Regina

Pre-Algebra

Summer Math Review

In the following pages, you will find review materials that will prepare you for next year's math course. Please take the exercises seriously as this will allow us to hit the ground running in the fall. These skills have already been taught and are necessary for success. If the examples preceding the practice problems are not enough of a reminder of a concept, please remember that Kahn Academy, YouTube, and math.com are very useful resources!

The review materials are separated into sections. Doing one section a week is only a suggestion. You will have the most benefit from this material if you work on it throughout the summer and do a final review of your work a week or two before school starts. This packet is due the first day of school.

Your completion of the packet will be recorded. It is not okay to skip sections where you are weak. Those are the skills you need to strengthen over the summer. You will be assessed on these skills during the first two weeks of school. Exact assessment dates will be announced by your teacher.

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 PreAlgebra. It is important that you are ready with these skills as they are necessary for success in PreAlgebra. 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.

Finish this packet and bring it with you the first day of classes.

Section 1: Numbers, Variables, and Expressions

Section 2: Adding and Subtracting Integers

Section 3: Simplifying Algebraic Expressions

Section 4: Solving One-Step Equations

Section 5: Multiplying and Dividing Rational Numbers

Section 6: Adding and Subtracting Like and Unlike Fractions

Section 7: Using Proportions (You may use calculators on this activity, but show your steps)

Section 8: Graphing in the Coordinate Plane

Materials needed for Pre-Algebra:

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

All Practice Activities courtesy of Viewpoint Middle School Web site.

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. $\frac{67+13}{34-29}$
7. 8. $8 \cdot 7 - 100 \div 5$

An $22 \div 11 + 9$ 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. $\frac{x}{y}$ =
3. $2x + 4z =$
4. $xy + z =$
5. $x(2 + z) =$
6. $\frac{x+y}{z}$ =

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: 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 3: Simplifying Algebraic Expressions

Important vocabulary:

Term: a number, a variable, or a product of numbers and variables (like 3x, -4n, 27, 8xy)
Coefficient: the numerical part of a term that also includes a variable (like 3, -4, and 8 above)
Constant: a term without a variable (like 27 above)
Like terms: terms that contain exactly the same variable (like 3x and 7x, y and -1/2y, 4xy and -8xy)
Expression: a group of terms without an equal sign (like 3x + 4)

To simplify an expression, combine all like terms. It is helpful to change all subtraction to adding the opposite before trying to combine like terms. When an algebraic expression has no like terms and no parentheses, we say it is in simplest form.

Example: Simplify 6x – 5 – 2x + 7

First change subtraction to adding the opposite: 6x + (-5) + (-2x) + 7
Now we can move like terms together: 6x + (-2x) + (-5) + 7
Now combine like terms: 6x + (-2x) = 4x, and (-5) + 7 = 2
So 6x – 5 – 2x + 7 simplifies to 4x + 2

Practice:
Simplify each expression

1. 9m + 3m
2. 5x – x
3. 8y + 2y + 5y
4. 4 + m – 3m
5. 10 – 4x + 2x – 3
6. 13n + 7n + 2n
7. 3y + 1 + 5 + 4y
8. 8x – 4 – x + 5
9. 5h – 3g + 2g – h
10. M + 4m + 2m + 7

Section 4: Solving One-Step Equations

In solving any equation we want to "undo" any math that puts numbers with the variable whose value we want. We always look to see what math is used in the equation and use the inverse operation to isolate the variable.

For example: x + 5 = 13

We want the x by itself, but there is a 5 with it connected by addition. If we subtract 5 from each side, that will get the x by itself as we want.

x + 5 = 13
-5 -5 x
= 8

We can always check to see if we have found the correct answer by substituting the value we found in for the variable and seeing if both sides of the equation have the same value.
Check: 8 + 5 = 13, 13 = 13 so we have the correct solution.

To solve x – 11 = 15, we would add 11 to both sides of the equation

x – 11 = 15
+ 11 + 11
x = 26 check: 26 – 11 = 15 Yes!

To solve 3x = 21, divide both sides of the equation by 3 getting x = 21

To solve x ÷ 8 = 4, multiply both sides of the equation by 8 getting x = 32

Practice. Show your steps and check. Use additional paper if needed.

1. t + 5 = 14
2. n – 24 = 81
3. t + 19 = 215
4. 2n = 25
5. 3x = 123
6. 1 1y = 132
7. n ÷ 10 = 27
8. y – 128 = 208
9. x/7 = 8
10. x + 14.9 = 37.2

Section 5: Multiplying and Dividing Rational Numbers

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

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

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

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

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

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

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

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

Section 7: Using Proportions (You may use calculators on this activity, but show your steps)

A proportion is an equation stating that two ratios are equal. You can use cross products to solve a proportions

Example: Solve the proportion $\frac{14.1}{x} = \frac{3}{4}$

Step 1 write the cross products: 14.1(4) = 3x

56.4 = 3x divide both sides by 3

18.8 = x

Solve each proportion:

1. $\frac{x}{9} = \frac{16}{12}$

2. $\frac{m}{12} = \frac{1}{10}$

3. $\frac{22}{x} = \frac{121}{16.5}$

4. $\frac{0.3}{n} = \frac{4.75}{14.25}$ =

5. $\frac{2}{5} = \frac{k}{15}$ =

6. $\frac{36}{21} = \frac{24}{n}$

7. $\frac{1}{y} = \frac{4.5}{11.7}$

8. $\frac{2}{3} = \frac{k}{21}$

9. $\frac{x}{33.44} = \frac{1}{3.2}$

10. $\frac{3.5}{2} = \frac{d}{80}$

Section 8: 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)

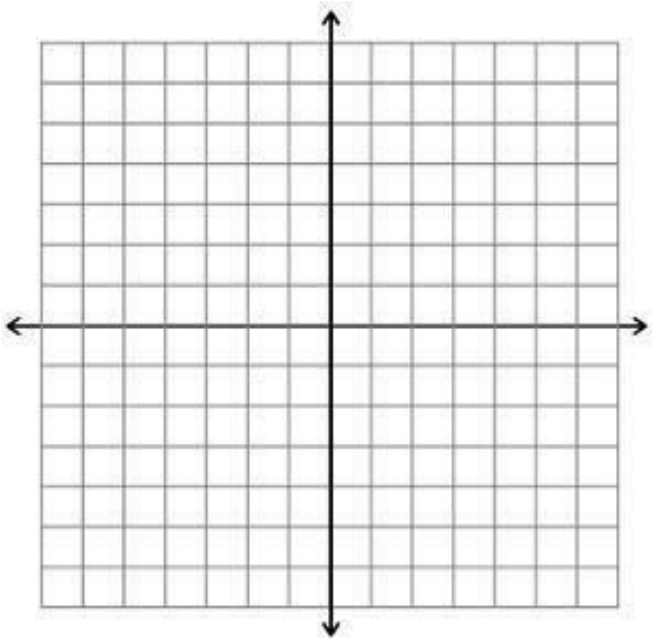
C(0, 4)

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(_____, _____)