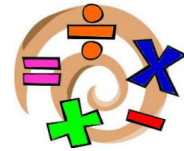# Summer Math Review 2023: 7th Math Entering 8th Pre-Algebra

Dear Students and Parents,

One of our goals is for each of you to develop a solid foundation for a successful transition to pre-algebra. Strong number sense, proportional reasoning, and confidence working with fractions and integers are all part of this foundation. Proficiency working with rational numbers, fluency with algebraic language, and understanding properties used when solving equations will all be major objectives of pre-algebra in 8th grade.

What did we learn this year? This packet has a page for each unit – from scale drawings to equations. Use the number relationships you know to help you figure things out! That's how to make the connections necessary for deep learning. Successful learners are curious, resilient, use what they know, and find ways to "figure it out". Working thoughtfully will help you begin 8th grade feeling confident.

Please READ the skills and key understandings listed at the top of each set before you start. We do not recommend calculators or SIRI (do you think we would?). Think about what the best strategy for the problem would be, and if it doesn't work, try again. Check to see if you have really answered the question and if your answers are reasonable. You have sharp number sense; don't forget to use it as you reason with number relationships.

We all are going to enjoy a well-deserved break this summer! Use this packet as an efficient way to fit a bit of reasoning and review into your summer schedule.

We are so proud of your efforts, mindset, attitude, and resilience this year. By showing up and playing along, you made our classrooms a great place for learning.

Have a wonderful summer!

Mrs. Matthews
Ms. Savage

Blank Sheet – Back of Letter

SKILLS:
I CAN explain what a scale factor is and can use it to create scale copies.
I CAN understand how corresponding lengths in scaled copies form equivalent ratios.
I CAN use ratio tables as a strategy when working with equivalent ratios.
I CAN describe the effects of scale factors >, <, or =1.
I CAN use reciprocals to go back and forth between an original and its scaled copy.

KEY UNDERSTANDINGS:
When I multiply each side of a figure by the same scale factor, I create a scaled copy.
Scale factors >1 create a larger copy; <1 create a smaller copy; =1 create a same-size copy.
To "undo" scaling and go back to the original, use the reciprocal of the scale factor.
Each corresponding side length of an original and its scaled copy form equivalent ratios.
**Corresponding angles of an original and scaled copy are congruent.**

Quadrilateral EFGH is a scaled copy of quadrilateral ABCD. Select ALL true statements.

a.) Segment EF is twice as long as segment AB.

b.) Segment CD is twice as long as segment FG.

c.) The length of segment EH is 16 units.

d.) The measure of angle HEF is twice as large as the measure of angle DAB.
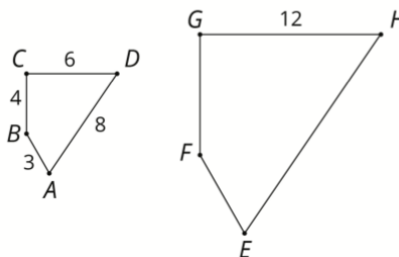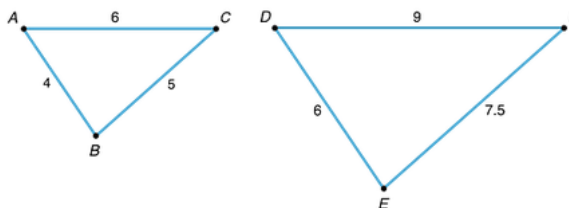

A scale drawing of a rectangular park is 5 inches wide by 7 inches long.

The scale is **1 in = 40 ft**. Find the width and length of the <u>actual</u> park. Use a ratio table?
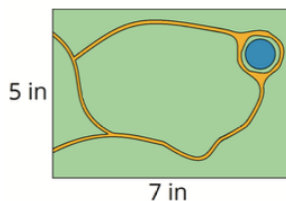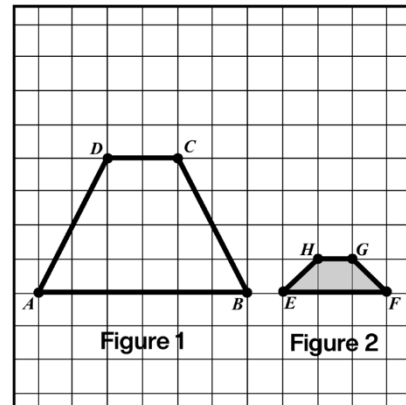

Tell whether these are scaled copies.   Support your reasoning with scale factors.
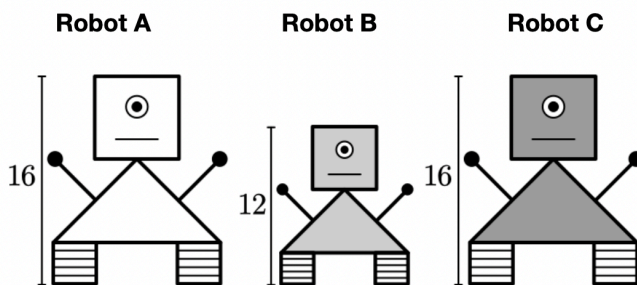
Ralphie says Figure 2 is a scaled copy of Figure 1.

Do you agree? _____

Explain your reasoning. Be specific and clear.

Figure 1

Figure 2

Determine the scale factor between each pair of robots.

Robot A   **Robot B**   **Robot C**

16   12   16
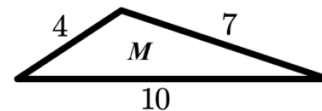
Robot A → Robot B: _____

Robot B → Robot C: _____

Robot A → Robot C: _____

Figure D is a scaled copy of figure C. Select all statements that must be true.

A. Figure D has the same number of sides as figure C.
B. Figure D is larger than figure C.
C. Figure D has the same angle measures as figure C.
D. The scale factor from figure D to figure C is less than 1.

Triangle Z (not shown) is a scaled copy of triangle M. Select all the sets of side lengths that are possible side lengths for triangle Z. *Think: each side in scale copies must form equivalent ratios!!*

A. 8, 11, and 14

B. 2, 3.5, and 5

C. 6, 10, and 15

D. 10, 17.5, and 25

4   7
M
10

SET 2 – PROPORTIONAL RELATIONSHIPS (2 sides)   **7TH Pre-Algebra Entering 8th Algebra**

SKILLS:
I CAN understand proportions as a set of equivalent ratios.
I CAN describe proportions in words, ratio tables, equations, and graphs.
I CAN solve problems with proportions.

KEY UNDERSTANDINGS:
A set of equivalent ratios (can show in a ratio table) describes a proportional relationship.
In a proportion, each x-value (independent) is multiplied by the constant of proportionality to get the y-value (dependent). We use the letter k for the constant of proportionality.
The constant of proportionality can be interpreted as a unit rate.
**The equation $y = kx$ (y is k times x) can be written to describe a proportion.**
The graph of a proportion is a straight line through the origin.

Read this graph carefully.

a. Fill in the table with the three data pairs shown on the graph.

b. Fill in the distance for 1 hour in the bottom row of the table to find the constant of proportionality. A decimal or mixed number is the best way to express your answer.

c. Fill in the table to show the distance hiked in 2 hours at this rate.

Hiking Distance
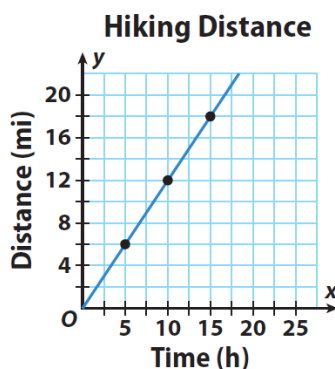
Time (hours)	Distance (miles)
5	
10	
15	
2	
1	

This table shows the weight of apples at the grocery store. Complete the table to show a proportional relationship between the number of apples and the weight.

(You can add rows to table if needed. Think: how can $5 * 12 = 60$ help you?)

number of apples	weight in kilograms
2	
5	0.60
12	

Choose which data set shows a proportion. For the one chosen, write the equation in $y = kx$ form, where k is the constant of proportionality.
(The number you multiply x by to get y)

x	y
1	6
2	8
3	10

x	y
1	4
2	8
3	12

Fill in so the ingredients are proportional. Use the ratio table as a strategy; add extra rows as needed.

Honey (tbsp.)	Flour (cups)
8	10
20	
13	
	12.5

My recipe calls for 8 cups of flour, 2 cups of butter, and 3 cups of milk.
*(a ratio table may help answer these questions.)*

If I use 4 cups of flour, how many cups of butter and milk should I use?

If I use 12 cups of flour, how many cups of butter and milk should I use?

If I want to make $\frac{3}{4}$ **of** the recipe, how many cups of each ingredient should I use?

Here are three cards. Two of them represent the same relationship and one is different. Which one represents a different relationship than the others?

Lucia has to work 12 hours in a week to earn $180.

Point (4, 60) on a line; Total Pay ($) vs Hours Worked.
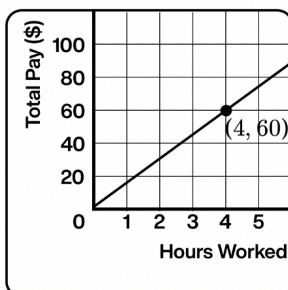
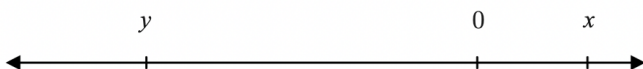| Hours Worked	Total Pay ($)
0	0
2	25
6	75
10	125
20	250

SKILLS:
- **I CAN understand models of distance and direction on the number line.**
- **I CAN compute efficiently with signed rational numbers.**
- **I CAN solve problems with signed rational numbers.**

KEY UNDERSTANDINGS:
- **A number's distance and direction from zero *(absolute value)* form the basis for operating with signed numbers. There are two ways to move in each direction from a starting point. Adding a positive and subtracting a negative move you larger. Subtracting a positive and adding a negative move you smaller.**
- **When multiplying and dividing two numbers, if signs are the same, solution is positive; if signs are different, solution is negative.**
- **We can apply these number line ideas to compute effectively not just with integers but also with positive and negative fractions and decimals.**
- **In many situations reasoning is preferable to long computation algorithms. Look for ways to use number relationships, place value, and basic facts when computing.**

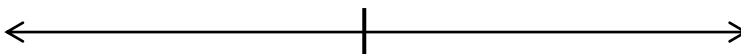|	
Use the positions on this number line. Tell whether $x + y$ is positive or negative. Support your reasoning.	Death Valley is 282 feet *below* sea level. Mount Davidson is 928 feet *above* sea level. Find the difference between these two elevations. Is your answer sensible?
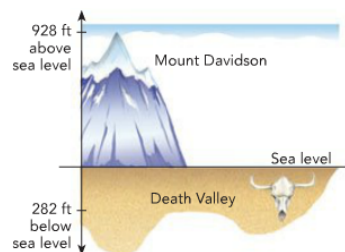
Show each of these equations on a number line.
Clearly show the <u>start</u> (S), an arrow to show the direction you <u>move</u>, and the <u>end</u> (E).
Make sure to write the answer on the line in the equation.

$-1 + 4 =$ _____

$-1 - 4 =$ _____

Find the sum or difference.		Each of these statements is NOT ALWAYS true. Write two number examples – one showing a case when it is true, and one not.
$-58 + 82$	$-64 + 37$	
		a. The absolute value of a number is NOT ALWAYS equal to the opposite of that number.
$-14 + 9$	$-73 - 15$	
$-2 + 81 + (-25) + 2$	$-82 + (-17)$	
		b. The sum $x + 1$ is NOT ALWAYS positive.
$-5 - (-25)$	$-5 - |(-25)|$	

Circle the expression or expressions that are positive. Think; do not calculate.	A tourist bus at a national park starts at an elevation of 140 feet **below** sea level. It then **ascends** (goes up) 470 feet.
a.) $16 - 72$ b.) $72 - 16$	What is the new elevation of the bus relative to sea level? A diagram may be helpful.
c.) $72 - (-16)$ d.) $-16 - 72$	
Circle the expression with the _smallest_ sum. Think; do not calculate.	
a.) $-228 + 9$ b.) $-9 + (-228)$	
c.) $-9 - (-228)$ d.) $-9 + 228$	

Find the quotient. No long division necessary; think math facts; place value, and relationships.

a.) $-4000 / 50$ b.) $-720 / -6$ c.) $-10 / 40$

Find the product. No long multiplication; think math facts, place value, and relationships.

a.) $-25 \cdot (-30)$ b.) $-8 \cdot 4000$ c.) $-3.5 \cdot 8$

SKILLS:
- **I CAN "translate" to describe situations with algebraic language.**
- **I CAN simplify and write equivalent algebraic expressions.**
- **I CAN use models to illustrate situations, properties, and solutions.**
- **I CAN apply algebraic properties with formal algebraic steps to solve equations.**
- **I CAN write and solve equations to describe situations and solve problems.**

KEY UNDERSTANDINGS:
- **Variables represent unknowns and let us generalize relationships. Algebraic expressions are made up of terms. Coefficients tell "how many" of the variables there are and show how the variable changes; constants are fixed. Combining like terms, factoring, and distributing are ways to simplify and write equivalent expressions.**
- **A solution of an equation is the value that makes the equation true – each side of the equal sign is balanced. Bar and hanger models show this so well! When solving, use inverse operations to both sides to "undo", isolate the variable, and keep balance.**
- **We solved "regular" two-step equations and also multi-step equations *(simplify expressions first before solving).***

Write an *expression*. Use x for the variable. Remember, no equal signs.	Which expression says *"ten less than product of 4 and x"*?
a.) One-fourth of a number x	$10 - 4x$ $\qquad\qquad$ $4x - 10$
b.) Nine less than twice a number x	$10 - 4 + x$ $\qquad\qquad$ $\frac{x}{4} - 10$
c.) Four groups of the sum of a number x and one	Which expression says *"three groups of the sum of a number x and 7"?*
	$3(x + 7)$ $\qquad\qquad$ $3 + (7x)$
d.) The sum of four times a number x and one	$3x + 7$ $\qquad\qquad$ $x + 3 + 7$

Identify the parts of this expression. $-a - 3b + 2c - 4$ What are the three coefficients? What is the constant term? How many terms are there? How many variables are there? Is this expression simplified?	Ralphie says $5x + 7$ is equivalent to $12x$. Tell whether you agree and why.

|	
Distribute to write an equivalent expression. a.) $5(3x + 12)$ b.) $-7(8 + 2x)$ c.) $-12(x - 7)$ d.) $2(2x - 2)$ Identify and combine like terms to simplify. $12 - 27 - 2x + 12x$	Simplify the expressions. How? Distribute if needed; then identify and combine like terms. a.) $3x - 2 - 8x + 7$ b.) $5(3x - 7) + 2(8x + 10)$
Find the value of x shown in the diagram. You must support your answer by using the diagram. No need to write an equation. 35 | 8	x	x	x	x	x	x		Find the value of x shown in the diagram. You must support your answer by using the diagram. No need to write an equation. | x + 1	x + 1	x + 1	x + 1	x + 1	x + 1 | 24
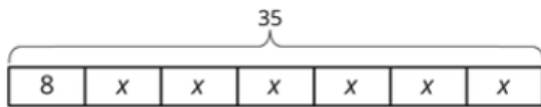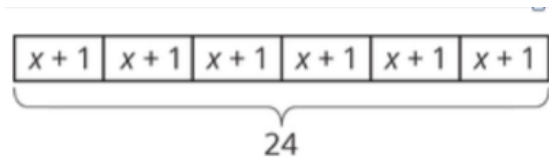
Keira and Emmy both wrote equations to figure out the value of x.

Keira wrote $14 = 2(x + 3)$ Emmy wrote $14 = 2x + 6$
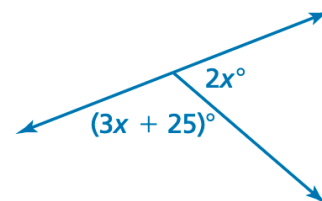
Tell WHY both are correct.

Find the value of the variable x.
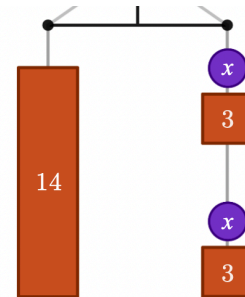
The two angles shown are supplementary – their angle measures add to 180 degrees.
First, write and solve an equation to find the value of x.
Then, use your value to find the measures of each angle.

$2x°$

$(3x + 25)°$

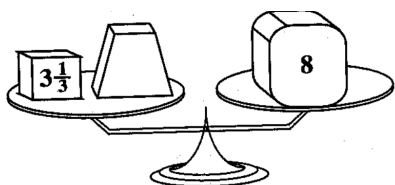|	
Solve this equation with proper steps. $-8 + 2x = -56$	Solve this equation with proper steps. $-2x + 12 = 28$
Solve this equation by <u>factoring</u>. $6(6x - 2) = -24$	Solve this equation by <u>distributing</u>. $6(6x - 2) = 17$
Read carefully. Translate into an equation. Then solve with proper steps. *" Ten less than twice a number is negative 25"*	Combine like terms; then solve with proper steps. $8x - 5 - 3x + 2 = 72$

Back of Set 4 - equations

SKILLS:
- **I CAN apply place-value ideas to understand and compute with decimal numbers.**
- **I CAN add and subtract fractions and mixed numbers.**
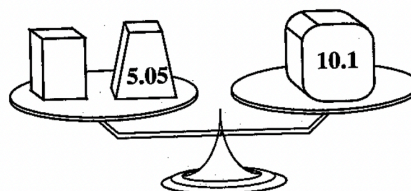- **I CAN multiply and divide fractions and mixed numbers.**

KEY UNDERSTANDINGS:
- **Addition/Subtraction: WHY must we use a common denominator? SIZE of parts needs to be the same. Can't add apples and oranges… turn them into fruit. The "fruit" is the LCM/LCD. So, find LCD, make equivalent fractions, add/subtract numerators only. For mixed numbers, keep whole numbers separate.**
- **Multiplication: No common denominators. Take "GROUPS OF", like with whole numbers. Always try to simplify BEFORE multiplying - find common factors between any numerator/denominator. Always changed mixed numbers to improper first.**
- **Division: Just as in whole numbers, one way to think of division is how many groups of the divisor are in the dividend. (*You should OWN these words!*) Two key strategies – find common denominators, or multiply by the reciprocal of the divisor.**

Find the number for the trapezoid that would make the sides balanced.	Find the number for the rectangle that would make the sides balanced.
$3\frac{1}{3}$ 8	5.05 10.1

If ▲ $= \dfrac{1}{2}$, then . . .

1.   ▲▲ = _____   3.   ▲▲▲▲▲▲▲▲▲▲ = _____

2.   ▲▲▲▲▲▲ = _____   4.   ▲▲▲▲ = _____

If ★★★ $= 1\dfrac{1}{2}$, then . . .

5.   ★★ = _____   7.   ★★★★★★ = _____

6.   ★★★★ = _____   8.   ★ = _____

It takes $1\frac{1}{6}$ ft. of paper to make a paper flag. How many flags can be made from 21 feet of paper?

Think: what operation is this? Does your solution make sense?

I ran $2\frac{1}{2}$ times around a $4\frac{2}{3}$ mile long trail. How many miles did I run? Show your thinking.

Think: what operation is this? Does your solution make sense?

Find the product or quotient.

$$\frac{20}{21} \cdot \frac{9}{40}$$

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

Find the sum or difference.

$$\frac{8}{9} + \frac{5}{6}$$

$$8\frac{5}{6} - 2\frac{3}{8}$$