let n represent the number. The equation is $3n + 4 = 22$

d) Let n represent the number. The equation is $\frac{n}{4} = 7$

2. a) $5s = 40$

b) Let a represent Alex's age now. The equation is $a + 8 = 20$

c) The equation is $2 \times 3 + 3x = 12$

3. a) Five more than a number is eight.

b) Two less than three times a number is nineteen.

c) A number divided by five is two.

d) Two more than four times a number is eighteen.

4. a) n ; $3n$; $3n - 5$; $3n - 5 = 13$

b) n ; $\frac{n}{2}$; $\frac{n}{2} + 7$; $\frac{n}{2} + 7 = 12$

5. a) B b) A c) C

Extra Practice 8A**Lesson 1.8**

1. a) Let n represent the number.
Five more than the number is $n + 5$.
The equation is $n + 5 = 7$.
The solution is $n = 2$.
The number is 2.
Verify: $2 + 5 = 7$
- b) Let n represent the number.
Two Less than the number is $n - 2$.
The equation is $n - 2 = 8$.
The solution is $n = 10$.
The number is 10.
Verify: $10 - 2 = 8$
- c) Let n represent the number.
Three times a number is $3n$.
One more than three times a number is $1 + 3n$.
The equation is $1 + 3n = 13$.
The solution is $n = 4$.
The number is 4.
Verify: $1 + 4 \times 3 = 14$
- d) Let n represent the number.
Two times a number is $2n$.
Three less than two times a number is $2n - 3$.
The equation is $2n - 3 = 5$.
The solution is $n = 4$.
The number is 4.
Verify: $2 \times 4 - 3 = 5$
2. a) $2n + 4 = 14$
b) $n = 5$
Verify: $2 \times 5 + 4 = 14$
3. a) $x = 4$ b) $y = 2$ c) $a = 4$ d) $b = 6$
4. a) Constant term: 5 or 9; Numerical coefficient: 1; Variable: x
b) Constant term: 7 or 9; Numerical coefficient: 1; Variable: y
c) Constant term: 8; Numerical coefficient: 2; Variable: a
d) Constant term: 18; Numerical coefficient: 3; Variable: b
5. a) $n - 4 = 6$
 $n = 10$
Verify: $10 - 4 = 6$
- b) $n + 5 = 20$
 $n = 15$
Verify: $15 + 5 = 20$
- c) $2n = 12$
 $n = 6$
Verify: $2 \times 6 = 12$
- d) $n + 3 = 12$
 $n = 9$
Verify: $9 + 3 = 12$