



Math 8 - Algebra Summer Packet

Name: _____

Team: _____

**Luther Jackson MS
3020 Gallows Road
Falls Church, VA 22042**

Due on Friday, September 11, 2009

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Dear students,

The mathematics department at Luther Jackson Middle School happily anticipates your arrival in the fall! In preparation for school in September, all rising Math 8 and Algebra students **MUST** complete this packet designed to keep you sharp for our year ahead.

It is suggested that you complete one section per week during the summer, and you will find that you breeze through math next year!

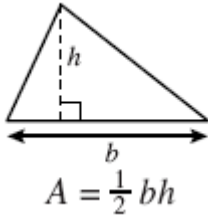
This packet is **REQUIRED** and will count as your first **QUIZ GRADE** for the first quarter, and should be turned in on **Friday, September 11, 2009**. Be sure to do your best!

Best wishes for a happy, healthy, safe, and educational summer! Enjoy your time off, and we look forward to meeting you in the fall!

Sincerely,
The Math Department
Luther Jackson Middle School

POPULAR GEOMETRIC FORMULAS

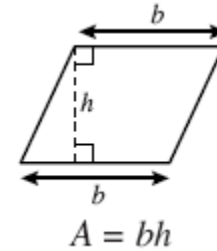
ABC'S OF THE FORMULAS:



A = area

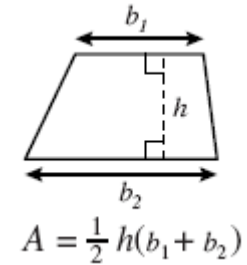
b = length of base

b_1 = length of base 1 in a trapezoid
 b_2 = length of base 2 in a trapezoid



C = circumference

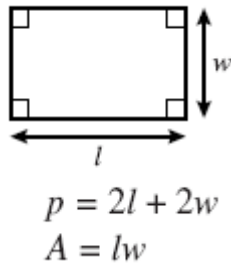
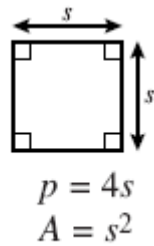
h = height (wherever it makes a right angle)



l = length of side

p = perimeter

r = radius (remember the radius is half of the diameter)

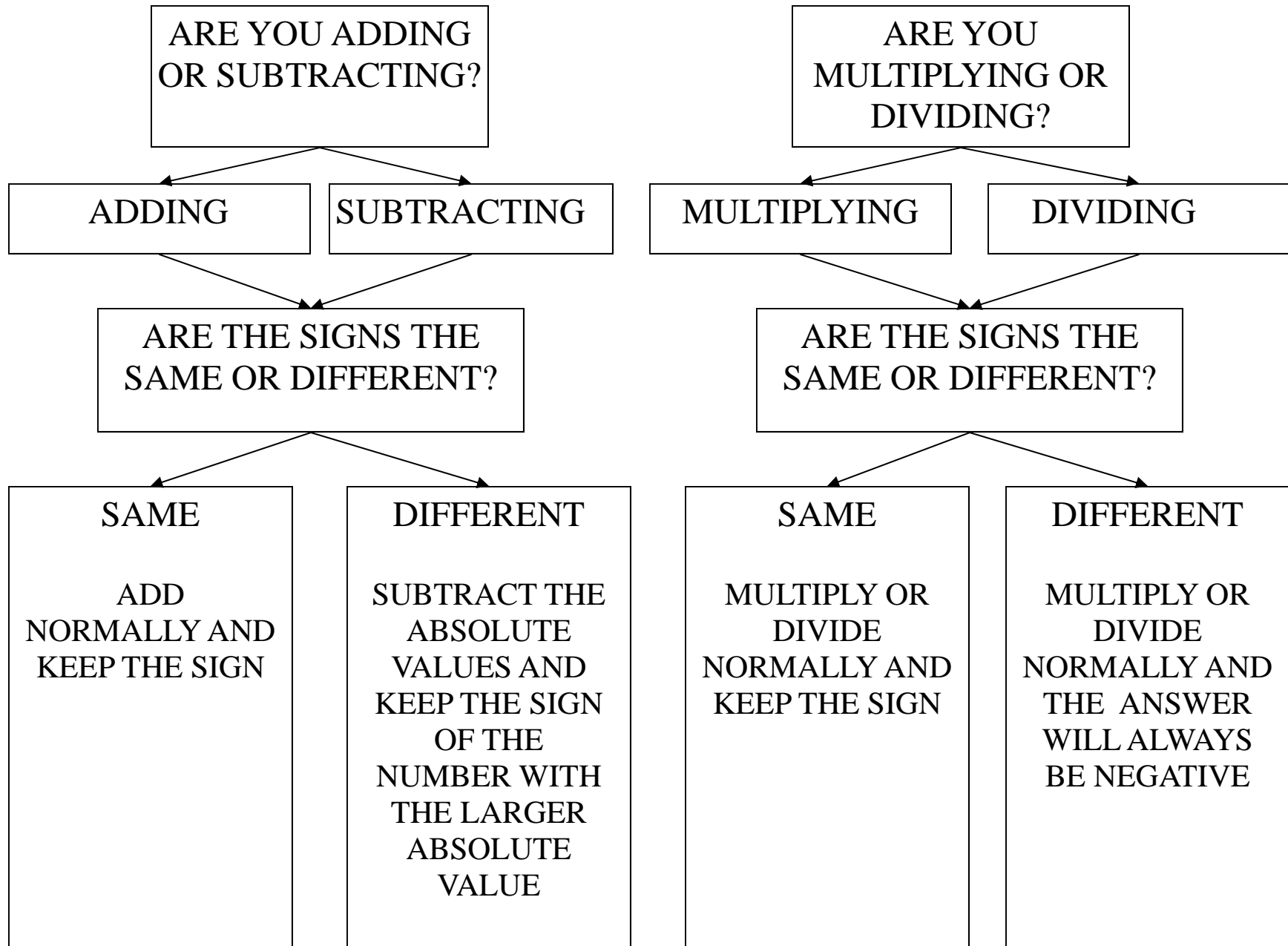


s = length of side of square

w = width of side



Integer Operations



Monday

Find the sum of the following:

$$-6 + -9 =$$

$$+7 + +11 =$$

$$+5 + -3 =$$

$$-2 + +7 =$$

Wednesday

Perform the following operations:

$$-2(-3) =$$

$$2(3) =$$

$$-8 \div (-4) =$$

$$8 \div 4 =$$

Friday

Try some more!

$$(-24) + (-3) =$$

$$(-100) - 25 =$$

$$12 + (-4) =$$

$$-6 - (-5) =$$

$$(-10) \div 2 =$$

$$(-56) \div 9 =$$

$$(40) \div -8 =$$

$$(-3) \times (-2) \times (-1) =$$

Tuesday

Subtract the following:

$$7 - 4 =$$

$$-12 - 7 =$$

$$1 - 5 =$$

$$5 - (-12) =$$

$$18 - (-4) =$$

Thursday

Perform the following operations:

$$-4(-9) =$$

$$32(4) =$$

$$80 \div (-40) =$$

$$18 \div -9 =$$

Fractions to decimal

numerator \div denominator

Fraction to percent

numerator \div denominator \cdot 100

Decimal to fractions

Move the decimal point 2 places to the right and place over 100; simplify

Decimal to percent

decimal \cdot 100

Percent to fraction

Numerator is the numbers in the percent; the denominator is 100; simplify

Percent to decimal

Percent \div 100

Fractions, Decimals, & Percents

Examples:

Fraction to decimal

$$\frac{1}{5} = 1 \div 5 = .20$$

Fraction to percent

$$\frac{2}{5} = 2 \div 5 \cdot 100 = 40\%$$

Examples:

Decimal to fraction

$$.84 = \frac{84}{100} = \frac{21}{25}$$

Decimal to percent

$$.76 = .76 \cdot 100 = 76\%$$

Examples:

Percent to fraction

$$45\% = \frac{45}{100} = \frac{9}{20}$$

Percent to decimal

$$28\% = 28 \div 100 = .28$$

Monday

Express 3.25 % as a decimal.

Express 32.5 % as a decimal.

Express 325 % as a decimal.

Wednesday

Express 46 % as a fraction.

Express 0.8 as a fraction.

Express 90 % as a fraction.

Tuesday

Express 0.375 as a percent.

Express 0.28 as a percent.

Express 1.35 as a percent.

Thursday

Express $\frac{2}{5}$ as a percent.

Express $\frac{1}{100}$ as a percent.

Express $\frac{56}{1000}$ as a percent.

Friday

Convert the following most commonly used fractions, decimals, and percents:

Fractions	Decimals	Percents
$\frac{1}{5}$		
	0.25	
		100%
	0.5	
$\frac{1}{3}$		
	0.75	
		10%
	0.1	
$\frac{1}{8}$		

Adding/Subtracting Fractions

- 1 Find a common denominator.
- 2 Compute the new numerator for each fraction
- 3 Add or subtract the numerator and place it over the common denominator
- 4 Simplify

Example:

$$\frac{3}{5} - \frac{1}{4} = \frac{3 \cdot 4}{5 \cdot 4} - \frac{1 \cdot 5}{4 \cdot 5} = \frac{12}{20} - \frac{5}{20} = \frac{7}{20}$$

But how do I find a common denominator?

Simply, list the multiples of each denominator (multiply by 2, 3, 4, etc.), and then look for the smallest number in each list.

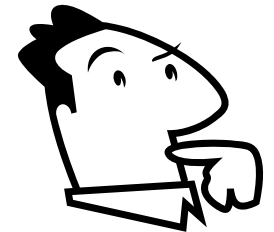
For example, $1/5 + 1/6$

Multiples of **5** are 10, 15, 20, 25, **30**, 35, 40,...

Multiples of **6** are 12, 18, 24, **30**, 36, 42, 48,...

So, the smallest, the common denominator, is 30!

Fractions



Multiplying Fractions

- 1 Multiply the numerators to get the new numerator (straight across); HINT: make sure the fractions are improper before multiplying
- 2 Multiply the denominators to get the new denominator (straight across)
- 3 Simplify

Example:

$$4 \frac{2}{7} \cdot \frac{1}{2} = \frac{30}{7} \cdot \frac{1}{2} = \frac{30}{14} = \frac{15}{7}$$

Dividing Fractions

Remember: Keep, Change, Flip!!!

- 1 Keep the first fraction the same
- 2 Change the division sign to a multiplication sign
- 3 Flip the second fraction. This is called the reciprocal
- 4 Multiply the two fractions (straight across)
- 5 Simplify

Example:

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

Monday

Add the following fractions:

$$\frac{1}{5} + \frac{1}{3}$$

$$\frac{6}{11} + \frac{3}{2}$$

$$\frac{7}{8} + \frac{3}{4}$$

Wednesday

Multiply the following fractions:

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

$$\frac{1}{3} \cdot \frac{1}{6}$$

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

Friday

Complete the following operations
(Remember, it is okay to have a
fraction for an answer!):

$$\frac{1}{6} + \frac{2}{5}$$

$$\frac{6}{11} \cdot \frac{3}{2}$$

$$\frac{7}{8} \div \frac{3}{4}$$

$$9\frac{1}{3} \div \frac{7}{9}$$

$$\frac{12}{5} \cdot 2\frac{2}{3}$$

$$\frac{20}{3} - \frac{5}{6}$$

Tuesday

Subtract the following fractions:

$$\frac{1}{3} - \frac{1}{5}$$

$$\frac{3}{4} - \frac{1}{2}$$

$$\frac{7}{8} - \frac{3}{4}$$

Thursday

Divide the following fractions:

$$\frac{1}{3} \div \frac{3}{4}$$

$$\frac{5}{7} \div \frac{10}{15}$$

$$4\frac{2}{7} \div \frac{2}{5}$$

Numeric and Algebraic Expressions

ORDER OF OPERATIONS

When simplifying expressions, it is important to **ALWAYS** use order of operations. You should always start at the top and work your way down. If you do not have a category, just keep going, and be sure to show your work **ALWAYS!**

GROUPING SYMBOLS

If you have parentheses, start by simplifying inside of them. Always work from the inside to the outside.

EXPONENTS

If you have exponents, now is the time you should simplify them. Remember 3^2 equals $3 \cdot 3$, NOT $3 \cdot 2$!

DIVISION AND MULTIPLICATION

If you have division or multiplication, you should perform the operation from LEFT TO RIGHT. If you have $3 \cdot 4 / 6$, you should multiply $3 \cdot 4$ before you divide by 6. If you have $4 / 2 \cdot 7$, you should divide $4 / 2$ before you multiply by 7.

SUBTRACTION AND ADDITION

If you have subtraction or addition, you should perform the operation from LEFT TO RIGHT. If you have $3 + 4 - 6$, you should add $3 + 4$ before you subtract 6. If you have $4 - 2 + 7$, you should subtract 2 before you add 7.

COMBINING LIKE TERMS

TERMS are separated by + and - signs.

$$3a + 6b - 2c^2 + 5$$

There are 4 terms in this expression: $3a$, $6b$, $-2c^2$, and 5

LIKE TERMS have the SAME variable and the EXPONENT of the variable is the SAME number.

$$5a + 7b - 3a + 2a^2 + 4b$$

How many terms are there? 5

Which terms can you combine? 5a with -3a, 7b with 4b

(Color code or underline the terms that are alike.)

Simplify: $2a + 11b + 2a^2$

EXPONENTS

Exponents are shorthand for multiplication: $(5)(5) = 5^2$ and $(5)(5)(5) = 5^3$

The EXPONENT stands for however many times the thing is being multiplied.

The thing that's being multiplied is called the BASE.

$$5^3$$

5^3 is read "five, raised to the third power" or "five cubed".

But with VARIABLES, we need the EXPONENT, because we'd rather deal with " x^6 " than with "xxxxxx".

For example, $t \cdot t \cdot t = t^3$ and $3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$

Monday

Simplify by combining like terms

$$6a + 2a = \underline{\hspace{2cm}}$$

$$x + 9x + 3 = \underline{\hspace{2cm}}$$

$$9y + 8 - 8 = \underline{\hspace{2cm}}$$

$$6c + 4 + c + 8 = \underline{\hspace{2cm}}$$

$$3x + y - 2x = \underline{\hspace{2cm}}$$

$$5x - 3 - 8x + 7 = \underline{\hspace{2cm}}$$

Wednesday

Simplify by combining like terms

$$6a + 2a = \underline{\hspace{2cm}}$$

$$r + 7(r + 1) = \underline{\hspace{2cm}}$$

$$-7 + 6(2 - y) = \underline{\hspace{2cm}}$$

$$5 + 6x^2 - 2x^2 - 6y + 3y =$$

$\underline{\hspace{2cm}}$

Friday

Simplify:

$$(8 \div 2 + 1) + 2(6 \times 2 + 1)$$

Try another one!

$$5 + -1 \times 3^3 - 5^2$$

Tuesday

Write each expression using exponents and then simplify.

$$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = \underline{\hspace{2cm}}$$

$$t \cdot t \cdot t = \underline{\hspace{2cm}}$$

$$(-8)(-8) = \underline{\hspace{2cm}}$$

$$7 \cdot a \cdot a \cdot a \cdot b \cdot b = \underline{\hspace{2cm}}$$

$$2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x = \underline{\hspace{2cm}}$$

Thursday

Simplify:

$$4(8) + 5(6 + 1)$$

Try another one!

$$-3(1 + 4) \div 5 + 2 \times 2^3 - 7^2$$

And another!

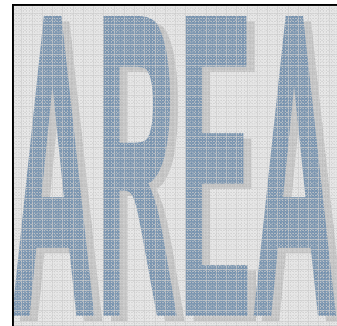
$$\frac{9 - (4^2 \cdot 2)}{3}$$

Area, Perimeter & Circumference



The **perimeter** is the total distance around the outside of a 2D shape. You calculate it by adding together all of the sides of the shape or using a formula if it makes it easier! See the scroll to the right for an example...

Area is the amount of surface a 2D shape covers. It is measured in square units. See the scroll to the right for an example...



Circles are special simply because they are round and involve a mathematicians favorite number—pi!

Since they are so special, the perimeter of a circle has a special name, **circumference**. The formula for circumference is

$$C = 3.14 \times (\text{radius})^2.$$

The units for circumference are the same as perimeter. And, why wouldn't we want to use this snazzy formula if we only have to measure the distance around the outside... Rulers aren't round!

**ATTENTION, ATTENTION!
EVERY PROBLEM LOOKS THE
SAME!**

BUT HOW IS THIS POSSIBLE?
FOLLOW THESE 4 EASY STEPS:

1. COPY DOWN THE CORRECT FORMULA
2. REPLACE THE VARIABLES WITH THE KNOWN VALUES
3. SIMPLIFY AND SOLVE USING ORDER OF OPERATIONS
4. WRITE ANSWER WITH CORRECT UNITS (METERS, FEET, ETC...)

EXAMPLE—FIND THE PERIMETER AND THE AREA OF THE FIGURE

5 IN



11 IN

PERIMETER

STEP 1: $P = 2l + 2w$

STEP 2: $P = 2(11) + 2(5)$

STEP 3: $P = 22 + 10$

STEP 4: $P = 32$ INCHES

AREA

STEP 1: $A = lw$

STEP 2: $A = (11)(5)$

STEP 3: $A = 55$

STEP 4: $A = 55$ IN²

HOORAY!

Monday

Find the area and perimeter of a rectangle with a length of 4 feet and width of 5 feet.

A =

A =

A =

P =

P =

P =

Wednesday

Find the area and circumference of a circle with a radius of 10 meters.

A =

A =

A =

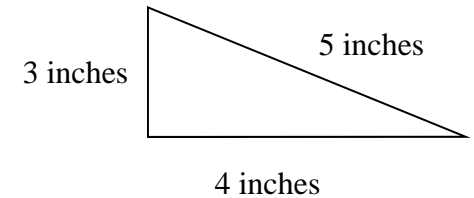
C =

C =

C =

Friday

Find the area and perimeter of the following shapes:



Tuesday

Find the area and perimeter of a square with a sides of 15.6 miles.

A =

A =

A =

P =

P =

P =

P =

Thursday

Find the area of a trapezoid with two bases of 3 inches and 7 inches and a height of 4 inches.

A =

A =

A =

A =

