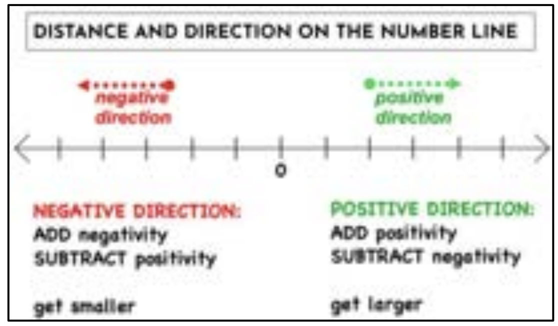
SET 1 – POSITIVES / NEGATIVES (2 sides) **7th Entering 8th Pre-Algebra B**

SKILLS:

I CAN use models of distance and direction on the number line.

I CAN compute efficiently and solve problems with signed rational numbers.

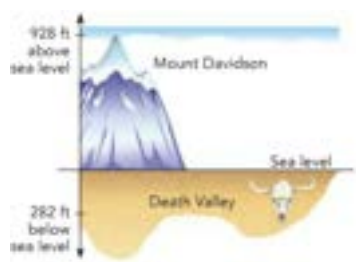


KEY UNDERSTANDINGS:

- **A number's distance and direction from zero *(absolute value, symbol: two straight lines)* 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.**
- **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.
Clearly support your reasoning.

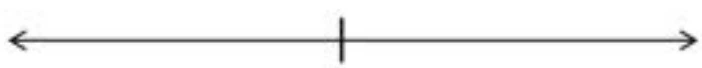
Death Valley is 282 feet ***below*** sea level.
Mount Davidson is 928 feet ***above*** sea level.
Find the difference between these two elevations. Is your answer sensible?



Show each of these equations on a number line.
Clearly show the *start* (S), an arrow to show the direction you *move*, and the *end* (E).
Make sure to write the answer on the line in the equation.

$-1 + 4$ = ______

$-1 - 4$ = ______



Find the sum or difference.

$-58 + 82$

$-64 + 37$

$-14 + 9$

$-73 - 15$

$-2 + 81 + (-25) + 2$

$-82 + (-17)$

$-5 - (-25)$

$-5 - |-25|$

Each of these is NOT ALWAYS true. Write two number examples – one showing a case when it IS true, and one showing when it is NOT.

a. The absolute value of a number is <u>NOT ALWAYS</u> equal to the opposite of that number.

b. The sum $x + 1$ is <u>NOT ALWAYS</u> positive.

Circle the expression or expressions that are positive. Think; do not calculate.

a.) $16 - 72$

b.) $72 - 16$

c.) $72 - (-16)$

d.) $-16 - 72$

Circle the expression with the <u>*smallest*</u> sum. Think; do not calculate.

a.) $-228 + 9$

b.) $-9 + (-228)$

c.) $-9 - (-228)$

d.) $-9 + 228$

A tourist bus at a national park starts at an elevation of 140 feet ***below*** sea level. It then ***ascends*** (goes up) 470 feet.

What is the new elevation of the bus relative to sea level? A diagram may be helpful.

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.) $-3.5 \cdot 8$

SET 2 – PROPORTIONAL RELATIONSHIPS (2 sides) **7^{TH} Math Entering 8^{th} Pre Algebra B**

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 $y = kx$ (*translated: y is k times x*) can be written to describe a proportion.
The graph of a proportion is a straight line through the origin.

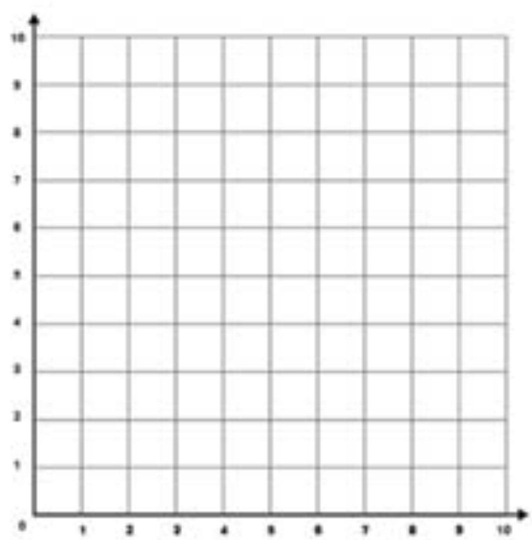
Follow directions to show this proportion in different ways.

Word Situation. ***I am training for a race. Every two days, I always run one mile.***

Ratio Table. Fill in the missing values to make equivalent ratios.

$Days\ (x)$	$Miles\ (y)$
0	0
1	
2	1
	1.5
4	
6	
	4
10	

Graph. Label the axes with the correct word- days or miles. Then graph the ordered pairs from the ratio table.



Constant of proportionality (k) = ______.
Think: unit rate

Equation in the form $y = kx$ ___________.

It costs $5 to buy 2 pounds of gummy worms.
Fill in the ratio table models to figure out how much different pounds of candy would cost.

How much would 9 pounds cost? How many pounds can we buy for $17.50?

dollars					
pounds					

Choose which data set shows a proportion.

x	y
1	6
2	8
3	10

x	y
1	4
2	8
3	12

Fill in this table to show a proportional relationship between apples and their weight.

What is the constant of proportionality?

Number of apples (x)	Weight in kg (y)
2	
5	0.60
12	
	2.4
1	

In Robot Factory, a robot's height was proportional to its width. Fill in table and the blanks.

Width (w)	Height (h)
3	6
4.5	
8	
1	

Given a width, I multiply by _______ to find height.
Fill in the rows in the table to show this.

Since height is _______ times the width, I can write an **algebraic expression** for ***any*** height w to fill in the last row.

That means the **constant of proportionality is** ______

The equation for a proportion is $y = kx$ where k is the constant of proportionality. In this problem, height is y and width is x.
Write an equation for this proportion in the form $h = kw$.

Equation: ___________________

SET 3 – EXPRESSIONS AND EQUATIONS (4 sides) **7^{TH} Entering 8^{th} Pre-Algebra B**

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 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 and help you see why and formal steps make sense. Use inverse operations to both sides to "undo", isolate the variable, and keep balance. We solved several types of equations with formal steps.**

Identify the parts of this expression. $\boldsymbol{-a - 3b + 2c - 4}$ What are the three coefficients? What is the constant term? How many terms are there? How many variables are there?	Write an ***expression***. Use x for the variable. Remember, no equal signs. a.) One-fourth of a number x b.) Nine less than twice a number x c.) Four groups of the sum of a number x and one d.) The sum of four times a number x and one

Which expression says, ***"ten less than product of 4 and x"***? $10 - 4x$ $\quad$ $4x - 10$ $10 - 4 + x$ $\quad$ $\frac{x}{4} - 10$ Which expression says, ***"three groups of the sum of a number x and 7"?*** $3(x + 7)$ $\quad$ $3 + (7x)$ $3x + 7$ $\quad$ $x + 3 + 7$	Ralphie says the expression $5x + 7$ is equivalent to the expression $12x$. Tell whether you agree and why.

Distribute to write an equivalent expression. Watch negatives.

$5(3x + 12)$ $-7(8 + 2x)$

$-12(x - 7)$ $2(\,2x - 2)$

$8(2x - 5)$ $\frac{1}{2}\,(\,4x - 10)$

Identify and combine like terms to simplify.

$12 - 27 - 2x + 12x$

$3x - x + 2 - 5$

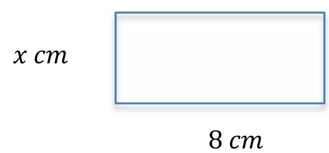
$\frac{1}{2}x + 8 - 10 + \frac{1}{4}x$

Simplify the expressions. How? Distribute first; then identify and combine like terms.

$3x + (2 - 8x) + 7$

$5(3x - 7) + 2(8x + 10)$

For this rectangle,

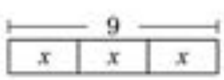


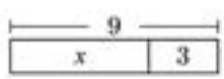
Write an expression for the PERIMETER.

Write an expression for the AREA.

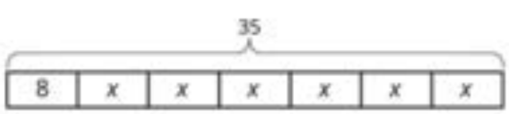
Write the letter of the equation under the diagram it matches. Each equation has a match.

A. $3 \cdot x = 9$	**B.** $3 + x = 9$	**C.** $x = 9 - 3$	**D.** $x = 9 + 3$	**E.** $x + x + x = 9$

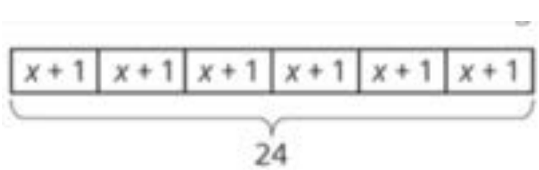




Find the value of x shown in the model. Support your answer with the diagram. No equation or steps.



Find the value of x shown in the model. Support your answer with the diagram. No equation or steps.



Solve this equation – undo multiplication first. $$-8+\ 2x=\ -56$$	Solve this equation – undo multiplication first. $$-2x+12=28$$
Solve this equation – undo division first. $$\frac{x}{7}-0.3=-2.5$$	Solve this equation – undo division first. $$\frac{x}{5}+5=25$$
Fraction coefficient – in the second step, divide by multiplying by the reciprocal. $$\frac{5}{8}x+\ \frac{1}{2}=\ \frac{7}{4}$$	Fraction coefficient – in the second step, divide by multiplying by the reciprocal. $$-5+\frac{3}{4}x=\ -2$$

Factoring. There are 6 groups; factor (divide) both sides to get one group. Then solve. $6(6x - 2) = -24$	Combine like terms first. Then solve. $8x - 5 - 3x + 2 = 72$

Write the sentence as an equation; then solve.

"Five more than the product of two and a number x is negative fifteen".

Suppose you buy 3 identical notebooks and a graphic novel. The novel costs $21 and you spend a total of $60. Write and solve an equation to find how much each notebook costs.

My variable is _____. It stands for ______________________