Morris Community High School
Algebra Readiness Packet

May 2022

Attention: 2022-23 Incoming Freshman

This packet was designed for you to practice the mathematical skills that **all** Algebra 1 students are expected to have mastered coming into the course. All topics in this packet have been covered in previous math courses that you have taken throughout grade school. Take some time this summer to prepare by completing all of the problems in the packet, reviewing where necessary.

Do not fake your way through this packet. Make sure all topics in this packet are mastered upon entry into Algebra 1. These prerequisite skills will make your time in Algebra 1 much easier and will greatly increase the likelihood of success this year!

As an Algebra 1 student, you will be tested on these skills on one of the first few days of school. **You will NOT be allowed to use a calculator on the test.** Therefore, you should also complete this packet without the use of a calculator.

Other resources to help you out:

Summer Work	How to access	Perseverance
Prodigy math game	www.prodigygame.com Class Code: C6CE44	**From the Prodigy website:** Prodigy has content from all major topics and will seamlessly cover Grades 1 - 8 to help ensure your students are ready for standardized testing. With a diagnostic test to place students in the correct grade, embedded assessments, and automatic differentiation, Prodigy ensures that each student succeeds at his or her own pace.
Khan Academy	https://www.khanacademy.org/math/pre-algebra	Students have an infinite number of problems to attempt on Khan Academy. If students are struggling, they can access helpful videos on Khan Academy and/or examples of problems.
IXL Math	https://www.ixl.com/math/grade-8	Here is a list of all of the math skills students learn in eighth grade. These skills are organized into categories, and you can move your mouse over any skill name to view a sample question. To start practicing, just click on any link. IXL will track your score, and the questions will automatically increase in difficulty as you improve. You may answer 10 questions for free each day.

List of Skills to be Mastered

❏ Multiply whole numbers between 1 and 12

❏ Operations with signed numbers

❏ Find the greatest common factor (GCF) and least common multiple (LCM)

❏ Divisibility rules

❏ Perfect square list of the numbers 1 through 20

❏ Convert decimals to fractions to percents

❏ Operations with fractions

❏ Ratios

❏ Order of operations

❏ Distributive property

❏ Combine like terms

❏ Evaluate expressions

❏ Solve basic one- and two-step equations

❏ Solve proportions

❏ Solve problems involving the percent of a number

❏ Translate verbal expressions to algebraic expressions

❏ Estimate

❏ Identify coordinates on a coordinate plane

❏ Slope

❏ Scientific notation

❏ Compare real numbers including absolute values

Operations on Signed Numbers

Find the sum or the difference.

1) $16 + (-4) =$	2) $20 - (-8) =$
3) $-50 + (-13) =$	4) $3 + (-5) - (-7) =$
5) $-(-10) + 18 =$	6) $45 - 10 + 5 =$
7) $-16 + 22 - 8 =$	8) $7 + 7 - (-14) =$
9) $-49 - 2 =$	10) $10 - 2 - 3 + (-5) =$

Find the product.

1) $6 \times (-4) =$	2) $(6)(9) =$
3) $(-3) \cdot (-12) =$	4) $(-5)(2)(-10) =$
5) $6 \times (-2) \times (7) =$	6) $9 \cdot 6 \cdot 10 =$
7) $(-4) \times (-4) \times (-8) =$	8) $(12)(11) =$
9) $10 \cdot (-3) \cdot 2 =$	10) $(8)(8)(10) =$

1) A bank account has an account balance of $800. You deposit $250, then withdraw $400 and $150. Is there a positive or negative balance in the account? Find the balance.

2) Maria starts at point A and walks 8 km south, then 19 km north, and then 3 km south. How far is she from her starting point? Write an expression using negative and positive numbers; let north be positive and south be negative.

Divisibility Rules

By which numbers is each given value divisible? Circle all that apply.

Number	Divisible by							
15	1	2	3	4	5	6	9	10
27	1	2	3	4	5	6	9	10
36	1	2	3	4	5	6	9	10
268	1	2	3	4	5	6	9	10
102	1	2	3	4	5	6	9	10

GCF and LCM

Method 1: Find the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of 24 and 32.

GCF

Common Factors →

2 | 24 32
4 | 12 16
3   4

GCF= 2 x 4 = 8

LCM

2 | 24 32
4 | 12 16
3   4

LCM = 2 x 4 x 3 x 4 = 96
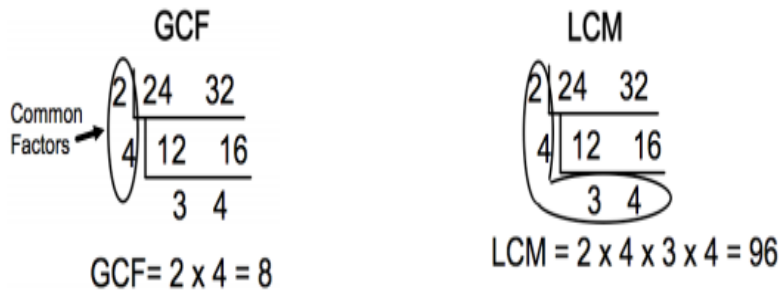
Method 2: Find the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of 18 and 12.

GCF=**2**·**3**=6
LCM=**2**·**2**·**3**·**3**=36

12   18

2 | **2·3** | 3

1
2 | 2
3 | 6
2 | 12

1
3 | 3
3 | 9
2 | 18

Prime Numbers - 2, 3, 5, 7, 11
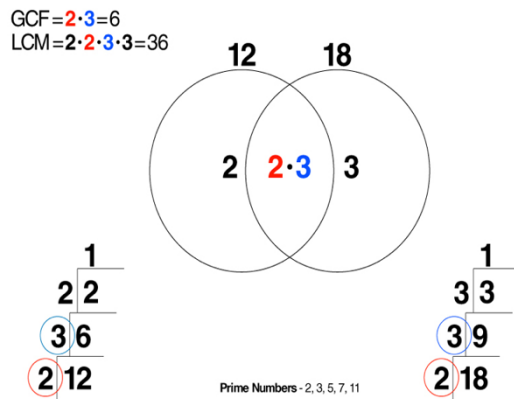
Numbers	Greatest Common Factor	Least Common Multiple
1) 60 and 66		
2) 44 and 14		
3) 7 and 56		
4) 20 and 22		

Adding/Subtracting Fractions

Simplify.

1. $\frac{-11}{7} + \frac{4}{7} =$	**2.** $\frac{9}{12} - \frac{5}{12} =$	**3.** $\frac{3}{2} + \frac{1}{3} =$
4. $\frac{6}{7} + \frac{3}{14} =$	**5.** $\frac{7}{3} - \frac{8}{5} =$	**6.** $\frac{1}{12} - \frac{2}{3} + \frac{1}{2} =$

Multiplying/Dividing Fractions

Simplify.

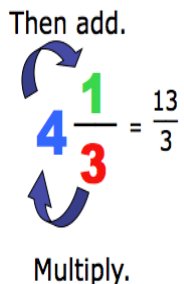|		
1. $-\frac{5}{4} \cdot \frac{1}{3} =$	**2.** $\frac{8}{7} \cdot \frac{7}{10} =$	**3.** $\frac{4}{9} \cdot \frac{7}{4} =$
4. $\frac{-1}{5} \div \frac{7}{4} =$	**5.** $\frac{-1}{2} \div \frac{5}{4} =$	**6.** $\frac{1}{2} \div \frac{8}{7} =$

Mixed Numbers and Improper Fractions

Converting a Mixed Number to an Improper Fraction

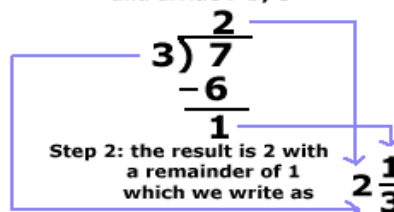*Multiply the whole number by the denominator and add the numerator.*

Keep the same denominator.

Then add.

$$4\frac{1}{3} = \frac{13}{3}$$

Multiply.

Converting Improper Fractions to Mixed Numbers

$$\frac{7}{3} = 2\frac{1}{3}$$

Step 1: Set-up a division problem and divide 7 by 3

$$3\overline{)7} \quad \begin{array}{r} 2 \\ -6 \\ \hline 1 \end{array}$$

Step 2: the result is 2 with a remainder of 1 which we write as $2\frac{1}{3}$

Convert the improper fraction to a mixed number.

1. $\frac{17}{6} =$	**2.** $\frac{28}{9} =$	**3.** $\frac{13}{2} =$

Convert the mixed number to an improper fraction.

1. $4\frac{1}{5} =$	**2.** $8\frac{2}{3} =$	**3.** $9\frac{3}{7} =$

Decimals and Percents

1 Create the top

0.15 → 15

2 Create the bottom

$$\frac{15}{100} \xleftarrow{\text{2 digits}} \xleftarrow{\text{2 zeros}}$$

3 Reduce the fraction

$$\frac{15 \div 5}{100 \div 5} = \frac{3}{20}$$

Convert the decimal to a fraction.

1. 0.6	2. 0.15	3. 2.5

Convert the fraction to a decimal. (Tutorial: https://tinyurl.com/kvturfe)

1. $\frac{4}{5}$	2. $\frac{7}{8}$	3. $\frac{4}{9}$

Convert the percent to a fraction and then to a decimal.
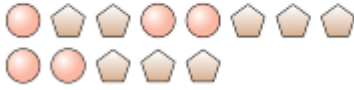
1. 25%	2. 40%	3. 72%
4. 102%	5. 22%	6. 6.5%

Ratios

Write each ratio in simplest terms.

1. What is the ratio of pentagons to circles?

___ : ___   or   ___ / ___

2. What is the ratio of triangles to stars?

___ : ___   or   ___ / ___

Fill in the missing information.

3. At the malt shop, the ratio of hot dogs sold to hamburgers sold was 2:7. For every ____ hamburgers sold, there were ____ hot dogs sold.

4. For every 5 dogs at the pet shelter, there are 3 cats. What is the ratio of dogs to cats?

___ : ___   or   ___ / ___

Fill in the blank to make an equivalent ratio.

5. ____ : 7 = 8 : 14

6. 30 : 36 = 5 : ____

8. 6 : 2 = ____ : 18

7. ____ : 4 = 30 : 24

Determine if the statements are true or false.

9. Diet sodas = 2 , Regular sodas = 9

     A. The ratio of diet sodas to regular sodas sold is 2:9

     B. The ratio of diet sodas to regular sodas sold is 9:2

     C. For every 2 diet sodas sold there are 9 regular sodas sold

     D. The ratio of regular sodas to diet sodas sold is 9:2

10. Texts sent = 8 , Calls made = 5

     A. The ratio of texts sent to calls made was 8:5.

     B. The ratio of texts sent to calls made was 5:8.

     C. For every 5 texts sent there were 8 calls made.

     D. For every 8 calls made there were 5 texts sent.

Order of Operations

Simplify the expression. If your answer is a fraction, write the answer in reduced form.

1. $40 \div 2 + 3$	2. $7 \times 7 + 1 + 16 \div 8$	3. $(15 \div 5 + 6 + 9) \times 4$
4. $2 + 5^2 + 59$	5. $-5 \cdot (-3)^2 + 16$	6. $5^2 + \left(\frac{1}{4} + \frac{7}{4}\right)^2$
7. $30 - (18 + 6 \div 3)$	8. $-5^2 + 32 + \frac{(85 - 10)}{5}$	9. $7 + [(120 \div 10 + 6) - (-2)]$

Distributive Property & Combining Like Terms

Simplify each expression by using the Distributive Property.

1. $-6(x+2)$	2. $3(2m+5n)$	3. $(-9r+4)\cdot 8$
4. $\frac{3}{4}(16x-8)$	5. $-7(-10x-9)$	6. $-\frac{1}{2}(-4a+3b)$

Simplify each expression by combining like terms.

7. $7x+9x-4x$	8. $15s-(-2s)+4t$	9. $\frac{4}{3}x+\frac{11}{3}x-6x$
10. $x+2x+4y-(-8y)$	11. $7a+\frac{4}{5}b-\frac{1}{2}b-9a$	12. $m+2n+m+4m-5n-8$

Simplify each expression.

13. $-4(x-8)+7x$	14. $\frac{4}{5}(-10x+15)-2$	15. $11+3(x-9)$
16. $\frac{2}{3}(6x+9)+4x-8$	17. $-2(2n+4)+7(n+1)$	18. $5(a+3b)-1(2a-6b)$

Evaluating Expressions

Evaluate the expressions when $x = 3, y = -2, z = \frac{1}{4}$. **Write your answer in reduced fraction form, if necessary.**

1. $5x + x - 10$	2. $-2x - 6x + 18$	3. $x(7 + y) - x$
4. $y(x + 3) + 8z$	5. $z + y - \frac{1}{2}$	6. $10 - y + x(3 + y)$
7. $\frac{7-x}{y}$	8. $(3 + y) \div z$	9. $x^2 - y^2$
10. $5x - \frac{x}{y}$	11. $xz \div z$	12. $y^2 + \frac{2}{3} + z$

Solving Linear Equations

Find the value of each variable by solving each equation.

1. $v - 10 = -9$	2. $-11k = 22$	3. $2x + 3 = 15$
4. $\frac{x}{5} = 2$	5. $\frac{3}{4}m = -9$	6. $-3x + 5 = -10$
7. $4n - 9 = 1$	8. $7x + 10 = -10$	9. $\frac{z}{2} - 7 = 2$
10. $5(3x - 4) = 10$	11. $5x + 3 + 2x = 5$	12. $8 - x = 12$
13. $7x - 10 = 2x + 25$	14. $13x + 3 = 4(2x + 7)$	15. $4(3x - 6) = 2(6x + 11)$

Proportions

Solve the proportion for the given variable. Write your answer in reduced fraction form.

1. $\frac{10}{k} = \frac{8}{4}$	2. $\frac{m}{5} = \frac{12}{20}$	3. $\frac{2}{c} = \frac{4}{9}$
4. $\frac{6}{a} = \frac{3}{-8}$	5. $\frac{12}{5} = \frac{4c}{10}$	6. $\frac{6x}{5} = \frac{2}{3}$

Percent Problems

Solve each problem.

1. What is 10% of 90?	2. What is 20% of 65?	3. What percent of 70 is 35?
4. 150 is 40% of what number?	5. What percent of 48 is 12?	6. 200% of 85 is what number?

Translating Algebraic Models

Translate the verbal model into an algebraic expression.

1. The product of five and a number z	2. A number p less than two	3. The difference of a number k and six
4. The sum of a number x and eleven	5. The quotient of a number y and four	6. The product of 7 and the sum of the number q and 10
7. The product of 7 and the difference of a number x and 1	8. Double the sum of a number w and 3	9. One-fourth of a number t increased by 5

Comparing Expressions

Absolute Value: the distance of a number from the origin on the number line
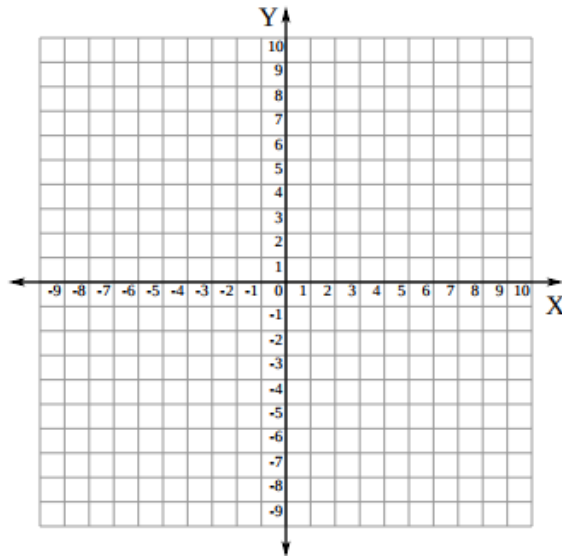- The absolute value of a number is never negative.

Simplify both expressions and then compare using the symbol <, >, or = .

1. $|-6|$ ___ -6	2. $28 \cdot (-2) \div (4)$ ___ $(-14) \cdot (-2) \cdot (-1)$
3. $-|10|$ ___ $|15 - 10|$	4. $17 - (-8)$ ___ $14 + 11$
5. $4 \cdot (-3)$ ___ $4 \cdot |-3|$	6. $2(-8 + 4)$ ___ $2 \cdot |-8 + 4|$

Coordinates on a Coordinate Plane

Part I: Graph and label by letter each of the coordinates on the coordinate plane.

A (0, 5)	B (-4, 1)	C (-2, -2)	D (6, 0)
E (1, -3)	F (0, 0)	G (-1, 6)	H (-5, -3)

**Part II: Use the graph to answer the following questions.**

1. **Which point(s) are graphed on the origin?**

2. **Which point(s) are graphed on the x-axis?**

3. **Which point(s) are graphed on the y-axis?**

4. **Which point(s) are graphed in quadrant I?**

5. **Which point(s) are graphed in quadrant II?**

6. **Which point(s) are graphed in quadrant III?**

7. **Which point(s) are graphed in quadrant IV?**

Slope

$$m = \frac{Change\ in\ y}{Change\ in\ x} = \frac{Rise}{Run} = \frac{y_2 - y_1}{x_2 - x_1}$$

Determine the slope of the line graphed. Label each slope m=_____.

1.	2.	3.
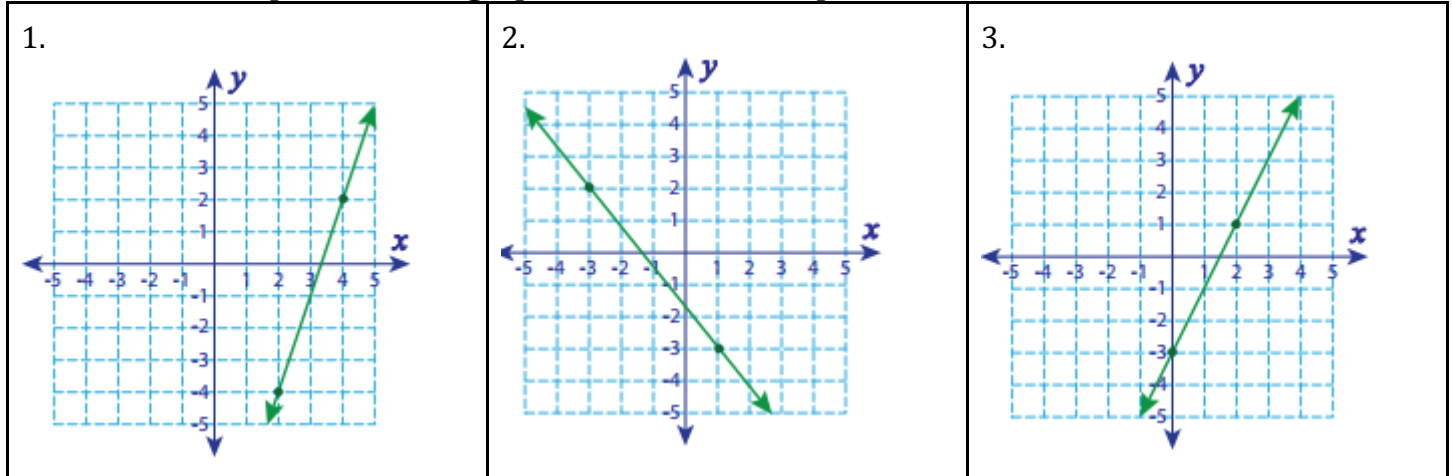
Determine the slope of the line from two points. Label each slope m=_____.

4. (9, 5) and (1, 2)	5. (7, 10) and (6, 8)	6. (11, 3) and (8, 0)
7. (-5, 1) and (4, 2)	8. (-6, -6) and (5, -6)	9. (-13, -7) and (-13, -4)

Application.

10. A climber is on a hike. After 2 hours, he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. What is the average rate of change?
      a. Write two ordered pairs to model the situation.

      b. Use the slope formula to determine the rate of change.

11. Michael started a savings account with $300. After 4 weeks, he had $350 dollars and after 8 weeks, he had $400. What is the rate of change of money in his savings account per week?
      a. Write two ordered pairs to model the situation.

      b. Use the slope formula to determine the rate of change.

Scientific Notation

Tutorial Video: https://www.youtube.com/watch?v=Dme-G4rc6NI

Write the given number in scientific notation.

1. 0.000006	2. 5,400,000	3. 0.0000002

Write the given number in decimal form.

4. 2.66×10^4	5. 7.5×10^{-5}	6. 4×10^0

7. True or false?   The number 804×10^2 is correctly written in scientific notation.

8. True or false?   The number 2.66×10^4 is correctly written in scientific notation.

9. Mr. Griffin's class is studying the solar system. The circumference of the Earth at the equator is about 24,900 miles. Express this number in scientific notation.

10. In 2013, the Los Angeles Dodgers' opening day payroll was about $\$2.16 \times 10^8$ and the Houston Astros' opening day payroll was about $\$2.4 \times 10^7$. How much higher was the Dodgers' payroll?

11. A TV show had 3.5×10^6 viewers for their first episode and 8.5×10^6 viewers for their second episode. How many viewers did they have overall?

12. The speed of an airplane was 2,000 mph for 7 hours. How far did the airplane travel? Write your answer in scientific notation.

Perfect Square List. Cut along the dotted line and fold on the solid line to make flash cards.

1^2	2^2	3^2
1	4	<u>9</u>
4^2	5^2	6^2

16	25	36
7^2	8^2	9^2
49	64	81

10^2	11^2	12^2
100	121	144
13^2	14^2	15^2

169	196	225
16^2	17^2	18^2
256	289	324

19^2	20^2	1^3
361	400	1
2^3	3^3	4^3

8	27	64
5^3	6^3	7^3
125	216	343