Regina

Summer Math Review

For students who

will be taking

Pre-Algebra

Completed review packet is

due the first day of classes.

Pre-Algebra Summer Review Packet

Welcome to Pre-Algebra!

This packet is designed to strengthen the skills you learned so you are ready to apply them in Pre-Algebra. It is important that you are ready with these skills as they are necessary for success in Pre-Algebra. Having these skills mastered will help you be able to focus on the new Pre-Algebra materials as they are presented. If you need more practice in any of the skills listed, Kahn Academy, You Tube, and math.com are resources available to you online.

The materials are separated into sections so you can work a little at a time if you wish. This will help your math skills stay sharp all summer and you will be ready for the first topic in Pre-Algebra.

SHOW YOUR WORK. THESE ARE NOT CALCULATOR PROBLEMS. YOU WILL BE EXPECTED TO DO THESE KINDS OF PROBLEMS IN CLASS WITHOUT CALCULATORS.

<u>Finish this packet and bring it with you the first day of classes.</u>

Section 1: Numbers, Variables, and Expressions

Section 2: Rounding

Section 3: Comparing Numbers and Ordering

Section 4: Converting Between Decimals and Fractions

Section 5: Adding and Subtracting Integers

Section 6: Multiplying and Dividing Like and Unlike Fractions

Section 7: Adding and Subtracting Like and Unlike Fractions

Section 8: Common US Measures

Section 9: Graphing in the Coordinate Plane

Materials needed for Pre-Algebra:

- Scientific Calculator (TI-30xIIS preferred)
- Accordion Folder Pocket/Binder for Math only
- Pencils

Section 1: Numbers, Variables, and Expressions

Use the order of operations to evaluate expressions:

Step 1: Simplify the expressions inside grouping symbols

Step 2: Calculate any exponents

Step 3: Do all multiplications and/or divisions as they occur reading from left to right

Step 4: Do all additions and/or subtractions as they occur reading from left to right

Examples:

$6 \cdot 5 - 10 \div 2$

$= 30 - 5$ Multiply and Divide

$= 6$ Subtract

$4(3 + 6) + 2 \cdot 11$

$= 4(9) + 2 \cdot 11$ Simplify inside parentheses

$= 36 + 22$ Multiply

$= 58$ Add

Practice:

1. $6 + 3 \cdot 9$
2. $26 - 4 + 9$
3. $2(6 + 2) - 12 \div 4$
4. $3\{(2 + 7) \div 9\} - 3$
5. $22 \div 11 \cdot 6$
6. $\dfrac{67+13}{34-29}$
7. $8 \cdot 7 - 100 \div 5$
8. $22 \div 11 + 9$

An algebraic expression is a combination of variables, numbers, and at least one operation. To evaluate an algebraic expression, replace the variable(s) with numbers and follow the order of operations.

Examples. Evaluate each expression if r = 6 and t = 2

8t – 2r =
= 8(2) – 2(6)   substitute in the values
= 16 – 12   multiply
= 4   subtract

3(r – t)=
= 3(6 – 2)   substitute in values
= 3(4)   math inside parentheses
= 12   multiply

Practice: Evaluate each expression if x = 10, y = 5, and z = 1

1. $x + y - z =$

2. $\dfrac{x}{y} =$

3. $2x + 4z =$

4. $xy + z =$

5. $x(2 + z) =$

6. $\dfrac{x+y}{z} =$

Translate a phrase into an algebraic expression.

Remember the math words that stand for operations:

Sum means Add	Product means Multiply	Difference means Subtract
Quotient means Divide	More means Add	Less means Subtract
Taller means Add	Shorter means Subtract	Times means Multiply

Examples:

The sum of 8 and 12 means 8 + 12

The difference between 20 and 9 means 20 − 9

The product of 5 and 7 means 5·7

The quotient of a number and 4 means x ÷ 4

Practice: (use x for any unknown value)

1. Eight inches taller than my height

2. Twelve more than four times five

3. The difference of sixty and twenty

4. Three times the number

5. Eleven less than twenty

6. The quotient of sixty-four and eight

7. Twenty-five increased by six

8. The product of seven and twelve

Section 2: Rounding

Rounding is another important skill. There will be times when our calculations include more decimal places than we care to use. In that case, we will round to the nearest place given.

The general method for rounding to the nearest is:

Find the place value you want (the "rounding digit") and look to the digit just to the right of it.

      A. If that digit is less than 5, do not change the "rounding digit" but change all digits to the right of the "rounding digit" and before the decimal point to zero.

      B. If that digit is greater than or equal to 5, increase the "rounding digit" by one. Any digits between that digit and the decimal point become zero.

Examples:

Round 12,543 to the nearest thousand.

2 is in the thousands place. 5 is the digit just right of the thousands place. Our rule tells us to raise the 2 to a 3.

12,543 rounded to the nearest thousand is 13,000.

Round 12,543 to the nearest hundred.

5 is in the hundreds place. 4 is the digit just right of the hundreds place. Our rule tells us to leave the 5.

12,543 to the nearest hundred is 12,500

If we are rounding to a decimal place less than one, we will follow the same rule, but drop all of the digits after the rounding place .

Round 45.173 to the nearest tenth.

The tenths digit is 1. Just to the right of the 1 is a 7. Raise the 1 to a 2.

45.173 rounded to the nearest tenth is 45.2

Try these:

Round to the nearest tenth:

1. 90.839
2. 1.98635
3. 238.098
4. 0.17695

Round to the nearest ten:

5. 1,085.7
6. 567.3
7. 9,036
8. 709.807

Section 3: Comparing Numbers and Ordering

Sometimes it is important to know which value is larger or smaller than others. To order numbers from largest to smallest or smallest to largest, first line the numbers up so you can compare all of the place values filled.

Ex. Order these numbers from largest to smallest: 0.5, 0.24, 0.117, 0.1, 0.62

Line them up so you compare digits by place value.

0.5
0.24
0.117
0.1
0.62

Now fill the empty place values with zeros so the same number of places are filled for each number and think of the "official" way to read each number.

0.500 = *500 thousandths*
0.240 = *240 thousandths*
0.117 = *117 thousandths*
0.100 = *100 thousandths*
0.620 = *620 thousandths*

Now we place them from largest to smallest
0.620 = *620 thousandths*
0.500 = *500 thousandths*
0.240 = *240 thousandths*
0.117 = *117 thousandths*
0.100 = *100 thousandths*

Correct order is: 0.62, 0.5, 0.24, 0.117, 0.1

Practice by ordering the numbers in each group from largest to smallest.

1. 0.17, 0.2, 0.03, 0.149

2. 1.3, 1.08, 1.4, 1.25, 1.2

3. 0.41, 1.14, 1.04, 0.14

4. 0.8, 0.08. 0.18, 0.10

5. 21.09, 21.8, 21.16, 20.8

Section 4: Converting between Decimals and Fractions

At times it is more convenient to write all numbers less than one as decimals.

To convert from fraction format to decimal format, remember that the bar in the fraction acts like a division sign. You simply divide numerator (top of the fraction) by denominator (bottom of the fraction).

Sometimes your fraction converts to a decimal that terminates (ends). Those numbers can be represented either as decimals or as fractions with no difference in value.

Sometimes your fraction repeats when changed to a decimal. It is usually best to keep that number written as a fraction because the decimal value is not exactly the same as the fraction value.

Examples:

1. $1/2 = 1 \div 2 = 0.5$

2. $4/9 = 4 \div 9 = 0.\overline{4}$

If your number is a mixed number, keep the whole number part and just divide the fraction part.

Examples:

1. $3\frac{5}{8} = 3 + 5 \div 8 = 3.625$

2. $11\frac{2}{3} = 11.\overline{6}$

Write these numbers as decimals.

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

2. $\frac{5}{12} =$

3. $\frac{7}{16} =$

4. $\frac{35}{42} =$

5. $12\frac{1}{4} =$

6. $57\frac{3}{8} =$

7. $3\frac{4}{15} =$

8. $846\frac{9}{11} =$

To change from decimal format to fraction format, use the place values to tell you what to write.

Example: 3.25 is three and twenty-five hundredths so write it as $3\frac{25}{100}$ and then simplify. $3.25 = 3\frac{1}{4}$

Write these decimals as fractions or mixed numbers in simplest form.

1. $2.7 =$

2. $9.34 =$

3. $11.5 =$

4. $0.75 =$

5. $0.004 =$

6. $0.133 =$

7. $8.3 =$

8. $93.07 =$

Section 5: Adding and Subtracting Integers

Adding integers with the same sign, add their absolute values and give the result the same sign as the integers.

Example: find the sum of -3 + (-4);   -3 + (-4) = -7

Adding integers with different signs, subtract out the 1 + (-1) pairs and the result is what is left.

Example: find the sum of -5 + 4; there are 4 pairs of 1 + (-1) which add to zero. There is a -1 that didn't have a 1 to add to it so the result is -1. -5 + 4 = -1

Example: find the sum of -8 and 11; there are 8 pairs of 1 + (-1) which add to zero. There are 3 ones left so the result is 3. -8 + 11 = 3

Practice: Find each sum.

1.   6 + (-3) =
2.   -4 + (-4) =
3.   20 + (-8) =
4.   -18 + (-5) =
5.   -14 + 25 =

6. -12 + (-10) =
7. -8 + 5 =
8. 9 + 11 =
9. 43 + (-11) =
10. -30 + 12 =

Subtracting integers: To subtract an integer, add its additive inverse (opposite).

Examples:

1.   -4 – 6 is the same as -4 + (-6). We changed the subtraction to adding the opposite of -6.

     -4 + (-6) = -10

2. 8 – (-5) is the same as 8 + 5. We changed the subtraction to adding the opposite of -5.

     8 – (-5) = 8 + 5 = 13

3. 6 – 10 is the same as 6 + (-10). We changed the subtraction to adding the opposite of 10.

     6 – 10 = 6 + (-10) = -4

Practice. Make sure to show how you changed subtraction to adding the opposite.

1.   12 – (-8) =
2. -14 – 4 =
3. 24 – (-12) =
4. -6 – (-9) =
5.   17 – (-9) =

6. -13 – 17 =
7. -10 – (-6) =
8. 26 – 49 =
9. 8 – (-6) =
10. -9 – 7 =

Section 6: Multiplying and Dividing Like and Unlike Fractions

To multiply fractions, multiply the numerators and multiply the denominators. Simplify either before or after multiplying.

Example: $\frac{8}{15} \cdot \frac{5}{9} = \frac{40}{135} = \frac{8}{27}$ or $\frac{8}{15} \cdot \frac{5}{9} = \frac{8}{3} \cdot \frac{1}{9} = \frac{8}{27}$

If the numbers are mixed numbers, write them as improper fractions and then multiply.

Example: $7\frac{1}{2} \cdot 2\frac{2}{3} = \frac{15}{2} \cdot \frac{8}{3}$ simplify first: $\frac{15}{2} \cdot \frac{8}{3} = \frac{5}{1} \cdot \frac{4}{1} = 20$

Practice: find each product. Show your steps. Write all answers in simplest form.

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

2. $\frac{4}{5} \cdot \frac{5}{8} =$

3. $\frac{7}{9} \cdot \frac{11}{20} =$

4. $\frac{8}{9} \cdot \frac{5}{16} =$

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

6. $1\frac{5}{7} \cdot 10\frac{1}{2} =$

7. $2\frac{1}{8} \cdot 4\frac{4}{7} =$

8. $4\frac{4}{5} \cdot 1\frac{1}{6} =$

9. $6 \cdot \frac{2}{3} =$

10. $1\frac{1}{2} \cdot \frac{4}{15} =$

To divide fractions, multiply by the reciprocal. There are two changes that happen in the set-up. First the division sign becomes multiplication, then we take the reciprocal (flip) the fraction after the division sign.

Any mixed numbers should be changed to improper fractions as the first step. Then change to multiplying by the reciprocal.

**Only simplify after changing to multiplying by the reciprocal. **

Example: $\frac{3}{4} \div \frac{5}{8} = \frac{3}{4} \cdot \frac{8}{5} = \frac{24}{20} = \frac{6}{5}$

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

2. $\frac{4}{5} \div \frac{3}{10} =$

3. $\frac{7}{9} \div \frac{14}{15} =$

4. $\frac{8}{9} \div \frac{4}{27} =$

5. $\frac{2}{5} \div 5 =$

6. $1\frac{5}{7} \div 10\frac{1}{2} =$

7. $2\frac{1}{8} \div 4\frac{1}{4} =$

8. $4\frac{4}{5} \div 1\frac{1}{5} =$

9. $6 \div \frac{2}{3} =$

10. $1\frac{1}{2} \div \frac{4}{15}$

Section 7: Adding and Subtracting Like and Unlike Fractions

To add or subtract fractions with like denominators, add or subtract the numerators and write the sum or difference over the denominator.

Example $1\frac{2}{9} + 3\frac{4}{9}$ add the whole numbers, add the fractions, combine and simplify

$1 + 3 = 4$ and $\frac{2}{9} + \frac{4}{9} = \frac{6}{9} = \frac{2}{3}$ so the sum is $4\frac{2}{3}$

It is often easier when subtracting to write the mixed numbers as improper fractions and then subtract.

Example: $7\frac{1}{3} - 5\frac{2}{3} = \frac{22}{3} - \frac{17}{3} = \frac{5}{3} = 1\frac{2}{3}$

Practice: Find each sum or difference. Write answers in simplest form.

1. $\frac{11}{12} + \frac{9}{12} =$

2. $\frac{19}{20} - \frac{17}{20} =$

3. $3\frac{7}{8} - 4\frac{5}{8} =$

4. $9\frac{2}{5} - 6\frac{3}{5} =$

5. $\frac{13}{15} + \frac{7}{15} =$

6. $\frac{23}{25} - \frac{8}{25} =$

7. $9 + 4\frac{3}{7} =$

8. $4\frac{11}{12} - 3\frac{7}{12} =$

Adding and subtracting fractions with different denominators. First rename the fractions with a common denominator, then add or subtract and simplify.

Example: $\frac{4}{7} + \frac{1}{3} = \frac{4}{7} \cdot \frac{3}{3} + \frac{1}{3} \cdot \frac{7}{7} = \frac{12}{21} + \frac{7}{21} = \frac{19}{21}$

Find each sum or difference:

1. $\frac{8}{9} + \frac{2}{5} =$

5. $\frac{7}{15} - \frac{3}{10} =$

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

6. $\frac{5}{8} - \frac{1}{4} =$

3. $3\frac{7}{10} - 2\frac{3}{5} =$

7. $9\frac{1}{4} - 4\frac{3}{7} =$

4. $9\frac{2}{3} - 6\frac{3}{4} =$

8. $4\frac{1}{3} - 3\frac{7}{10} =$

Section 8: Common US Measures

These common US Measures should be memorized.

1 week = 7 days

1 year = 365 days

1 year = 52 weeks

1 year = 12 months

1 foot = 12 inches

1 yard = 3 feet

1 yard = 36 inches

1 mile = 5280 feet

1 pound = 16 ounces

1 ton = 2000 pounds

1 gallon = 4 quarts

1 quart = 2 pints

1 pint = 2 cups

1 cup = 8 ounces

Section 9: Graphing in the Coordinate Plane

When locating points on a coordinate plane, we use a pair of values called coordinates to tell us where to place the point. The coordinates are written this way: (x , y) where the x-value tells us how many spaces horizontally to travel away from the origin and the y-value tells us how many spaces vertically to travel away from the origin. The coordinates A(-3, 5) mean to go 3 spaces left of the origin and then 5 spaces up. Mark the point and call it A.

1. Graph the following points on the coordinate grid provided. Mark each point with the letter given.
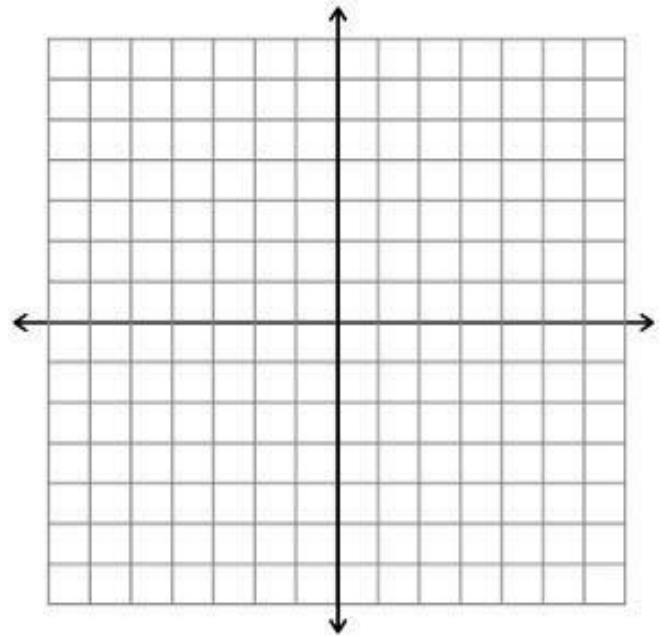
A(-2, 3)

B(5, -7)

C(0, 4)

D(1, 6)

E(-4, -5)

F(-1, 0)

G(3, -3)

2. Use at least 6 points to mark points that form your initial when connected. Make sure you place points in all four sections (quadrants) of the graph. Name the points chosen like in question 1 and write the coordinates. Add more points below those listed if needed.

A(_____, _____)

B(_____, _____)

C(_____, _____)

D(_____, _____)

E(_____, _____)

F(_____, _____)