Module 1 Reviewing Number Systems

Section 1.1 Classifying Numbers

Practice Problems 1.1

For Problem 1-10, name the set(s) the number given belongs to: natural numbers, whole numbers, integers, rational numbers, and irrational numbers. There can be more than one answer.

1. $\frac{1}{3}$

2. $e = 2.71828 \ldots$

3. 3

4. -4

5. 0

6. -9

7. 4.6

8. $-3.\overline{3}$

9. $\pi = 3.14159265 \ldots$

10. $-6\frac{1}{8}$

For Problem 11-14, use the information given to solve the problem.

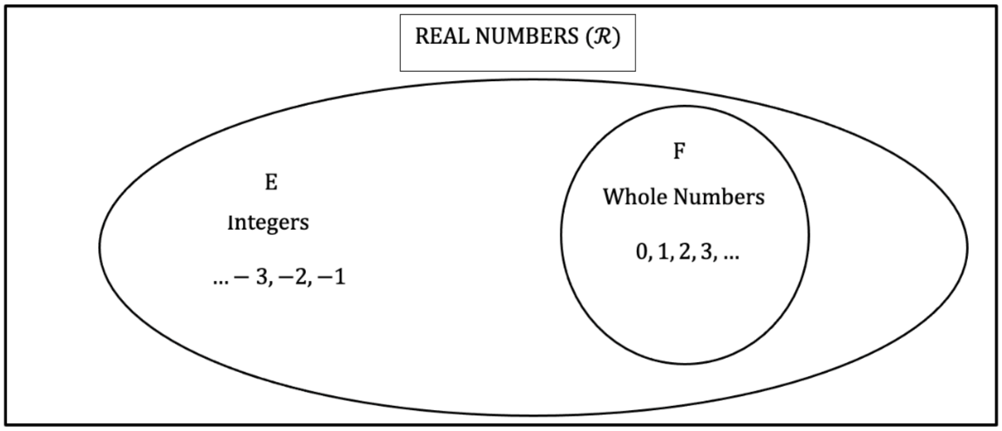
11. What is the union of set A and set B if A is the set of whole numbers and B is the set of natural numbers? $A \cup B =$

12. What is the intersection of set A and set B if A is the set of whole numbers and B is the set of natural numbers? $A \cap B =$

13. What is the intersection of C and D if set C is equal to {Positive Odd Numbers} and set D is equal to {Positive Even Numbers}? $C \cap D =$

14. What is another name for the union of all positive even numbers and positive odd numbers?

For Problem 15-17, use the given Venn diagram to solve the problem.



15. Shade in the Venn diagram for E ∩ F.

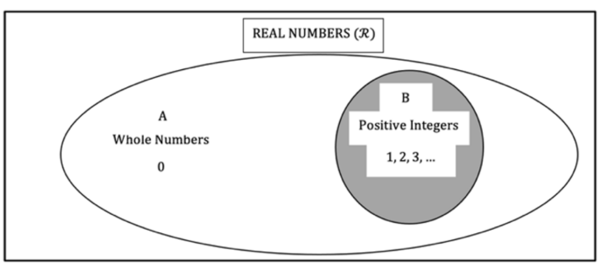
16. Shade in the Venn diagram for E ∪ F.

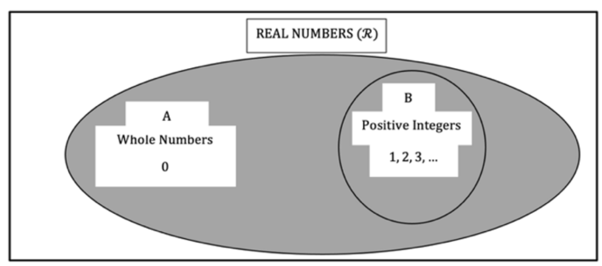
17. Use the subset and superset symbols to fill in the blanks for the Venn diagram.

E ________ F

F ________ E

For Problem 18-20, use the given Venn diagrams to solve the problem.





18. Which drawing represents A ∪ B and which represents A ∩ B?

19. Which drawing represents B ⊂ A?

20. Which diagram represents $\mathcal{R} \supset (A \cup B)$?

Section 1.2 The Identity Elements

Practice Problems 1.2

For Problem 1-4, find the solution to the equation and circle the identity element.

1. $2 + 0 =$ ________

2. $7 \cdot 1 =$ ________

3. $2 - 0 =$ ________

4. $15 \div 1 =$ ________

For Problem 5-8, find the solution to the problem and name the property.

5. In the problem $x - 1 = -1$, what is the value of x? Why is this true?

6. In the problem $-\frac{3}{5} \cdot m = -\frac{3}{5}$, what is the value of m? Why is this true?

7. What number is the identity element for multiplication?

8. What number is the identity element for addition?

For Problem 9-14, use the given information and table to solve the problem.

The table below shows that A is coded to the number 0 and B is coded to the number 1. Substitute these values for the variables below to solve the coded problems. The dot means to multiply.

Input	**Code**
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7
I	8
J	9

9. $(\mathrm{A} \cdot \mathrm{B}) \cdot \mathrm{H}$

10. $\frac{\mathrm{I}}{\mathrm{J}} \cdot \mathrm{A}$

11. $\mathrm{J} + \mathrm{I} - \mathrm{A}$

12. $\mathrm{C} \cdot \mathrm{A} + \frac{\mathrm{J}}{\mathrm{B}}$

13. $A \cdot B \cdot C \cdot D \cdot E \cdot F \cdot G \cdot H \cdot I \cdot J$

14. $(B + C + D + E + F + G + H + I + J) \cdot A$

For Problem 15-20, tell whether the statement is true or false.

15. The code is a proper subset of whole numbers.

16. The code is a proper subset of natural numbers.

17. The code is a proper subset of integers.

18. The code is a proper subset of rational numbers.

19. The code is a proper subset of irrational numbers.

20. The code is a proper subset of real numbers.

Section 1.3 Number Properties

Practice Problems 1.3

For Problem 1-7, name the property.

1. $10 + 0 = 10$

2. $-5 \cdot 1 = -5$

3. $14 \cdot -1 = -14$

4. $m \cdot \frac{1}{m} = 1$

5. $n + -n = 0$

6. $0.2 = \frac{1}{5}$

7. $f \cdot 0 = 0$

For Problem 8-13, use the property given to complete the equation.

8. $y \cdot 0 =$ ________

Multiplication Property of Zero

9. $d +$ ________ $= 0$

Inverse Property of Addition

10. $-8 \cdot$ ________ $= 1$

Inverse Property of Multiplication

11. $x \cdot -1 =$ ________

Multiplication Property of -1

12. $1 \cdot t =$ ________

Identity Property of Multiplication

13. $0 + j =$ ________

Identity Property of Addition

For Problem 14, solve the word problem.

14. Why does the Inverse Property of Multiplication only apply to nonzero real numbers?

For Problem 15 and 16, name the set or sets of numbers in which the number given belongs. (Your choices include: natural numbers, whole numbers, integers, rational numbers, and irrational numbers.)

15. $-\frac{10}{2}$

16. -4.34

17. $\frac{1}{3}$

For Problem 18-20, tell whether the statement is true or false.

18. Negative integers are rational numbers.

19. There are some whole numbers that are irrational.

20. All integers are whole numbers.

Section 1.4 The Commutative and Associative Properties

Practice Problems 1.4

For Problem 1-8, name the property and demonstrate that it is true.

1. $(3 \cdot 1) \cdot 0 = 3 \cdot (1 \cdot 0)$

2. $(2 \cdot -1) \cdot 3 = 2 \cdot (-1 \cdot 3)$

3. $5 + 3.2 = 3.2 + 5$

4. $\frac{1}{2} \cdot 5 = 5 \cdot \frac{1}{2}$

5. $(4 + 3) + 2.6 = 2.6 + (4 + 3)$

6. $(4 + 7) + 2.6 = 4 + (2.6 + 7)$

7. $4 \cdot 0 = 0$

8. $-5 \cdot -\frac{1}{5} = 1$

For Problem 9-12, fill in the blanks.

9.

$$(1 \cdot 4) \cdot 8 = 8 \cdot (\_\_\_\_\_\_\_\_ \cdot 4)$$

$$4 \cdot 8 = 8 \cdot \_\_\_\_\_\_\_\_$$

$$32 = \_\_\_\_\_\_\_\_$$

10.

$$(3 \cdot 2) \cdot \_\_\_\_\_\_\_\_ = 3 \cdot (\_\_\_\_\_\_\_\_ \cdot 1)$$

$$6 \cdot \_\_\_\_\_\_\_\_ = 3 \cdot \_\_\_\_\_\_\_\_$$

$$6 = 6$$

11.

$$(4 + 5) + 2.6 = 4 + (\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_)$$

$$\_\_\_\_\_\_\_\_ + 2.6 = 4 + \_\_\_\_\_\_\_\_$$

$$\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_$$

12.

$$-9 + 0 = \_\_\_\_\_\_\_\_ + -9$$

$$\_\_\_\_\_\_\_\_ = -9$$

For Problem 13-16, tell which of the following sets of numbers best works for the situation given: natural numbers, whole numbers, integers, or rational numbers. Explain why.

13. The temperature on the news at night.

14. The number of brothers and sisters you have.

15. The number of animals on board Noah’s Ark.

16. The number of gallons of seal needed to cover a driveway.

For Problem 17-20, determine whether the situation given is always true, sometimes true, or never true.

17. The opposite of a number is greater than the number.

18. The quotient of two nonzero numbers is an irrational number.

19. The difference or sum of two integers is an integer.

20. The opposite of a negative integer is a positive integer.

Section 1.5 The Distributive Property

Practice Problems 1.5

For Problem 1-20, use the Distributive Property to fill in the blanks.

1. $5(4+3) = 5(\_\_\_\_\_\_\_\_) + 5(3)$

$= 20 + \_\_\_\_\_\_\_\_$

$= \_\_\_\_\_\_\_\_$

2. $(2m+1)\frac{1}{2} = 2m(\_\_\_\_\_\_\_\_) + 1(\frac{1}{2})$

$= m + \_\_\_\_\_\_\_\_$

3. $-1(3x+1) = -1(3x) + (-1)(\_\_\_\_\_\_\_\_)$

$= -3x + \_\_\_\_\_\_\_\_$

$= \_\_\_\_\_\_\_ - \_\_\_\_\_\_\_$

4. $3y + 5y = y(3 + \_\_\_\_\_\_\_\_)$

$= y(\_\_\_\_\_\_\_\_)$

$= 8\_\_\_\_\_\_\_\_$

5. $4(x-3) = 4(\_\_\_\_\_\_\_\_) - 4(\_\_\_\_\_\_\_\_)$

$= 4x - 12$

6. $(3n-2)7 = (3n)(\_\_\_\_\_\_\_\_) - 2(\_\_\_\_\_\_\_\_)$

$21n - \_\_\_\_\_\_\_\_$

7. $9x - 4x = (9-4)x$

$= \_\_\_\_\_\_\_\_x$

8. $15(102) = 15(100+2)$

$15(100) + 15(2)$

$= \_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_$

$= \_\_\_\_\_\_\_\_$

9. $5(\$2.13) = 5(\$2.00 + \$0.13)$

$= 5(\$2.00) + 5(\$0.13)$

$= \_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_$

$= \_\_\_\_\_\_\_\_$

10. $4(\$2.99) = 4(\$2.00 + \$0.99)$

$= 4(\$\_\_\_\_\_\_\_\_) + 4(\$\_\_\_\_\_\_\_\_)$

$= \_\_\_\_\_\_\_\_ + \$3.96$

$= \$11.96$

11. $(100-4)6 = (100)6 - (\_\_\_\_\_\_\_\_)6$

$= \_\_\_\_\_\_\_\_ - 32$

$= \_\_\_\_\_\_\_\_$

12. $3(2.2+m) = \_\_\_\_\_\_\_\_(\_\_\_\_\_\_\_\_) + 3(\_\_\_\_\_\_\_\_)$

$= \_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_$

13. $3(3n + 2n) = 3(3n) + 3(\_\_\_\_\_\_\_\_)$

$= 9n + \_\_\_\_\_\_\_\_$

$= \_\_\_\_\_\_\_\_$

14. $(6y - 4)(2) = (6y)2 - (4)2$

$= 12y - \_\_\_\_\_\_\_\_$

15. $(3 + 6)0.5 = (\_\_\_\_\_\_\_\_)0.5 + (\_\_\_\_\_\_\_\_)0.5$

$= \_\_\_\_\_\_\_\_ + 3.0$

$= \_\_\_\_\_\_\_\_$

$= \_\_\_\_\_\_\_\_$

16. $3(222) = 3(200 + 22)$

$= 3(200) + 3(22)$

$= \_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_$

$= \_\_\_\_\_\_\_\_$

17. $4(a + b + c)$

$= 4(\_\_\_\_\_\_\_\_) + 4(\_\_\_\_\_\_\_\_) + 4(\_\_\_\_\_\_\_\_)$

$= 4a + 4b + 4c$

18. $2(1 - x)$

$= 2(1) - 2(x)$

$= 2 - \_\_\_\_\_$

19. $-5(x + y)$

$= -5(x) + -5(y)$

$= -5x + -5y$

$= -5x\_\_\_\_5y$

20. $3.2(a + 1)$

$= 3.2(a) + 3.2(\_\_\_\_)$

$= \_\_\_\_\_ + 3.2$

Section 1.6 Opposites, Inverses, and Reciprocals

Practice Problems 1.6

For Problem 1-5, write the opposite of the constant or term given.

1. -7

2. 0.3

3. 1.56

4. $-2.1y$

5. $\frac{1}{5}$

For Problem 6-10, write the reciprocal of the constant or term given.

6. $\frac{1}{3}$

7. $-\frac{1}{2}$

8. 9

9. $115x$

10. -120

For Problem 11-15, use the Distributive Property to solve the problem.

11. Ysmeen gives 3 students 2 tickets each on Monday, 4 students 2 tickets each on Tuesday, and 6 students 2 tickets each on Friday. How many tickets did she give away in the week?

12. $4(3+8)$

13. $(9+99)10$

14. $2(x+3)$

15. $(y-3)4$

For Problem 16-22, tell whether the statement is true or false.

16. All positive whole numbers are integers.

17. All negative whole numbers are integers.

18. Every multiple of 2 is an even number.

19. Every multiple of 5 is an odd number.

20. All integers are rational numbers.

21. Every whole number is a rational number.

22. There are some whole numbers that are irrational.

Section 1.7 Absolute Value and the Number Line

Practice Problems 1.7

For Problem 1-9, find the absolute value of the number given.

1. $|9|$

2. $|-9|$

3. $|-7|$

4. $|-1.2|$

5. $|0.5|$

6. $\left|\frac{1}{5}\right|$

7. $|0|$

8. $|-11|$

9. $|-1.24|$

For Problem 10-17, simplify the expression.

10. $|3-1|$

11. $|5-2.5|$

12. $|5-1|+6$

13. $|4-2|-1$

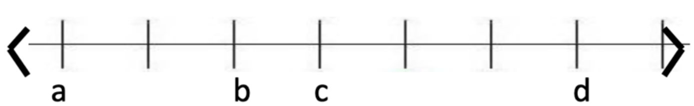
14. $a+|a-a|$

15. $|6+4|+|-2|$

16. $|1.1+3.2|+|-4.7|$

17. $|9|\cdot|-2|$

For Problem 18-20, use the number line to answer the question.



18. If a and d are opposites, is 0 at b or c? How do you know?

19. If a and d are opposites, which one is a negative number? How do you know?

20. Which has a larger absolute value, a or b? How do you know?

Section 1.8 Walk the Number Line

Practice Problems 1.8

For Problem 1-16, walk the number line to solve the problem. Problem 15 and 16 are three numbers so start at 0 again after finding the solution to the first two and add or subtract that to the third number.

1. $4 - 7$
2. $-2 - 5$
3. $0 + -5$
4. $-8 + 2$
5. $-3 + 0$
6. $-4 - (-2)$
7. $-4 + -5$
8. $-7 + -4$
9. $-4 + 3$
10. $2 + -2$
11. $-5 - (-7)$
12. $-5 - 9$
13. $4 + 3 - 1$
14. $-4 + -3 - 1$
15. $-2 + -4 + -3$
16. $6 - 2 + (-1)$

For Problem 17-20, solve the word problem.

17. Write a math rule for adding two positive or two negative numbers.

18. Write a rule for adding two numbers when one is positive and one is negative.

19. Write a rule for subtracting two integers.

20. Killian was scuba diving and was lowered 5 feet below sea level. He then swam up 2 feet toward the boat to grab the line. Once he had the line, he was lowered 13 more feet. How far below sea would Killian be?

Section 1.9 Adding with Variables

Practice Problems 1.9

For Problem 1-6, play the game (again) to answer the question given.

1. In Game 1, why must you draw 5 cards to be assured you will have a common suit? Would the game work with 4 cards?

2. In Game 1, you have 3 cards of the same suit. What is the largest possible sum you could have in your hand?

3. In Game 2, if you lay down one color and your partner lays down the other color, which color will always win?

4. In Game 1, would you rather have matches with black or red?

5. In Game 2, if you and your partner both lay down red cards but the absolute value of the number you have is bigger, who wins?

6. In Game 2, you have 3 cards of the winning suit. What is the smallest possible sum you can have in your hand?

Section 1.10 Subtracting with Variables

Practice Problems 1.10

For Problem 1-18, simplify the expression by combining like terms.

1. $-0.4x + -0.1x$

2. $\frac{1}{3}y + \frac{1}{3}y$

3. $-\frac{2}{3}n + \frac{1}{3}n$

4. $-3m - (-2n)$

5. $-z + (-4z) + (-8z)$

6. $-1.3t - 4.5t$

7. $-8.6s - (-2.4s)$

8. $4.1kg + 6.1kg$

9. $-22° - 34°$

10. $-4b + 7 + 3b - 4$

11. $7z - 12 + 3z$

12. $2mn + 3mn + 4mn$

13. $12x - 3 + 4x - 5$

14. $-2n + (-3n) + 16n$

15. $-14t - 14t$

16. $3xy + 3xy - 6xy$

17. $-20p + 12p$

18. $-13q - (-20q)$

For Problem 19-20, solve the word problem.

19. Is $|10 - 6|$ the same as $|6 - 10|$?

20. Is $|-2 + -6|$ the same as $|-2| + |-6|$?

Section 1.11 Multiplying with Variables

Practice Problems 1.11

For Problem 1-8, simplify the expression.

1. $4(3st)$

2. $-2(-4mn)$

3. $-1.25(4xy)$

4. $\frac{1}{3}(-3z)$

5. $2t(-8)$

6. $(-1.1p)(-3.1q)$

7. $(-3u)(-3v)$

8. $(20m)(10n)$

For Problem 9 and 10, use the given table to solve the problem.

Lawns Mowed	**Hours Worked**	**Money Earned**
1	2	\$10
2	4	\$20
3	6	\$30

9. If Roger mowed x lawns, write a monomial expression for how many hours he worked.

10. If Kent mowed x lawns, write a monomial expression for how much money he earned.

Challenge Problems 1.11

11. Given a 3x3 matrix, put the numbers 1-9 in each cell so that each number is only used once and the sum of each row, column, and diagonal is the same. Where do you think 5 will go? Where will the largest and smallest numbers go? Why?

12. Fill in the magic square (matrix) with the numbers 1, 4, 5, 7, 8, 9, 11, 12, and 15. Again, each number may be used only once and the sum of each row, column, and diagonal must be the same. This is called the magic sum. (Hint: The magic sum is 24.)

13. Now, make your own magic square. Here are the expressions for each cell on the 3x3 magic square:

$a-c$	$a+c-b$	$a+b$
$a+c+b$	a	$a-c-b$
$a-b$	$a+b-c$	$a+c$

Pick a value for b and c. Pick a value for a that is greater than b and c. Substitute your numbers in for the variables and find the number in each cell.

14. What is your magic sum given your values from Problem 13?

15. What is the variable expression for the sum of each row?

16. What is the variable expression for the sum of each column?

17. What is the variable expression for the sum of each diagonal?

18. If a is 15, what will be the magic sum of each column, row, and diagonal?

Section 1.12 Dividing with Variables

Practice Problems 1.12

For Problem 1-8, simplify the monomial term given.

1. $\frac{8x}{-4}$

2. $\frac{-15}{3y}$

3. $\frac{-21.2}{2t}$

4. $5y(-\frac{1}{2})$

5. $-8y(\frac{1}{4})$

6. $\frac{-10xy}{-5}$

7. $8 \cdot (\frac{4p}{-2q})$

8. $-5(\frac{b}{100})$

For Problem 9-14, circle the coefficients of each term given.

9. $3x + 4y$

10. $-14.6m + 60.1n$

11. $-\frac{1}{2}s - 3t$

12. $14.2m - 1.6n$

13. $-22m + 12n$

14. $10x - 4y + 2z$

For Problem 15-18, underline the variables in each term in the expression given.

15. $-14m + 22n + 1$

16. $\frac{1}{3}p - \frac{2}{3}q + r$

17. $-16p - 42q$

18. $-1.5b - 42.3c + 18.1d$

For Problem 19 and 20, solve the word problem given.

19. Complete the decimal magic square below using the decimal numbers 0.2 to 1.8 by increments of 0.2 (0.2, 0.4, 0.6, 0.8, …, 1.6, 1.8).

1.2		
0.2	1.0	
1.6	0.6	

20. What is the magic sum for the Square in Problem 19?

Section 1.13 The Distributive Property Revisited

Practice Problems 1.13

For Problem 1-8, use the Distributive Property to simplify the expression.

1. $2(4x-5)$

2. $(3a-2)\frac{1}{2}$

3. $5(n-4)$

4. $2(8+3t)$

5. $(0.1s+0.2)4$

6. $-(3x-1)$

7. $(3-4b)(-2)$

8. $-1(9-3c)$

For Problem 9-11, solve the word problem given.

9. Circle the like terms that could be combined when adding or subtracting:

$-4x$ and $9x$ $-16x^2y^2$ and $10x^2y^3$ $3z$ and $4p$ x^2y and xy^2

$2x$ and $-3x^2$ $2m$ and $-3n$ st and $-st$ $-3y^2$ and $19y^2$

10. Use the Distributive Property to demonstrate the following is true:

$$3x^2+9x^2=12x^2$$

11. Use the Distributive Property to demonstrate the following is true:

$$-4d+1d=-3d$$

For Problem 12-17, use the Distributive Property to factor out the common factor.

12. $3k + 9$

13. $4mn - 12n$

14. $27x - 9$

15. $z + 14$

16. $15w + 10$

17. $2q - 14qr$

For Problem 18, solve the word problem.

18. Is $4mn$ the same as $4m \cdot 4n$? Explain your reasoning.

For Problem 19 and 20, use the Distributive Property to write a variable expression.

19. Jerusa stopped at the school and bought 4 of one item and 4 of another item. Write a variable expression to show the total number of items purchased. Let the items be a and b.

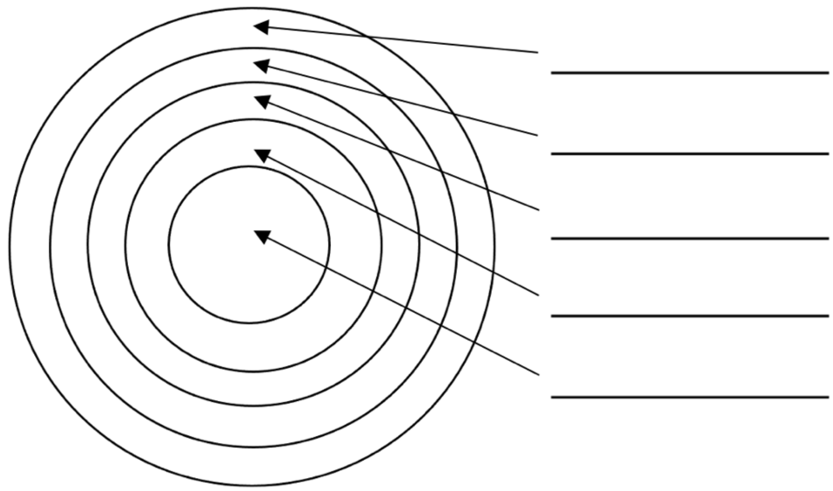
20. Destiny stopped at the store after school and bought 3 CD-ROMs at one price, and 3 CD-ROMs at another price. Write a variable expression for the total amount she spent. Let the prices be m and n.

Section 1.14 Module Review

For Problem 1, use the words listed to complete the Venn diagram that demonstrates subsets and supersets.

1.

- The Universe
- The Earth
- Solar System
- Earth's Orbit
- Galaxy



For Problem 2 and 3, tell whether the statement is true or false.

2. The Earth ⊆ The Universe

3. The Solar System ⊆ Earth

Set A: $\{6, 8, 10, 12\}$ Set B: $\{3, 6, 9, 12\}$

4. What is A ∩ B?

5. What is A ∪ B?

For Problem 6 and 7, solve the word problem given.

6. Tell whether the following numbers are rational or irrational:

a) π

b) $\sqrt{2}$

c) 4.6

d) $0.\overline{3}$

7. Name the property given the expression.

a) $\frac{1}{3}(3) = 1$

b) $4(3x - 1) = 12x - 4$

c) $(a + 2b) + 3c = a + (2b + 3c)$

For Problem 8-11, match the statements that make them true.

8. Distance from zero ___________________________ a) Coefficient

9. -5 and 5 ___________________________ b) Opposites

10. Addition & Subtraction ___________________________ c) Constant

11. The -3 in $-3x$ ___________________________ d) Inverse Operations

e) Reciprocals

f) Absolute Value

For Problem 12-14, select the answer to fill in the blank that makes the statement true.

12. A negative number multiplied by a negative number always gives a _____________________ number.

a) Positive b) Natural

c) Negative d) Zero

13. The positive and negative numbers are called _____________________.

a) Whole b) Irrational

c) Natural d) Integers

14. Adding a negative number is the same as _____________________.

a) Adding b) Multiplying

c) Subtracting d) Dividing

For Problem 15-20, use algebraic properties to combine like terms and simplify the expression.

15. $4a - 3b + a$

16. $-3(2s - 3t)$

17. $4x - 3y + 9x - 2y$

18. $1.1(2) + 1.4(\frac{a}{2.8})$

19. $\frac{1}{2}(2x) - \frac{1}{3}(3y)$

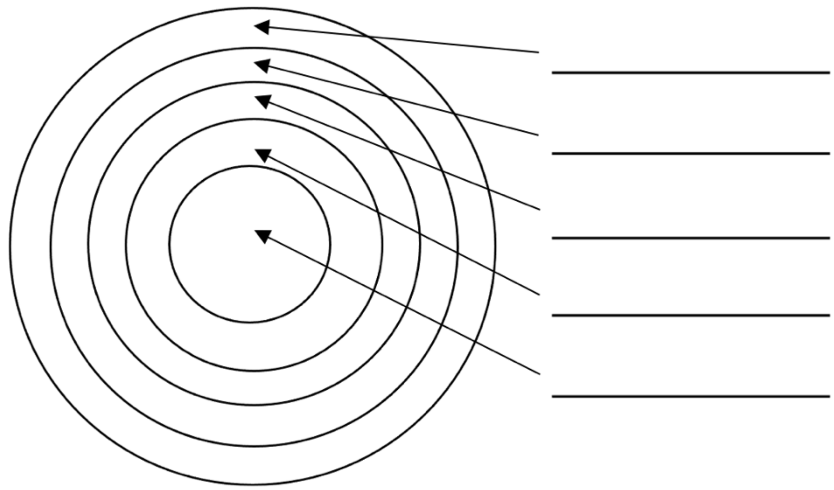
20. $3m + 2n - 2n + 4mn$

Section 1.15 Module Test

For Problem 1, use the words listed to complete the Venn diagram that demonstrates subsets and supersets.

1.

- Natural Numbers
- Whole Numbers
- Rational Numbers
- Real Numbers
- Integers



For Problem 2 and 3, tell whether the statement is true or false.

2. Real Numbers ⊆ Natural Numbers

3. Whole Numbers ⊆ Integers

For Problem 4 and 5, write your answer to the question in the roster method.

Set A: the set of natural numbers

Set B: the set of whole numbers

4. What is A ∩ B?

5. What is A ∪ B?

For Problem 6, solve the word problem.

6. For each number, name all the subsets of Real Numbers. You may use Natural Numbers, Whole Numbers, Integers, Rational Numbers, or Irrational Numbers. There may be more than one answer.

a) 0

b) $0.\overline{14}$

c) $\frac{1}{2}$

d) -17

For Problem 7-10, match the statements that make them true.

7. Number in front of a variable __________________________ a) Coefficient

8. Multiplication and Division __________________________ b) Opposite

9. $\frac{5x}{6}$ and $\frac{6}{5x}$ __________________________ c) Constant

10. $|a| = a$ __________________________ d) Inverse Operations

e) Reciprocals

f) Absolute Value

For Problem 11-13, fill in the blank.

11. Subtracting a positive number is the same as adding a _____________________ number.

12. Distance from zero is called the ______________________.

13. When we divide two numbers with opposite signs, we get a _____________________ number.

For Problem 14-20, simplify the expression.

14. $-4(x-7)$

15. $\frac{1}{4}(16mn)$

16. $-13p + 2q - 3p - 2q$

17. $\frac{-24x}{12y}$

18. $22(y + 8)$

19. $-t + 4s - 22$

20. $-4\pi + 10\pi$