LEON HIGH SCHOOL
ALGEBRA 1A
REVIEW PACKET

Parents and students are encouraged to connect with the teachers via Remind or email. Students should also create a Khan Academy account in preparation for future lessons and activities.

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Khan Academy: You already have a Khan Academy account. DO NOT create a new one. If you are having login issues, contact Mrs. Taylor to help you reset your password.	

Algebra 1A Week 1

Dear Parent/Guardian,

During Week 1, we will review and support mastery of the Algebra 1 standards: Seeing Structure in Expressions. Your child will work towards rewriting algebraic expressions in different equivalent forms by recognizing the expression's structure. There are nine topics in this section. It is suggested you complete one topic per day this week. A proposed schedule is included.

Additionally, students can access Math Nation, the Pearson textbook and Khan Academy through ClassLink. All three sites offer instructional support including video lessons, practice quizzes and more.

We also suggest that students have an experience with math each day. Practicing at home will make a HUGE difference in your child's school success! Make math part of your everyday routine. Choose online sites that match your child's interests. Online math games, when played repeatedly, can encourage strategic mathematical thinking, help develop computational fluency, and deepen their understanding of numbers.

Links for additional resources to support students at home are listed below:
https://www.brainpop.com/games/sortifyangles/
https://www.hoodamath.com/games/highschool.html
https://www.khanacademy.org/resources/teacher-essentials
https://www.mangahigh.com/en-us/games/wrecksfactor
http://www.xpmath.com/forums/arcade.php?do=play&gameid=115
https://www.purplemath.com/modules/

Week 1 At A Glance	
Day 1	Section 1 – Expressions Topic 1: Using Expressions to Represent Real-World Situations
Day 2	Section 1 – Expressions Topic 2: Understanding Polynomial Expressions
Day 3	Section 1 – Expressions Topic 3: Algebraic Expressions Using the Distributive Property
Day 4	Section 1 – Expressions Topic 4: Algebraic Expressions Using the Commutative and Associative Property
Day 5	Section 1 – Expressions Topic 5: Properties of Exponents

Section 1: Expressions
Student Learning Plan

Topic Number	Topic Name	Date Completed	Study Expert(s)	Check Your Understanding Score
1	Using Expressions to Represent Real-World Situations			
2	Understanding Polynomial Expressions			
3	Algebraic Expressions Using the Distributive Property			
4	Algebraic Expressions Using the Commutative and Associative Properties			
5	Properties of Exponents			
6	Radical Expressions and Expressions with Rational Exponents			
7	Adding Expressions with Radicals and Rational Exponents			
8	More Operations with Radicals and Rational Exponents			
9	Operations with Rational and Irrational Numbers			

What did you learn in this section? What questions do you still have?

Who was your favorite Study Expert for this section? Why?

Section 1 – Topic 1
Using Expressions to Represent Real-World Situations

1. Write each phrase as a mathematical expression.

Phrase	Mathematical Expression
nine increased by a number	
fourteen decreased by a number	
seven less than a number	
the product of nine and a number	
thirty-two divided by a number	
five more than twice a number	
the product of a number and six	
seven divided by twice a number	
three times a number decreased by eleven	
withdrawing $10 every week from an outstanding balance of $400	

2. Joseph tweets 13 times a day. Define each variable and write an algebraic expression to describe the number of posts after any given number of days.

3. Emanuel has 745 pictures in his phone. His memory is getting full, so he starts deleting 20 pictures every day. Define each variable and write an algebraic expression to describe the number of pictures left on his phone after any given number of days.

4. Ashley posts 17 status updates on her Facebook wall each day. Roberto posts 21 status updates on his Facebook wall each day.

   Part A: Define each variable and write an algebraic expression to describe the combined number of posts for Ashley and Roberto after any given number of days.

   Part B: Write an algebraic expression to describe the difference between number of posts for Ashley and Roberto after any given number of days.

5. Tommy posts 11 pictures on Instagram every day. Elizabeth posts 15 pictures on Instagram every day.

   Part A: Define each variable and write an algebraic expression to describe the combined number of posts for Tommy and Elizabeth after any given number of days.

   Part B: After 7 days, how many pictures have Tommy and Elizabeth posted altogether? How do you know?

6. Homer and Bart plan to buy one computer for $499.00 strictly for gaming purposes. Games cost $49.99 each.

   Part A: Define each variable and write an algebraic expression to describe how much they will spend before sales tax, based on purchasing the computer and the number of games.

   Part B: If they purchase one computer and five games, how much do they spend before sales tax?

   Part C: Homer and Bart have friends. They want to purchase extra controllers. Each controller costs $24.99. Use an algebraic expression to describe how much they spend in total (before sales tax) when they purchase one computer, when they purchase any number of games, and when they purchase any number of extra controllers.

   Part D: What would be the total cost, before sales tax, if Homer and Bart purchase one computer, four games, and three extra controllers?

7. Alex and Leandro purchase two matinee movie tickets. A matinee ticket costs $6.50, a drink costs $5.50, and a bag of popcorn costs $6.00. Define each variable and write an algebraic expression to describe how much they spend based on the number of drinks and bags of popcorn they buy. Identify the parts of the expression by underlining the coefficient(s), circling the constant(s), and drawing a box around the variable(s).

8. The local humane society is restocking on cat food to prepare for kitten season. Very young kittens need kitten formula which costs $3.99 per bottle. Older kittens need wet cat food which costs $1.50 per can.

   Part A: Write an algebraic expression to describe how much the humane society will spend preparing for kitten season. Identify the parts of the expression by underlining the coefficient(s), circling the constant(s), and drawing a box around the variable(s).

   Part B: How much money (before tax) will the humane society spend if they buy 30 bottles of kitten formula and 120 cans of wet cat food?

   Part C: If you add a 7% sales tax to the purchase of bottles of kitten formula and cans of wet cat food, how would the algebraic expression in parts *A* and *B* change?

9. Create a storyline (word problem) using the following algebraic expressions:

Part A: $\frac{1,000}{r}$

Part B: $75 - 3m$

Part C: $30 + 2d$

10. An airplane is flying at 35,000 feet above sea level. The airplane starts to descend at a rate of 2,500 feet per minute. Let m be the number of minutes. Which of the following expressions describe the height of the airplane after any given number of minutes?

- Ⓐ $2,500 - 35,000m$
- Ⓑ $2,500 + 35,000m$
- Ⓒ $35,000 - 2,500m$
- Ⓓ $35,000 + 2,500m$

Section 1 – Topic 2
Understanding Polynomial Expressions

1. Write $9x + 3x^2 - 4x^5 + x^3 + 2x^4$ in standard form.

2. Determine the type and degree of each of the following polynomial expressions.

   $9x^4y^9$

   $x^4 - 3x^2 + 7x^5$

   $19a^6b^2 + 8ab^3c - 27a^7$

3. Consider the following polynomial expression: $4x^5 - 16x^2 + 13x^8$.

   Part A: Write the polynomial expression in standard form.

   Part B: What is the degree of the polynomial?

   Part C: How many terms are in the polynomial?

   Part D: What is the leading term?

   Part E: What is the leading coefficient?

Section 1: Expressions

4. Match the polynomial in the left column with its descriptive feature in the right column.

A. $x^3 + 3x^2 - 2x + 7$ I.   9th degree monomial
B. $3a^3b^6$ II.   Constant term of -7
C. $3x^4 - 9x^3 + 5x^8$ III.   7th degree polynomial
D. $7a^3b^2 + 18ab^2c - 9a^3$ IV.   Leading coefficient of 4
E. $2x^5 - 9x^3 + 8x^7$ V.   Four terms
F. $4x^8 - 7x^2 + 9$ VI.   5th degree polynomial
G. $x^2 - 7$ VII.   Equivalent to $5x^8 + 3x^4 - 9x^3$

5. Write a binomial expression in standard form that has a degree of 4.

6. Write a trinomial expression in standard form that has a degree of 5.

7. Janae wrote the following polynomial expression: $2x^5 - 4x^3 + 6x^8$. Janae claimed it was a trinomial with a leading coefficient of 2. Justin argued back claiming that it was a trinomial with a leading coefficient of 6. Who is correct? Explain.

8. Ladarius wrote the following monomial expression: $5x^8y^3$. Ladarius said the monomial had a degree of 11. Ayla said the monomial had a degree of 8. Who is correct? Explain.

Section 1 – Topic 3
Algebraic Expressions Using the Distributive Property

1. Match each expression in the left column to its equivalent expression in the right column. Use the table below to write the letters that correspond to each of the numbers.

_____	$7(12)$	A. $5(1 + 3a)$
_____	$3(15)$	B. $3(a + 3)$
_____	$3a + 9$	C. $3(x + y + z)$
_____	$9a + 3$	D. $7(8 + 4)$
_____	$5 + 15a$	E. $3(x + 2y + 3z)$
_____	$10 + 5a$	F. $5(2 + a)$
_____	$3x + 6y + 9z$	G. $3(3a + 1)$
_____	$3x + 3y + 3z$	H. $(2 + 1)(15)$

2. Write an equivalent expression for $4(a + 5)$ by modeling and by using the distributive property.

3. Write an equivalent expression for $5(2x + y - 3z)$ by modeling and by using the distributive property.

4. Write an equivalent expression for $(x - 6)(x - 3)$ by using the distributive property and by modeling.

5. Write an equivalent expression for $(2m + 3)(m - 1)$.

6. The recommended heart rate for weight management exercise and improving cardio fitness, in beats per minute, depends on a person's age and can be represented by the expression $0.7(220 - a)$.

   Part A: What does the variable in the expression represent?

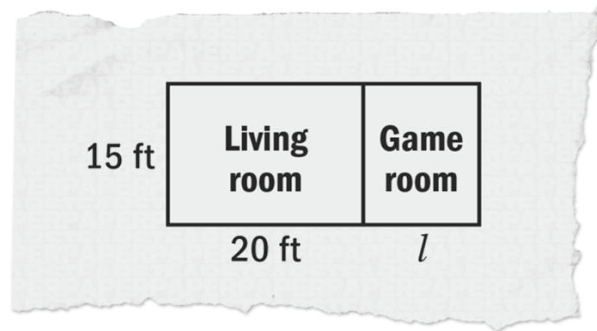   *Part B:* Rewrite the expression using the distributive property.

   Part C: What is the recommended heart rate for a 20-year-old person?

7. Coach Smith is buying equipment for his soccer team. He has 11 players and each player needs three uniforms, two shin guards, one ball, and two pairs of cleats.

   Part A: Write an algebraic expression to represent this situation.

   Part B: If each uniform costs $48.00, each shin guard costs $5.00, each ball costs $17.00, and each pair of cleats costs $89.00, determine how much Coach Smith will spend, before taxes, on equipment for his soccer team.

Section 1: Expressions

8. Logan is building a game room adjacent to his living room so that both rooms will have the same width. He created a model on a piece of paper, shown below.

Part A: Write an expression for the total area of both rooms by using the distributive property.

Part B: If the length of the game room is 15 feet, what is the total square footage of the two rooms?

9. The state of Maine encourages recycling by giving refunds for certain recycled items. When you recycle a glass bottle, you get back $0.05, when you recycle an aluminum can, you get back $0.10, and when you recycle a plastic bottle, you get back $0.15.

Part A: Drinks in a glass bottle cost $2.00, drinks in an aluminum can cost $0.50, and drinks in a plastic bottle cost $1.50. You plan to purchase two of each. Use the distributive property to write an expression that represents the amount of money you will spend.

Part B: You plan to recycle all of the items you purchased. Use the distributive property to write an expression to represent the amount of refund you will receive.

Part C: After receiving the refund, how much was your net cost for the items?
Hint: Net cost is equal to the total cost minus the amount of your refund.

10. Suppose you are building a rectangular pen for your goats. You use 400 feet of fencing for the pen. Let l represent the pen's length (in feet).

Part A: Which of the following expressions could represent the width of the pen?

Ⓐ $2l + 400$

Ⓑ $400 - 2l$

Ⓒ $2l - 400$

Ⓓ $400(2l)$

Part B: Find the width of the pen if you make the pen 80 feet long.

Part C: Find the width and the area of the pen if the length is 90 feet.

Section 1: Expressions

Section 1 – Topic 4
Algebraic Expressions Using the Commutative and Associative Properties

1. Identify the property used to find the equivalent expression.

$[4 + (-2)] + 1 = 4 + [(-2) + 1]$ $(9 \cdot 3) \cdot 6 = 6 \cdot (9 \cdot 3)$

$(a \times 3) \times b = b \times (a \times 3)$ $x + (y + z) = (x + y) + z$

$2 \times (p \times q) = (q \times p) \times 2$ $(8 + 17) + 18 = 18 + (17 + 8)$

2. The following is a proof that shows $(5p)(4q)$ is equivalent to $20pq$. Fill in each blank with either "Commutative Property" or "Associative Property" to indicate the property being used.

$(5p)(4q) = 5(p \cdot 4)q$ _____

$= 5(4 \cdot p)q$ _____

$= (5 \cdot 4)(p \cdot q)$ _____

$= 20pq$

3. Write a mathematical proof to show $(3x)(5y)(7z)$ is equivalent to $105xyz$.

4. Identify which of the following properties are being used in each step below.

| Associative Property | Commutative Property | Distributive Property |

$(4 + 7)(m^2 + n^2) = 4(m^2 + n^2) + 7(m^2 + n^2)$ _____

$= 4m^2 + 4n^2 + 7m^2 + 7n^2$ _____

$= 4m^2 + 7m^2 + 4n^2 + 7n^2$ _____

$= 11m^2 + 11n^2$

5. Write an equivalent expression using the given property.

Part A: Commutative property of multiplication

$$3xy =$$

*Part B:* Associative property of addition

$$x + y + z =$$

Part C: Distributive property

$$3x(y - 2) =$$

6. Use these abbreviations for the properties of real numbers and complete the flow diagram.

C_+ for the commutative property of addition
$C_\times$ for the commutative property of multiplication
A_+ for the associative property of addition
$A_\times$ for the associative property of multiplication
D for the distributive property

$2(pq + xy)$ ⟶ ◯ ⟶ $2(qp + yx)$ ⟶ ◯ ⟶ $2yx + 2qp$

◯ ⟶ $2(qp + xy)$ ◯ ⟶ $2(yx + qp)$ ◯ ⟶ $(2y)x + (2q)p1$
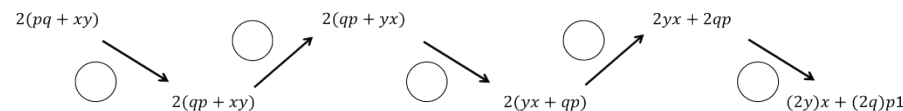
7. If $pq = 23$ and $uv = \frac{1}{23}$, find the value of $u \cdot q \cdot v \cdot p$. Explain which properties you used.

8. Consider the expressions ab^2 and a^2b^2. Are the two expressions equivalent? Which properties did you use to prove or disprove equivalency?

1. Simplify the following expressions.

   Part A: $\dfrac{2x^3y^3}{4y^2} =$

   Part B: $\left(\dfrac{x^{-8}}{y^{11}}\right)^{-2} =$

   Part C: $\dfrac{(2x^3)(x^4)^2}{8x^{11}} =$

2. Your neighbor has a square-shaped pool with side lengths of $3a^5$. What is the area of the pool?

3. Bojangles has a rectangular-shaped roof with a width of $6x^2$ feet and a length $12x^3$. What is the area of the roof?

4. Consider each equation. Find the value of m in each equation below. Justify your answer.

Part A: $(x^m \cdot x^2)^3(k^3)^5 = x^{21}k^{15}$

Part B: $x^3 \cdot y^2 \left(\frac{x^2 \cdot y^3 \cdot z^m}{z^{-5}}\right) = x^5 y^5 z$

Part C: $\left(\frac{x^8}{yz^5}\right)^m = 1$

5. John buys a water tank from a company that likes to use exponents as dimensions. The tank he buys has the dimensions b^2 by b^4 by $4c^3$. Which of the following expressions represent the volume of the water tank?

Ⓐ $4b^8c^3$
Ⓑ $4b^6c^3$
Ⓒ $12b^8c^3$
Ⓓ $2b^6c^3$

6. The dimensions of Peyton and Parker's sandbox are t^2m by t^5 m by $3v^2$ m. One cubic meter of the sandbox contains $3s^{21}$ grains of sand. Which of the following expressions represent the number of grains of sand in the sandbox?

Ⓐ $27t^{10}v^2s^{21}$
Ⓑ $t^{10}v^2s^{21}$
Ⓒ $3t^7v^2s^{21}$
Ⓓ $9t^7v^2s^{21}$

7. Consider the equation $a^{-3} = \left(\frac{1}{a}\right)^5$.
What value(s) of a make the equation true?

8. Harry, Louis, and Niall are working with exponents. Harry claims $4^2 \cdot 4^5 = 4^{10}$. Louis claims $4^2 \cdot 4^5 = 4^7$. Niall claims $4^2 \cdot 4^5 = 16^7$. Which student has the correct answer? Explain why.

9. Raymond and Rose were working with exponents.

Part A: Raymond claims that $5^5 * 5^2 = 5^3$. Rose argues that $5^5 * 5^2 = 5^7$. Which one of them is correct? Use the properties of exponents to justify your answer.

Part B: Raymond claims that $\frac{7^9}{7^5} = 7^4$. Rose argues that $\frac{7^9}{7^5} = 7^{45}$. Which one of them is correct? Use the properties of exponents to justify your answer.

Section 1: Expressions

ALGEBRA NATION

1. The following expression shows a simplification of a radical with a missing index.

$$\sqrt[n]{54 \cdot x^6 \cdot y^{12}} = 3x^2 y^4 \sqrt[n]{2}$$

What is the index n for this expression?

A) 2

B) 3

C) 6

D) 9

2. Simplify the expression, $\left(\left(p^{-2} + \frac{1}{p}\right)^1\right)^p$, when $p = \frac{3}{4}$, in both radical and rational exponents forms.

Radical form:

Rational exponent form:

3. Write an equivalent expression in rational exponent form.

Part A: $\sqrt[8]{5^6}$

Part B: $\sqrt[4]{x^{\frac{2}{3}}}$

Part C: $\sqrt[3]{8}\left(\sqrt{8^2 + 8^2}\right)$

4. Determine the value of n such that $\sqrt[4]{64^{\frac{1}{3}}} = 64^{\frac{1}{n}}$.

5. Determine whether each expression is equivalent to $x^{\frac{7}{4}}$.

Expression	Yes	No
$\sqrt[7]{x^4}$	○	○
$\sqrt[4]{x^7}$	○	○
$\left(\sqrt[4]{x}\right)^7$	○	○
$\sqrt{x^{\frac{7}{4}}}$	○	○
$\sqrt[4]{x^5}\cdot\sqrt[4]{x^2}$	○	○
$\sqrt[5]{x^4}\cdot\sqrt[2]{x^4}$	○	○
$\dfrac{\left(\sqrt[4]{x}\right)^7}{\left(\sqrt{x}\right)^0}$	○	○

6. Write an equivalent expression to $3^{\frac{2}{3}}\cdot\sqrt[8]{3^4}$.

7. Prove that $\left(\dfrac{\sqrt[3]{512x^6y^9}}{\sqrt{16x^4y^6}}\right)^{\frac{1}{2}}=\sqrt{2}$.

Section 1 – Topic 7
Adding Expressions with Radicals and Rational Exponents

1. Perform the following operations and write the answers in radical form.
   Part A: $\sqrt{7}+\sqrt{3}+\sqrt{98}-\sqrt{18}$

   Part B: $3\sqrt{5}-3\sqrt{11}+2\sqrt{121}-3\sqrt{90}$

2. Perform the following operations and write the answers in radical form.
   Part A: $8^{\frac{1}{2}}+16^{\frac{1}{4}}-12^{\frac{1}{2}}+81^{\frac{1}{4}}$

   Part B: $8\cdot 2^{\frac{1}{2}}-24^{\frac{1}{4}}-3^{\frac{1}{2}}+128^{\frac{1}{4}}$

3. Which of the following expressions are equivalent to $7\sqrt{5}$?

   ☐ $14^{\frac{1}{2}}\cdot 25^{\frac{1}{2}}$
   ☐ $49^{\frac{1}{2}}\cdot 5^{\frac{1}{2}}$
   ☐ $\sqrt{70}$
   ☐ $\sqrt{155}$
   ☐ $\sqrt{7}\cdot\sqrt{5}$
   ☐ $\dfrac{\sqrt{196}\cdot\sqrt{5}}{2}$
   ☐ $\dfrac{\sqrt{49}+\sqrt{25}}{5}$

Section 1: Expressions

4. Which of the following expressions are equivalent to $4\sqrt{3}$?

☐ $4^{\frac{1}{3}} + 3^{\frac{1}{3}}$
☐ $27^{\frac{1}{2}} + 3^{\frac{1}{2}}$
☐ $\sqrt{32}$
☐ $\sqrt{48}$
☐ $2\sqrt{12}$
☐ $2\sqrt{18}$
☐ $\sqrt{27} + \sqrt{3}$

5. Prove that $\sqrt{8} + \sqrt{2} = 3 \cdot 2^{\frac{1}{2}}$

6. Find the perimeter of the following figures and circle the figure with the greatest perimeter.

$3\sqrt{147} + 2\sqrt{108}$

$6\sqrt{12}$

$2\sqrt{48} + 3\sqrt{75}$

$\frac{1}{3}\sqrt{63}$

$\frac{1}{4}\sqrt{100}$

$2\sqrt{48} + 4\sqrt{75}$
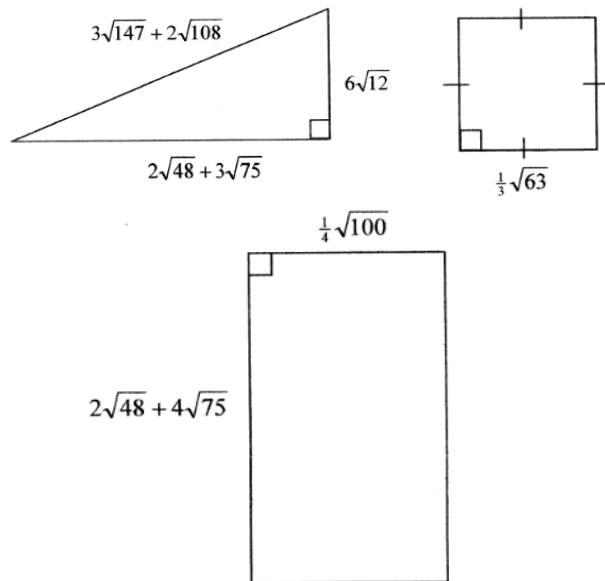
Section 1 – Topic 8
More Operations with Radicals and Rational Exponents

1. Perform the following operations and write the answers in radical form.
   Part A: $\left(2\sqrt{7} + \sqrt{27}\right)\left(\sqrt{28} - 3\sqrt{3}\right)$

   Part B: $\frac{\sqrt{12}\left(2\sqrt{48}\right)}{7\sqrt{3}}$

2. Perform the following operations and write the answers in radical form.
   Part A: $12^{\frac{1}{2}}\left(2^{\frac{1}{2}} + 3^{\frac{1}{2}}\right)\left(2^{\frac{1}{2}} - 3^{\frac{1}{2}}\right)$

   Part B: $\frac{12 \cdot 2^{\frac{1}{2}}}{27^{\frac{1}{3}}}$

3. Find the value of x if $9^{\frac{1}{2}} \cdot 9^{\frac{1}{2}} = \sqrt[x]{81}$.

ALGEBRA NATION

4. Find the value of z if $z^{\frac{1}{2}} \cdot 16^{\frac{1}{4}} = \frac{2\sqrt{8} \cdot \sqrt{49}}{2\sqrt{2}}$.

5. Prove that $\sqrt{8} \cdot \sqrt{2} = 10 - 3 \cdot 4^{\frac{1}{2}}$.

6. What is the area of a rectangle that measures $3\sqrt{5} - 4\sqrt{2}$ by $\sqrt{125}$?

7. The area of a parallelogram is $8\sqrt{90}$ and the base is $2\sqrt{5}$. What is the height of the parallelogram?

Section 1 - Topic 9
Operations with Rational and Irrational Numbers

1. Describe in your own words what it means to say that integers are closed under addition.

2. Describe in your own words what it means to say that integers are not closed under division.

3. Under which of the following operations are integers closed?

☐ Addition
☐ Subtraction
☐ Multiplication
☐ Division

4. Complete the following proof to show that the sum of two rational numbers is a rational number.

Let a, b, c and d be integers. Let x and y be rational numbers.

Statements	Reasons
1. a, b, c and d are integers, and x and y are rational numbers.	1. Given
2. $x = \frac{a}{b}$ and $y = \frac{c}{d}$	2.
3. $x + y = x + y$	3.
4. $x + y = \frac{a}{b} + \frac{c}{d}$	4.
5.	5. Use rules for addition of fractions (common denominator, add numerators) to write equivalent expression for $\frac{a}{b} + \frac{c}{d}$.
6. $ad + cb$ is an _____.	6. Integers are closed under addition and multiplication.
7. bd is an integer.	7.
8. $\frac{ad + cb}{bd}$ is a _____ number.	8. Definition of rational number.
9. $x + y =$ a rational number.	9.

5. Write an algebraic proof to show that the product of two rational numbers is a rational number.

Given: x and y are rational numbers.

Statements	Reasons

Section 1: Expressions

6. Complete the following proof by contradiction to show that the sum of a rational number and an irrational number is irrational.

Given: x is a rational number and y is an irrational number.

Assume that the sum of a rational number and an irrational number is rational.

Statements	Reasons
1. x is a rational number and y is an irrational number.	1. Given
2. $x + y = z$, where z is a rational number.	2. Assumption
3. $x = \frac{a}{b}$ and $z = \frac{c}{d}$, where a, b, c, and d are integers.	3.
4. $\frac{a}{b} + y = \frac{c}{d}$,	4.
5. $y = \frac{c}{d} - \frac{a}{b}$	5.
6.	6. Used rules adding fractions to write equivalent expression for $\frac{c}{d} - \frac{a}{b}$.
7.	7.
8. $cb - ad$ is an _____.	8. Integers are closed under multiplication and subtraction.
9. db is an integer.	9.
10. $\frac{ay-xb}{by}$ is a _____ number.	10.

We have proven that our assumption is _____. Therefore, the sum of a rational and irrational number must be _____.

7. Write a proof by contradiction to show that the product of a rational number and irrational number is irrational.

Given: x is a rational number and y is an irrational number.

Statements	Reasons

Section 1: Expressions

8. Based on the previous information, conjecture whether each statement is ALWAYS true, SOMETIMES true, or NEVER true. Circle the correct answer below each statement.

    i.   The sum of a rational number and a rational number is rational.

           ALWAYS   SOMETIMES   NEVER

    ii.   The sum of a rational number and an irrational number is irrational.

           ALWAYS   SOMETIMES   NEVER

    iii.   The sum of an irrational number and an irrational number is irrational.

           ALWAYS   SOMETIMES   NEVER

    iv.   The product of a rational number and a rational number is rational.

           ALWAYS   SOMETIMES   NEVER

    v.   The product of a rational number and an irrational number is irrational.

           ALWAYS   SOMETIMES   NEVER

    vi.   The product of an irrational number and an irrational number is irrational.

           ALWAYS   SOMETIMES   NEVER

9. Does either item below contradict the statement: "*The sum of two rational numbers is a rational number*"?

Item 1: $\frac{1}{2} + \frac{3}{4} = \frac{5}{4}$

Item 2: $\frac{1}{2} + \frac{3}{2} = 2$

Ⓐ Item I contradicts the statement. Item II is an example when the statement is true.

Ⓑ Item II contradicts the statement. Item I is an example when the statement is true.

Ⓒ Both Item I and Item II contradict the given statement.

Ⓓ Neither Item I nor Item II contradicts the given statement.

10. Select all of the following expressions that result in rational number.

☐ $\sqrt{49} - \sqrt{16}$
☐ $\sqrt{5} + \sqrt{6} + \sqrt{7} + \sqrt{8}$
☐ $10\pi - \pi\sqrt{100}$
☐ $(\pi - \sqrt{3})(\pi + \sqrt{3})$
☐ $\sqrt{11} - 4$
☐ $\pi^2 + 5$
☐ $r + s$, where r and s are irrational numbers

11. Thomas argues that $\frac{\sqrt{27}}{\sqrt{3}}$ is rational. Mateo argues that the quotient between $\sqrt{27}$ and $\sqrt{3}$ is irrational. Prove who is right. Make sure you justify your answer.

12. The traffic warning sign below has a triangle shape with base of 18 inches.

The value of the area of the triangle (half base times altitude), in square inches, is an irrational number. The number that represents the altitude of the triangle must be _____. Select the best answer to fill in the blank.

Ⓐ A whole number
Ⓑ A rational number
Ⓒ An irrational number
Ⓓ A non-real complex number

Explain your answer.

Algebra 1A Week 2

Dear Parent/Guardian,

During Week 2, we will continue reviewing several topics from Section 1 and support mastery of the Algebra 1 standards: Reasoning with Equations and Inequalities. Your child will work towards building on justifications for solving equations. Additionally, students will create and solve equations that represent real-world situations. There are nine topics in this section. It is suggested you complete one topic per day. A proposed schedule is included. All topics not listed on the schedules are available as optional review exercises.

Additionally, students can access Math Nation, the Pearson textbook and Khan Academy through ClassLink. All three sites offer instructional support including video lessons, practice quizzes and more.

We also suggest that students have an experience with math each day. Practicing at home will make a HUGE difference in your child's school success! Make math part of your everyday routine. Choose online sites that match your child's interests. Online math games, when played repeatedly, can encourage strategic mathematical thinking, help develop computational fluency, and deepen their understanding of numbers.

Links for additional resources to support students at home are listed below:
https://www.brainpop.com/games/sortifyangles/
https://www.hoodamath.com/games/highschool.html
https://www.khanacademy.org/resources/teacher-essentials
https://www.mangahigh.com/en-us/games/wrecksfactor
http://www.xpmath.com/forums/arcade.php?do=play&gameid=115
https://www.purplemath.com/modules/

Week 2 At A Glance	
Day 1	Section 1 – Expressions Topic 6: Radical Expressions and Expressions with Rational Exponents
Day 2	Section 1 - Expressions Topic 7: Adding Expressions with Radicals and Rational Exponents
Day 3	Section 2 - Equations and Inequalities Topic 1: Equations: True or False?
Day 4	Section 2 - Equations and Inequalities Topic 3: Solving Equations
Day 5	Section 2 - Equations and Inequalities Topic 3: Solving Equations

Section 2: Equations and Inequalities
Student Learning Plan

Topic Number	Topic Name	Date Completed	Study Expert(s)	Check Your Understanding Score
1	Equations: True or False?			
2	Identifying Properties When Solving Equations			
3	Solving Equations			
4	Solving Equations Using the Zero Product Property			
5	Solving Inequalities – Part 1			
6	Solving Inequalities – Part 2			
7	Solving Compound Inequalities			
8	Rearranging Formulas			
9	Solution Sets to Equations with Two Variables			
Honors 1	Solving Power Equations			

Honors resources are available online.

What did you learn in this section? What questions do you still have?

Who was your favorite Study Expert for this section? Why?

ALGEBRA NATION

Section 2 – Topic 1
Equations: True or False?

1. Consider the statement: $4 - 3 + 5 = -6 + 8 + 4$. This is a mathematically correct sentence.

   Is the sentence true or false? Explain how you know.

2. Determine if the sentence is true. Select all that apply.

   ☐ $2 + 5 = 19 - 12$
   ☐ $\frac{4}{5} + \frac{1}{5} = 2 - 1 - 1$
   ☐ $5 - 4 - 3 - 2 - 1 = 30 - 34 - 1$
   ☐ $2(x + 8) = 2x - 8$
   ☐ $2(x + 5) - 4x = 3(x - 2) - 5x + 16$

3. Determine whether the following number sentences are TRUE or FALSE. Justify your answer.

   Part A: $7 + 5 + 3 + x = x + 3 + 12$

   Part B: $\frac{1}{2} - \frac{5}{8} - \frac{7}{9} = \frac{7}{9} - \frac{5}{8} - \frac{1}{2}$

   Part C: $6^3 + 5^2 = 18 + 5^2$

   Part D: $(2 + 2)^2 = 2^2 \cdot 2^2$

4. For the equation, $x - 7 = 24$, can a value be substituted for x to make the equation a true number sentence? How many values could be substituted for x and have a true number sentence?

5. Consider $x + 4 = x + 8$. What values could be substituted for x to make this a true number sentence? Explain how you know.

6. Determine what value(s) for the variable would make each algebraic equation a true number sentence.

   $m^2 = 81$ is true for _____.

   $6p = 3p + 2p + p$ is true for _____.

   $r + 74 = r - 74$ is true for _____.

7. Which of the following has the correct solution given for x? Check all that apply.

☐ $3x - 3 = 24; x = 9$

☐ $4 + x + 5 - x = 20; x = 3$

☐ $\frac{x+5}{7} = 5; x = 30$

☐ $9 = 2x - 3; x = 6$

☐ $50 = \frac{1}{3}x + 5; x = 48$

1. The following pairs of equations are equivalent. Describe the operation that occurred in the second equation.

   Part A: $3 + 9 = 12$ and $3 + 9 - 5 = 12 - 5$

   Part B: $x - 4 = 7$ and $x - 4 + 4 = 7 + 4$

   Part C: $2(6) = 12$ and $\frac{2(6)}{2} = \frac{12}{2}$

   Part D: $\frac{x}{2} = 5$ and $2 \cdot \frac{x}{2} = 2 \cdot 5$

2. Complete the following table with the properties used to solve $4(x + 3) = 20$.

Statements	Proof
$4(x + 3) = 20$	*Given*
$4x + 12 = 20$	
$4x = 8$	
$x = 2$	

ALGEBRA NATION

3. Complete the following table with the mathematical statements that correspond to the proofs used to solve $\frac{4(x-3)}{3} = 20$.

Statements	Proof
$\frac{4(x-3)}{3} = 20$	Given
	Multiplication Property of Equality
	Distributive Property
	Addition Property of Equality
	Division Property of Equality

4. Consider the equations $5x + 10 = 30$ and $5(x + 10) = 30$.

   Do they have the same solution? Why or why not?

5. Consider the equations $3x + 2 = 14$ and $2 + 3x = 14$.

   Do they have the same solution? Why or why not?

6. Consider the equation $3(x + 2) + 3x = 36$.

   Without solving, name all the properties that would be used to solve the equation.

7. Consider the equation $\frac{x}{3} + 7 = 13$.

   Part A: Write an equivalent equation using the multiplication property of equality.

   Part B: What properties will you use next to solve the equation?

8. Solve the following equation. Justify each step.

$$0.2x + 3.1 - 2.1x = 0.3(x - 5) + 0.2$$

9. Write an equation in which the distributive property, commutative property, associative property, addition or subtraction property of equality, and multiplication or division property of equality can be used to find the solution.

10. Solve the equation that you wrote in Question 9, justifying each step.

Section 2 – Topic 3
Solving Equations

1. Solve the equation for x. For each step, identify the property used to convert the equation.

   Part A: $18 = 6(2x - 8)$

   Part B: $8 + 3b = -13$

   Part C: $\frac{x-3}{4} = 12$

   Part D: $14 + 3n = 8n - 3(n - 4)$

   Part E: $22x + 11 = 4x - 7$

2. During summer vacation, you charge people $8 per hour for swimming lessons and a $20 registration fee. If you make $52 one day, how many hours did you spend teaching lessons?

3. Lacoste Middle School surveyed its student population about their favorite mobile apps. The 786 students who listed Facebook as their favorite app represented 32 fewer students than two times the number of students who listed Instagram as their favorite app. How many students listed Instagram as their favorite app?

4. The 2015 senior class from Puma High School raised funds for an end of the year party at Club Sizzle. It costs $4,000 to rent out Club Sizzle plus $20 per student for food and drinks. If the senior class raised $11,000, how many students can attend the end of year party?

5. Alex sells cars at Keith Palmer Ford. He earns $400 a week plus $150 per car he sells. If he earned $1450 last week, how many cars did he sell?

Section 2: Equations and Inequalities

Section 2- Topic 4
Solving Equations Using the Zero Product Property

1. Solve the following equation using the zero product property.

   $(x + 8)(x + 11) = 0$

2. Solve the following equation using the zero product property.

   $(x + 9)(4x - 1) = 0$

3. Solve the following equation using the zero product property.

   $5(-v - 5) \cdot 3(v - 8) = 0$

4. Manny was given the equation $(x + 2)(x - 17) = 0$ and asked to find the zeros. The solutions he came up with were $x = 2$ and $x = -17$.

   Are his solutions correct? Justify your answer.

5. Which equations have the same pair of solutions? Select all that apply.

   ☐ $(x + 6)(x - 6) = 0$
   ☐ $(x + 6)(x + 6) = 0$
   ☐ $(x - 6)(x - 6) = 0$
   ☐ $(2x + 12)(2x - 12) = 0$
   ☐ $(2x - 12)(x - 12) = 0$
   ☐ $(x + 12)(x - 12) = 0$
   ☐ $(x + 12)(x - 6) = 0$

6. Ted and Maggie solved the following equation, $(3x - 2)(x + 5) = 0$. Their work is shown below.

Ted	Maggie
$(3x - 2)(x + 5) = 0$	$(3x - 2)(x + 5) = 0$
$3x - 2 = 0 \quad or \quad x + 5 = 0$	$3x - 2 = 0 \quad or \quad x + 5 = 0$
$3x = 2 \quad or \quad x = -5$	$3x = -2 \quad or \quad x = 5$
$x = \frac{2}{3} \quad or \quad x = -5$	$x = -\frac{2}{3} \quad or \quad x = 5$

   Who is correct? Correct the mistake in the incorrect work.

Section 2 – Topic 5
Solving Inequalities – Part 1

1. Match the inequalities below with one of the statements in the table. Not all inequalities will be used.

$x \leq 35$	$x \leq 12$	$x > 3$

$x \leq 10$	$x > 32$	$x \geq 10$

$x \leq 5$	$x \geq 35$	$x \geq 3$

$x \geq 32$	$x \geq 12$	$x < 10$

$x < 40$	$x \leq 40$	$x \geq 5$

Statement	Inequality
A student will study German for at least 3 years.	
All employees work less than 40 hours.	
There are at least 35 people in the emergency room.	
The carton holds at most 12 eggs.	
There are no more than 10 gallons of gas in the tank.	
There are fewer than 10 yards of fabric left.	
The temperature is above 32°F.	
Years of experience cannot be less than 5 years.	

2. Consider the diagrams below.
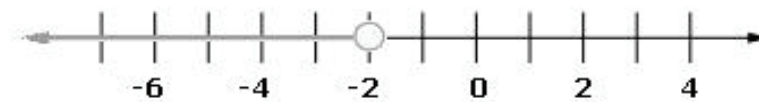
Graph 1

Graph 2
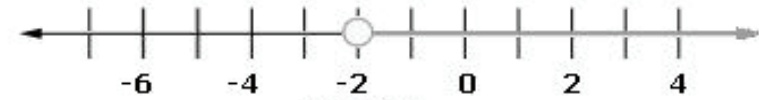
Graph 3
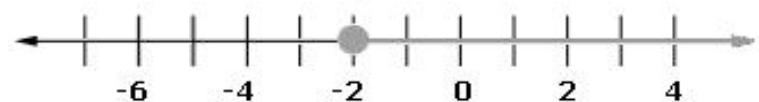
Graph 4

Write the inequality for each graph shown above:

Graph 1:   Graph 2:

Graph 3:   Graph 4:

Section 2: Equations and Inequalities

3. The Latino Rams at Englewood High School are seeking to raise at least $750 in a fundraiser to pay for their end-of-the year field trip to Islands of Adventures.

   Part A: Write an inequality to represent this situation.

   Part B: Graph the inequality on a number line.

4. Find the solution set to each inequality. Express the solution in set notation.

   Part A: $6m + 2 < 5m - 4$

   Part B: $\frac{a}{5} + 8 \leq 13$

   Part C: $-3(x - 7) > -27$

   Part D: $8(p - 6) > 4(p - 4)$

1. In order for Brady to earn a B in his biology course, his test scores must average at least 80%. On the first 5 tests, he has an average of 77%. There is one test remaining in the course. What is the minimum score Brady needs to earn on the last test to receive a B in the class?

2. Shawn has been hired as a sales associate at the Horizon Mobile Phone Company. He has two salary options. He can either receive a fixed salary of $750.00 per week or a salary of $400.00 per week plus an 8% commission of his weekly sales. Which solution set among the options below represents the dollar amount of sales that he must generate each week in order for the option with commission to be the better choice?

   Ⓐ $\{s|s > \$810.00\}$
   Ⓑ $\{s|s > \$1150.00\}$
   Ⓒ $\{s|s > \$4,375.00\}$
   Ⓓ $\{s|s > \$9,375.00\}$

3. In GeoTown, there are 210 teenagers that own a tablet. This is at least $\frac{4}{5}$ of all teenagers that live in GeoTown. What is the maximum number of teenagers who live in GeoTown?

4. Ms. Ache is paid $1,250 per week but is fined $100 each day she is late to work. Ms. Ache wants to make at least $3,000 over the next three weeks so she can take a vacation.

   Over the next three weeks, what is the maximum number of days she can be late to work and still reach her goal of making at least $3,000?

5. The Hot Summer Fair is coming to town! Admission to the fair costs $12.99 and each ride costs $1.75. You have $35 to spend at the fair including admission.

   Part A: Write an inequality that represents this situation.

   Part B: Solve the inequality to determine the maximum number of rides you can enjoy at the Hot Summer Fair.

Section 2 – Topic 7
Solving Compound Inequalities

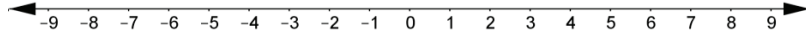1. Match the compound inequalities below with one of the statements in the table. Not all inequalities will be used.

$-42 < x < 102$	$20 \leq x < 32$	$x > 0 \text{ and } x \leq 10$
$x < 25 \text{ or } x \geq 62$	$16 \leq x \leq 20$	$x < 54 \text{ and } x \geq 72$
$x < 54 \text{ or } x \geq 72$	$x > 0 \text{ and } x < 6$	$x > 85 \text{ or } x < 65$
$16 < x < 20$	$25 < x \leq 62$	$x > 85 \text{ and } x < 65$
$x \geq 20 \text{ or } x < 32$	$-42 \leq x \leq 102$	$x > 0 \text{ or } x < 6$

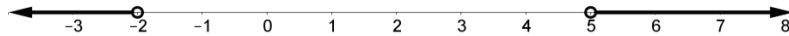|	
All real numbers that are less than six but more than 0.	
All real numbers between -42 and 102, inclusive.	
All positive real numbers less than or equal ten.	
All students earning above 85 or below a 65 were asked to report to the media center for further instructions.	
The expected weight must be greater or equal to 20 pounds but less than 32 pounds.	
Students under 25 or seniors at or above 62 get a discount.	
If temperature is at or above 72°F or below 54°F, the samples in the biology lab are no longer useful.	
Cookies must be baked between 16 and 20 minutes.	

2. Graph $x \leq 8$ and $x > -1$.

```
◄——————————————————————————►
  -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

3. Graph $x < -6$ or $x \geq 4$.

```
◄——————————————————————————►
  -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```
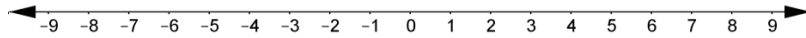
4. Write a compound inequality for the following graphs.

   Part A:

```
◄——————○————————————○————————►
   -3  -2  -1   0   1   2   3   4   5   6   7   8
```

   Part B:

```
◄————————●——————————————○————————►
   -3  -2  -1   0   1   2   3   4   5   6   7   8
```
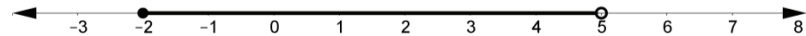
5. Amaya's test scores in Algebra 1 are 78 and 91. She has one more test left and wants to earn a B for the course, which is from 80-89 inclusive.

   *Part A:* Write a compound inequality to represent the situation.

Part B: Solve the inequality to find the range of scores Amaya has to earn to get a B in Algebra 1.

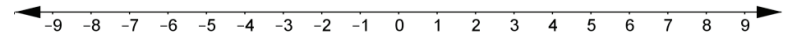6. Uncle Sammy invests money on stocks and makes 7 to 13 percent of the invested money.

   Calculate the range of money Sammy will make if he invests his next paycheck of $2,300.

7. Solve and graph the following compound inequalities.

   Part A: $7 \leq 5x + 2 < 22$

```
◄——————————————————————————►
  -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```
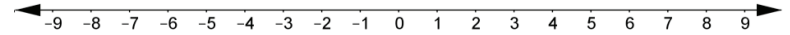
   Part B: $-4p \geq 12$ or $8 - 2p < 12$

```
◄——————————————————————————►
  -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```

8. An Indy car driver has to be a certain height to fit into the racecar. Consider the inequality $175 \leq 3x - 17 \leq 187$, where x represents the height of the driver in inches.

   What is the range for the height of an Indy car driver?

9. Peyton is altering her new jacket to enter it into the Bodacious Bedazzling Contest. In order for a garment to be considered "bedazzled", it must contain a number of gems that fall within the range of the following inequality $132 \leq \frac{1}{2}x + 7 \leq 193$.

   Find the range of gems Peyton must use to enter her jacket into the contest.

Section 2 – Topic 8
Rearranging Formulas

1. Consider the following equation, $bh + hr = 25$.

   Part A: Solve the equation for h.

   Part B: Solve the equation for r.

2. Consider the following equation $x = \frac{r-h}{y}$.

   Part A: Solve the equation for h.

   Part B: Solve the equation for r.

ALGEBRA NATION

3. Charlize and Camille solved the equation $4x - 2y = 8$ for y. Their work is shown below.

Charlize	Camille
$4x - 2y = 8$	$4x - 2y = 8$
$-2y = 8 + 4x$	$-2y = 8 - 4x$
$y = -4 - 2x$	$y = -4 + 2x$

Which student solved the equation correctly? Justify your answer.

4. Solve the following equation for p.

$$2m = \frac{p-q}{r}$$

5. The formula to find the volume of a sphere is $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere. What is the formula in terms of r?

1. Martha can complete 15 activities a day at summer camp. She can choose between crafts or sports.

   Part A: Define two variables and create an equation to represent the situation.
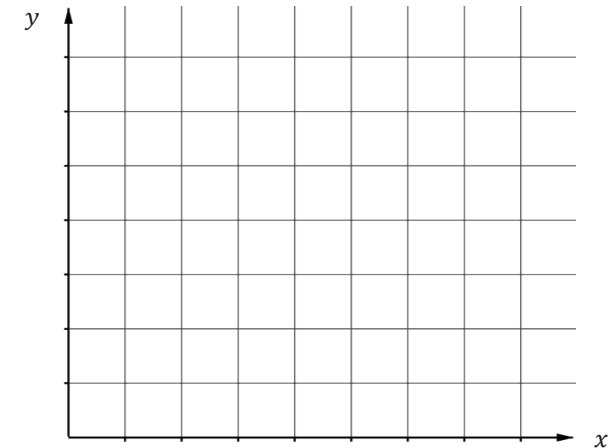
   Variable 1:

   Variable 2:

   Equation:

   Part B: What are three possible combinations of crafts and sports that Martha can do?

   Part C: Create a graph that represents the solutions to the equation from *Part A.*

Part D: Are the solutions to the graph above discrete or continuous? Explain your answer.

Part D: Are the solutions to the graph above discrete or continuous? Explain your answer.

2. Mahagony's favorite brand of ice cream is Ben & Jerry's. This weekend while she was doing her grocery shopping, she bought 9 single-serving containers, some "That's My Jam", and some "Cherry Garcia".

    Part A: Define two variables and create an equation to represent the situation.
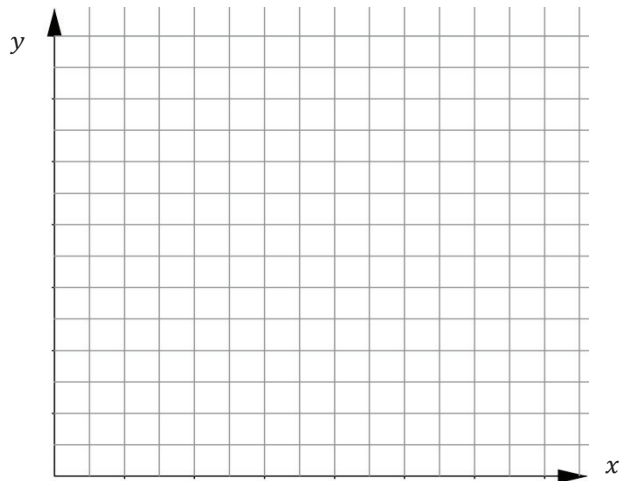
    Variable 1:

    Variable 2:

    Equation:

    Part B: What are three possible combinations of "That's My Jam" and "Cherry Garcia" containers Mahagony might have purchased?

    Part C: Create a graph that represents the solutions to the equation from *Part A*.

3. The sum of two numbers is 23.

    Part A: Define two variables and create an equation to represent the situation.
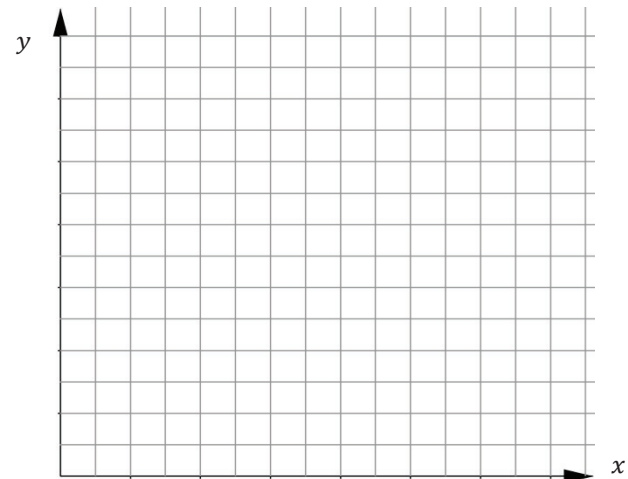
    Variable 1:

    Variable 2:

    Equation:

    Part B: What are three possible combinations of numbers that will satisfy the situation?

    Part C: Create a graph that represents the solutions to the equation from *Part A*.

Part D: Are the solutions to the graph above discrete or continuous? Explain your answer.

Part B: What are three possible combinations of numbers that will satisfy the situation?

Part C: Is this an example of a discrete or continuous function?

4. Demarcus' workout playlist consists of classic rock songs and rap songs. His playlist contains a total of 47 songs.

   Which of the following statements represent the number of classic rock and rap songs on Demarcus' playlist? Select all that apply.

   ☐ $x + y = 47$
   ☐ 24 and 24
   ☐ 43 and 4
   ☐ $x = y + 47$
   ☐ $y = -x + 47$
   ☐ 13 and 34

5. Debahni is moving boxes into her new house. She is able to move 17 boxes per hour. She is only able to move the small and medium size boxes.

   Part A: Define two variables and create an equation to represent the situation.

   Variable 1:

   Variable 2:

   Equation:

6. Mr. Mayntz's math class is made up of 29 students. Some of the students are male and some are female.

   Which of the following statements represent the number of males and females in Mr. Mayntz's class? Select all that apply.

   ☐ 23.5 males and 5.5 females
   ☐ $x + y = 29$
   ☐ 12 males and 17 females
   ☐ $x = y - 29$
   ☐ $y = -x - 29$