

**8th Grade Mathematics 2023-2024  
Dr. Rolando Espinosa K-8 Center**

**SUMMER PACKET**

**For ENTERING GRADE 8- PRE ALGEBRA**



This project will be due the first week of school and it will be graded. These are the concepts are expected to know coming into the 8<sup>th</sup> grade Pre-Algebra. Make sure that you show all your work for each question. You should complete the entire packet **without** the use of **a calculator**. No credit will be given to any question(s) you answer without showing work. **Please use pencil only** and remember:

**NO WORK = NO CREDIT**

Name: \_\_\_\_\_

Teacher: \_\_\_\_\_ Period: \_\_\_\_\_

## Skill #1: Operations with Integers

Addition	Subtraction
<p>same signs? KEEP THEM!</p> $(+) + (+) = +$ $(-) + (-) = -$ <p>Different signs? Subtract the smaller # from the larger #</p> $(+) + (-) = +$ $(-) + (+) = -$ <p>Keep the larger sign</p>	<p>Keep the first number</p> <p>Change the subtraction to addition</p> <p>Change the sign of the second number</p> <p>then use the addition rules!</p>
Multiplication and Division	
<p>① Multiply or divide like normal</p> <p>② same signs? Answer is POSITIVE!</p> <p>③ Different signs? Answer is NEGATIVE!</p>	<p>If you love to love, you're a lover. <math>(+) \cdot (+) = +</math></p> <p>If you love to hate, you're a hater. <math>(+) \cdot (-) = -</math></p> <p>If you hate to love, you're a hater. <math>(-) \cdot (+) = -</math></p> <p>If you hate to hate, you're a lover. <math>(-) \cdot (-) = +</math></p>

\*\* Note: Try to do these WITHOUT a calculator first. Then use it to verify your answers.\*\*

Now try these problems

1.  $46 + (-13)$

2.  $-16 + (-2)$

3.  $-13 - (-16)$

4.  $13 - (-13)$

5.  $-12 (-5)$

6.  $\frac{30}{-15} =$

# Operations with FRACTIONS

## Addition

+

$$\frac{1}{4} + \frac{3}{8} =$$

If the denominators are different, first find a common denominator.

$$\left[\frac{1}{4} \times \frac{2}{2}\right] + \frac{3}{8} =$$

Then add or subtract the numerators.

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

The denominators stay the same.

## Subtraction

-

$$\frac{5}{6} - \frac{3}{4} =$$

If the denominators are different, first find a common denominator.

$$\left[\frac{5}{6} \times \frac{2}{2}\right] - \left[\frac{3}{4} \times \frac{3}{3}\right] =$$

Then add or subtract the numerators.

$$\frac{10}{12} - \frac{9}{12} = \frac{1}{12}$$

## Multiplication

×

Multiply the numerators.

$$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5}$$

Multiply the denominators.

Reduce.

## Division

÷

First, invert the divisor.

$$\frac{4}{5} \div \frac{5}{6} =$$

Multiply the numerators.

$$\frac{4}{5} \times \frac{6}{5} = \frac{24}{25}$$

Multiply the denominators.

Remember to Reduce!

For all operations, reduce or simplify when possible

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Now try these problems

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

2.  $\frac{5}{7} - \frac{2}{7}$

3.  $\frac{2}{4} \times \frac{1}{9}$

4.  $\frac{3}{7} + \frac{4}{5}$

## Skill #1: Simplifying Numerical Expressions

To simplify numerical expressions, you must follow order of operations.

# ORDER →

always work LEFT to RIGHT

**P**arentheses  $()$

**E**xponents  $x^3$

**PRACTICE:**

$$3 + 7 \times 6 \div 3 =$$

$$3 + 42 \div 3 =$$

$$3 + 14 =$$

17

$$(6 \times 4) \div 3 - 6 + 2 =$$

$$24 \div 3 - 6 + 2 =$$

$$8 - 6 + 2 =$$

$$2 + 2 =$$

4

$$2^2 \times 9 \div 3 =$$

$$4 \times 9 \div 3 =$$

$$36 \div 3 =$$

12

**M**ultiply  $\times$

OR  
**D**ivide  $\div$



P	Please	Parentheses
E	Excuse	Exponents
M	My	Multiply
D	Dear	Divide
A	Aunt	Addition
S	Sally	Subtraction

**A**ddition  $+$

OR  
**S**ubtraction  $-$

Now try these problems

1.  $7 + (6 \times 5^2 + 3)$

2.  $3 + 6 \times (5 + 4) \div 3 - 7$

3.  $(8 - 1) \times (5 - 4)$

4.  $9 - (3 - 8 + 4 \div (1 \times 1))$

5.  $(8 - 7) \times (2 + 1) + 1$

6.  $16 \div 2[8 - 3(4 - 2)] + 1$



### Skill #1: Distribution

#### The Distributive Property\*\*

**Definition:** For any numbers  $a$ ,  $b$ , and  $c$ ,

$$a(b + c) = ab + ac \text{ and } (b + c)a = ba + ca;$$

$$a(b - c) = ab - ac \text{ and } (b - c)a = ba - ca;$$

**Example:**

$$10(x + 2) = 10x + 10(2) = 10x + 20$$

### Skill #2: Combining Like Terms

#### Like Terms

Like terms have the same variables to the same power.

Like terms can be combined.

Like Terms	Unlike Terms
$2x, -5x$	$6x, 5y$
$a, \frac{1}{2}a$	$y, y^2$
$-2xy^2, 8xy^2$	$x, 7$

**\*\* Make sure to take a look at the signs!\*\***

$$8(x + 3) = 8x + 24$$

$$2x(5x - 7) = 10x^2 - 14x$$

$$-3(x^2 + 4x - 2) = -3x^2 - 12x + 6$$

**Combine like terms.**

**A.  $2x + 5x - 4y + 3$**

$$(2x + 5x) - 4y + 3$$

$$7x - 4y + 3$$

*Identify like terms.*

*Combine coefficients:  $2 + 5 = 7$*

**B.  $9d + 7c - 4d - 2c$**

$$(9d - 4d) + 7c - 2c$$

$$5d + 5c$$

*Identify like terms.*

*Combine coefficients:  $9 - 4 = 5$   
and  $7 - 2 = 5$*

**C.  $8g + c - 6$**

$$8g + c - 6$$

*No like terms.*

Putting the two concepts together:

$$3(x+2) - 6(x+1) =$$

$$3(x) + 3(2) - 6(x) - 6(1) =$$

$$3x + 6 - 6x - 6 =$$

$$-3x$$

Now try these problems

1.  $4(2x + 2) =$

2.  $-2x - 3 + 4x + 5x + 6 =$

3.  $-3(x - 3) =$

4.  $3y - 2y + 5 + y - 2 =$

5.  $3(x + 2) + 2(2x + 1) =$

6.  $-4(x - 1) + 2(x - 2) =$

Independent Practice:

**Simplify each expression.**

43)  $-6(7n + 5) - 7n$

44)  $-10(a + 10) + 2a$

45)  $9 - 4(k - 1)$

46)  $-9 + 3(7x + 4)$

47)  $3 - 3(4x - 3)$

48)  $-9(4 - 2m) - 9(1 - 3m)$

49)  $10(3 - 7a) + 5(1 - 7a)$

50)  $10(7 - 6n) - (2n - 10)$

51)  $9(1 + 10n) - 6(n + 8)$

52)  $-2(7x + 9) + 6(-4x - 6)$

## Skill #1: Solving Two-Step Equations

You can solve equations by *isolating* the variable using inverse operations:

### INVERSE OPERATION

Operation	+	-	×	÷
Inverse	-	+	÷	×
Example	6+4= 10 10-4= 6	28-10= 18 18+10= 28	7×3= 21 21÷3= 7	50÷10= 5 5×10= 50

$$2x + 5 = 21$$

$$2x + 5 - 5 = 21 - 5$$

$$2x = 16$$

$$\frac{2x}{2} = \frac{16}{2}$$

$$x = 8$$

Now try these problems

1.  $3b + 9 = -18$

2.  $3z - 2 = -26$

3.  $2x + 8 = 4$

4.  $-2y - 6 = 6$

5.  $2a + 9 = 11$

6.  $3y - 5 = -32$

Independent Practice:

Solve each equation.

$$53) -1 = \frac{-5 + v}{14}$$

$$54) \frac{-9 + x}{7} = -2$$

$$55) \frac{9 + v}{5} = 3$$

$$56) 44 = -2n + 10$$

$$57) 1 + \frac{x}{8} = 3$$

$$58) 4 + \frac{n}{6} = 2$$

$$59) 0 = -1 + \frac{a}{10}$$

$$60) \frac{n}{4} + 2 = 1$$

$$61) -2 + \frac{v}{6} = 1$$

$$62) \frac{x+1}{14} = -1$$



## STEPS TO SOLVING MULTI-STEP EQUATIONS

**STEP 1:** Distribute.

**STEP 2:** Combine Like Terms on each side.

**STEP 3:** Move variables to one side.

**STEP 4:** Move constants to the other side.

**STEP 5:** Multiply by the denominator/divide  
by coefficient

$$-3x - 32 = -2(5 - 4x)$$

$$-3x - 32 = -10 + 8x$$

$$-3x + 3x - 32 = -10 + 8x + 3x$$

$$-32 = -10 + 11x$$

$$-32 + 10 = -10 + 10 + 11x$$

$$-22 = 11x$$

$$\frac{-22}{11} = \frac{11x}{11}$$

$$-2 = x$$

Now try these problems

1.  $7 - 2x = x - 14$

2.  $3y + 8 = 2y - 7$

3.  $6 - 4x = 16 - 9x$

4.  $3.6y = 5.4 + 3.3y$