

To the Guardian of the upcoming Algebra I students,

Attached is the summer packet that your child is required to complete prior to entering Algebra I in Bayonne High School. This is the third year that the district has assigned a summer project and it has shown to be a success for the start of the school year.

Recently, The State of New Jersey decided to implement The American Diploma Project Algebra I End-of-Course Exam. As a result, the Bayonne High School Algebra I teachers will have higher expectations from their students. Additional Mathematic concepts are required to ensure the success of all students.

The Algebra I teachers in conjunction with the Director of Mathematic, Mrs. Ann Marie Palmieri-Monahan have reached the conclusion that the following fundamentals **MUST** be mastered prior to the entrance of Algebra I. These fundamentals have been previously taught in grades 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup>.

Integers - addition, subtraction, multiplication, and division  
Fractions – addition, subtraction, multiplication, and division  
Order of Operations  
Mean, Median, Mode, Outlier

Directions are incorporated in the packet. Additional help is available on the internet or you can find references in bookstores.

We ask that you encourage your children **NOT TO USE CALCULATORS**. Even though the results maybe more accurate, they will not learn the skills that will be expected of them on the first day of school.

Please remind your child that they are to bring this packet along with any questions with them on their first day of school. All children including those who transfer in and are repeating the course are required to have this packet completed. Within the first two weeks of school, a school-wide Algebra I test will be given to the students. The topics given above will be tested **WITHOUT CALCULATORS**.

Our goal is to have a 100% passing rate for students taking the Algebra I End-of-Course Exam and we strongly believe your child will have the most highly qualified teacher to ensure his/her success. As an Algebra I committee we are determined and confident that we can make our goal a reality.

We would like to thank you in advance for your cooperation. Remember you the parents are the first teachers. Please work with us in order for your sons and daughters to achieve the Mathematical skills required for not only graduation but the real world. We promise to do our job here, help us at home. Stay Involved, Ask Questions, and Continue to Motivate.

Sincerely,  
Algebra I Teachers

## ADDING AND SUBTRACTING FRACTIONS

Fractions consist of two numbers. The top number is called the numerator. The bottom number is called the denominator.

$$\frac{\text{numerator}}{\text{denominator}}$$

To add or subtract two fractions with the same denominator, add or subtract the numerators and place that sum or difference over the common denominator.

$$\frac{5}{11} + \frac{14}{11} = \frac{19}{11} = 1\frac{8}{11}$$

How to Add/Subtract Fractions with different denominators:

- Find the Least Common Denominator (LCD) of the fractions
- Rename the fractions to have the LCD
- Add or subtract the numerators of the fractions
- Simplify the Fraction

$$\frac{3}{5} - \frac{1}{3} = \frac{9}{15} - \frac{5}{15} = \frac{4}{15}$$

The steps are the same whether you're adding or subtracting mixed numbers:

1. Find the Least Common Denominator (LCD)
2. Find the equivalent fractions.
3. Add or subtract the fractions and add or subtract the whole numbers.
4. Write your answer in lowest terms.

$$1. \quad 3 - \frac{1}{4} \quad \begin{array}{l} 3 = 2\frac{4}{4} \text{ "Borrow" a 1 from the} \\ - \frac{1}{4} = -\frac{1}{4} \quad \text{3 and change to } \frac{4}{4}. \\ \hline 2\frac{3}{4} \end{array}$$

$$\begin{array}{r} 9\frac{1}{2} \\ + 5\frac{2}{3} \\ \hline \end{array} \longrightarrow \begin{array}{l} 9\frac{1}{2} \times \frac{3}{3} = 9\frac{3}{6} \\ + 5\frac{2}{3} \times \frac{2}{2} = 5\frac{4}{6} \\ \hline 14\frac{7}{6} = 15\frac{1}{6} \end{array}$$

$$2. \quad 2\frac{1}{3} + 3\frac{1}{8} \quad \begin{array}{l} 2\frac{1}{3} = 2\frac{8}{24} \\ + 3\frac{1}{8} = + 3\frac{3}{24} \\ \hline 5\frac{11}{24} \end{array}$$

The LCD of 3 and 8 is 24.

## MULTIPLYING FRACTIONS

To multiply fractions:

1. Simplify the fractions if not in lowest terms.
2. Multiply the numerators of the fractions to get the new numerator.
3. Multiply the denominators of the fractions to get the new denominator.

Example:  $\frac{1}{5} \times \frac{2}{3}$

$$\frac{1}{5} \times \frac{2}{3} = \frac{1 \times 2}{5 \times 3} = \frac{2}{15}$$

Simplify the resulting fraction if possible.

Here are the steps for multiplying mixed numbers.

1. Change each number to an improper fraction.
2. Simplify if possible.
3. Multiply the numerators and then the denominators.
4. Put answer in lowest terms.
5. Check to be sure the answer makes sense.

$$5\frac{2}{3} \times \frac{1}{4}$$
$$5\frac{2}{3} \times \frac{1}{4} = \frac{17}{3} \times \frac{1}{4}$$

$\frac{17}{3} \times \frac{1}{4}$  cannot simplify

$$\frac{17}{3} \times \frac{1}{4} = \frac{17}{12}$$
$$\frac{17}{3} \times \frac{1}{4} = \frac{17}{12} = 1\frac{5}{12}$$

## DIVIDING FRACTIONS

To divide any number by a fraction:

1. Multiply the number by the reciprocal of the fraction.
2. Simplify the resulting fraction if possible.

*Write the division as multiplication by the reciprocal of the divisor.*

$$\frac{1}{3} \div \frac{3}{4} = \frac{1}{3} \times \frac{4}{3} = \frac{4}{9}$$

Here are the steps for dividing mixed numbers.

1. Change each mixed number to an improper fraction.
2. Multiply by the reciprocal of the divisor, simplifying if possible.
3. Put answer in lowest terms.
4. Check to be sure the answer makes sense.

$$5\frac{2}{3} \div \frac{1}{4} = \frac{17}{3} \div \frac{1}{4}$$
$$\frac{17}{3} \times \frac{4}{1} = \frac{68}{3} = 22\frac{2}{3}$$

## Operations with Rational Numbers

### Addition

When addends have the same sign, ADD. Use that sign when you write the sum

$$5 + 8 = 13$$

$$-20 + -30 = -50$$

When addends have different signs, subtract. Use the sign of the greater addend.

$$-6 + 4 = -2$$

$$45 + -10 = 35$$

### Multiplication

When the factors have the same sign, the product is positive.

$$5 \times 6 = 30$$

$$-13 \times -3 = 39$$

When the factors have different signs, the product is negative.

$$-6 \times 8 = -48$$

$$9 \times -11 = -99$$

### Subtraction

To subtract an integer, add its opposite.

$$4 - 12 = 4 + -12 = -8$$

$$9 - -12 = 9 + 12 = 21$$

The opposite of -15 is 15

$$1 - -15 = 1 + 15 = 16$$

$$-20 - -15 = -20 + 15 = -5$$

### Division

When the dividend and the divisor have the same sign, the quotient is positive.

$$45 \div 9 = 5$$

$$-120 \div 6 = 20$$

When the dividend and the divisor have different signs, the quotient is negative.

$$35 \div -5 = -7$$

$$-250 \div 10 = -25$$

# Order of Operations

## Key Concepts

1. Work inside grouping symbols. ( ) [ ]
2. Exponents
3. Multiplying and divide in order from left to right.
4. Add and subtract in order from left to right.

Examples:

$$\begin{aligned}2 + 5 \times 3 \\2 + 15 \\17\end{aligned}$$

$$\begin{aligned}12 \div 3 * 1 \\4 * 1 \\4\end{aligned}$$

$$\begin{aligned}10 - 1 * 7 \\10 - 7 \\3\end{aligned}$$

$$\begin{aligned}4^3 - 1 * 2 + 6 \div 3 \\64 - 1 * 2 + 6 \div 3 \\64 - 2 + 6 \div 3 \\64 - 2 + 2 \\62 + 2 \\64\end{aligned}$$

$$\begin{aligned}5 + 6 * 4 \div 3 - 1 \\5 + 24 \div 3 - 1 \\5 + 8 - 1 \\13 - 1 \\12\end{aligned}$$

$$\begin{aligned}[6^2 - (2*2)] \\[6^2 - 4] \\[36-4] \\32\end{aligned}$$

## Mean, Median, Mode, Outlier

$$\text{Mean} = \frac{\text{sum of the data items}}{\text{Total \# of data items}}$$

\*\*\*Also known as the average\*\*\*

Example: Jenna's grades are 87, 93, 88, 100, and 90. What is the mean of her test grades?

$$\frac{87 + 93 + 88 + 100 + 90}{5} = 91.6$$

The **median** is the middle value in the set when the numbers are arranged in order.

Finding the median:

Step 1: Order the data from least to greatest.

Step 2: Find the middle number.

\*\*If there is two middle numbers,  
find the average of the two\*\*

Example: Jenna's grades are 87, 93, 88, 100, and 90. What is the median of her test grades?

87, 88, 90, 93, 100

The **mode** is the data item that occurs the most time.

\*\* It is possible for a set of numbers to have *no mode, one mode, or more than one mode.* \*\*

Examples: 2, 3, 4, 5, 6, 7 - No mode

2, 2, 2, 3, 3, 4, 5 - One mode (2)

2, 2, 2, 3, 3, 3, 4, 5 - More than one mode (2 and 3)

An **outlier** is a data value that is much higher or lower than the other data values.

Example: 80, 90, 95, 86, 50, 92

\*\*Think of the number that doesn't fit. \*\*

NAME \_\_\_\_\_

Adding and Subtracting Positive and Negative Numbers

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1) $(-2)+3$                      | 2) $(-14)+(-7)$                   |
| 3) $3 - (-8)$                    | 4) $(-9) + 14$                    |
| 5) $(-8)-(-2)$                   | 6) $5 + (-8)$                     |
| 7) $(-27)-24$                    | 8) $(-41)+(-40)$                  |
| 9) $38-(-17)$                    | 10) $(-44)+(-9)$                  |
| 11) $(-16)-(-36)$                | 12) $(-6)-24$                     |
| 13) $(-16)-6+(-5)$               | 14) $15-13+2$                     |
| 15) $16-(-13)-(-5)$              | 16) $(-7)-(-2)-9$                 |
| 17) $(-11)-(-14)+7$              | 18) $7+(-1)+12-7$                 |
| 19) $6+(-7)+(-5)-(-2)$           | 20) $(-3)+5+(-5)+12$              |
| 21) $(-11)-8+1-(-6)$             | 22) $10-(-10)-7-5$                |
| 23) $6-3.98$                     | 24) $5.8+(-2.5)$                  |
| 25) $1.8-(-3.7)$                 | 26) $7-2.8$                       |
| 27) $(-0.8) + (-7.2) - 5.4$      | 28) $1.7-(-0.8)+4.013$            |
| 29.) $-14 - 20$                  | 30) $-30 + 23$                    |
| 31.) $8 - 12$                    | 32.) $19 - 23$                    |
| 33.) $-9 + 10$                   | 34.) $23 - 19$                    |
| 35.) $14 - 72$                   | 36.) $-9 - (-10) + 6 - 10 + 23$   |
| 37.) $-3 + 7 - 9 + 10 - 12 + 13$ | 38.) $11 - 19 + 20 - 15 + 23 - 5$ |

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Multiplying and Dividing Positive and Negative numbers

1)  $\frac{10}{5}$

2)  $\frac{-24}{12}$

3)  $\frac{-20}{-2}$

4)  $\frac{-300}{-20}$

5)  $\frac{65}{5}$

6)  $\frac{-66}{-6}$

7)  $\frac{75}{-15}$

8)  $\frac{-56}{-14}$

9)  $\frac{102}{-17}$

10)  $\frac{-72}{-4}$

11)  $153 \div 17$

12)  $12 \div -3$

13)  $48 \div 6$

14)  $-120 \div -20$

15)  $306 \div 18$

16)  $-65 \div 13$

17)  $-85 \div -17$

18)  $128 \div -16$

19)  $-180 \div 15$

20)  $234 \div -13$

21)  $-11 \times 9$

22)  $-7 \times -12$

23)  $-8 \times -11$

24)  $-6 \times 4$

25)  $-3 \times -11$

26)  $-5 \times -9$

27)  $9 \times -7$

28)  $-9 \times -3$

29)  $12 \times -12$

30)  $11 \times -6$

31)  $-5^2$

32)  $(-5)^2$

33)  $(-4)^3$

34)  $(-4)^2$

35)  $-4^3$

36)  $-4^2$

37)  $-2^4$

38)  $(-2)^4$

39)  $-3^3$

40)  $-3^6$

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### Adding and Subtracting Fractions

\*\*All work should be shown on a separate piece of paper.\*\*

1)  $\frac{11}{9} - \frac{7}{6}$     2)  $\frac{14}{11} - \frac{1}{3}$     3)  $\frac{5}{11} + \frac{4}{3}$     4)  $\frac{3}{5} - \frac{1}{3}$     5)  $\frac{1}{2} + \frac{13}{10}$

6)  $\frac{3}{4} + \frac{3}{4}$     7)  $\frac{1}{2} - \frac{1}{11}$     8)  $\frac{3}{10} + \frac{4}{3}$     9)  $\frac{13}{8} + \frac{11}{7}$     10)  $\frac{1}{2} - \frac{1}{6}$

11)  $\frac{19}{10} + \frac{1}{2}$     12)  $2 + \frac{3}{2}$     13)  $\frac{3}{5} + \frac{5}{8}$     14)  $\frac{1}{10} + \frac{2}{3}$     15)  $\frac{8}{5} - \frac{2}{3}$

16)  $1\frac{4}{7} + 6\frac{7}{8}$     17)  $1\frac{5}{8} + 5\frac{5}{6}$     18)  $3\frac{4}{9} - \frac{3}{8}$     19)  $5\frac{4}{7} - 4\frac{5}{9}$     20)  $12 - 1\frac{8}{11}$

21)  $1\frac{1}{9} + 2\frac{2}{5}$     22)  $3\frac{5}{8} - \frac{5}{6}$     23)  $5\frac{3}{4} + 4\frac{7}{8}$     24)  $2\frac{3}{8} - 1\frac{1}{7}$     25)  $2\frac{1}{3} + 4\frac{2}{5}$

26)  $6\frac{1}{10} + 1\frac{3}{8}$     27)  $\frac{8}{9} + 2\frac{5}{8}$     28)  $6\frac{5}{12} - 3\frac{5}{8}$     29)  $10\frac{3}{7} + 5\frac{4}{5}$     30)  $7 - \frac{1}{2}$

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### Multiplying and Dividing Fractions

**Multiply. Write your answers in simplest form.**

1.  $\frac{2}{5} \cdot \frac{3}{4}$

2.  $\frac{3}{7} \cdot \frac{4}{3}$

3.  $1\frac{1}{2} \cdot 5\frac{3}{4}$

4.  $3\frac{4}{5} \cdot 10$

5.  $5\frac{1}{4} \cdot \frac{2}{3}$

6.  $4\frac{1}{2} \cdot 7\frac{1}{2}$

7.  $3\frac{2}{3} \cdot 6\frac{9}{10}$

8.  $6\frac{1}{2} \cdot 7\frac{2}{3}$

9.  $2\frac{2}{5} \cdot 1\frac{1}{6}$

10.  $4\frac{1}{9} \cdot 3\frac{3}{8}$

11.  $3\frac{1}{5} \cdot 1\frac{7}{8}$

12.  $7\frac{5}{6} \cdot 4\frac{1}{2}$

13.  $1\frac{2}{3} \cdot 5\frac{9}{10}$

14.  $3\frac{3}{4} \cdot 5\frac{1}{3}$

15.  $1\frac{2}{3} \cdot 3\frac{9}{16}$

**Divide. Write your answers in simplest form.**

16.  $\frac{3}{5} \div \frac{1}{2}$

17.  $\frac{4}{5} \div \frac{9}{10}$

18.  $2\frac{1}{2} \div 3\frac{1}{2}$

19.  $1\frac{4}{5} \div 2\frac{1}{2}$

20.  $3\frac{1}{6} \div 1\frac{3}{4}$

21.  $5 \div \frac{3}{8}$

22.  $\frac{4}{9} \div \frac{3}{5}$

23.  $\frac{5}{8} \div \frac{3}{4}$

24.  $2\frac{1}{5} \div 2\frac{1}{2}$

25.  $6\frac{1}{2} \div \frac{1}{4}$

26.  $1\frac{3}{4} \div 4\frac{3}{8}$

27.  $\frac{8}{9} \div \frac{2}{3}$

28.  $\frac{1}{5} \div \frac{1}{3}$

29.  $2\frac{2}{5} \div 7\frac{1}{5}$

30.  $7\frac{2}{3} \div \frac{2}{9}$

Name \_\_\_\_\_

### Mean, Mode, and Median, Outlier

Find for each set of numbers the mean, mode, median, and outlier.

You must show all work as to how you got your answers.

1. 1,4,5,5,6,7,6,6,9,3,5,15

2. 12,6,8,11,8,6,16,18,4,8,4,2,40

3. 5,40,50,90,70,50,60,40,80,90

4. 16,20,12,26,35,14,20,16, 17

5. 50,60,70,25,30,15,5,10,5

**Order of Operations****Evaluate each expression.****\*\*All work should be shown on a separate piece of paper.\*\***

1)  $3(6 + 7)$

2)  $5 \times 3^2 \times 2$

3)  $72 \div 9 + 7$

4)  $2 + 7 \times 5^3$

5)  $9 + 8^2 - 7$

6)  $9 - 32 \div 4^2$

7)  $5(10 - 1)$

8)  $48 \div (4 + 4)$

9)  $20 \div (4 - (10 - 8))$

10)  $40 \div 4 - (5 - 3)$

11)  $9 + 9 + 6 - 5$

12)  $(5 + 16) \div 7 - 2$

13)  $7 + 10 \times 5 + 10$

14)  $(6 + 25 - 7) \div 6$

15)  $(6 - 4) \times 49 \div 7$

16)  $(7^2 \times 5) \div 5$

17)  $\frac{43 - 1}{4 + 2^2} + 10$

18)  $(8 + 5) \times \frac{35}{5} + 6$

19)  $\frac{27}{2 + 3 + 4} + 3$

20)  $\frac{45}{8(5 - 4) - 3}$

21)  $8 \times \frac{15}{5} - (5 + 9)$

22)  $2^3 \times 7 - \frac{10}{9 - 4}$

23)  $(10 + 2^4 - 2) \times 6 - 1$

24)  $\frac{49}{7} \times \frac{60}{2 \times 5}$

25)  $(2 + 6 \times 2 + 2 - 4) \times 2$

26)  $\frac{8}{5 - 1} \times (3 + 6) \times 3$