DHSHS Math

Student Workbook

Unit 0 - Foundational Skill Building (FSB)

Name ______________________________

Formulas - Quick Reference Guide

Order of Operations

Simplifying: PEMDAS Solving: SADMEP

P parenthesis or grouping

E exponents

MD multiplication or division (from left to right)

AS addition or subtraction (from left or right)

Properties of Exponents

$a^n \cdot a^m = a^{n+m}$ $\frac{a^n}{a^m} = a^{n-m}$

$(a^n)^m = a^{n \cdot m}$ $a^0 = 1$

$(ab)^n = a^n \cdot b^n$ $a^{-n} = \frac{1}{a}$

$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n = \frac{b^n}{a^n}$ $\frac{1}{a^{-n}} = a^n$

Arithmetic Properties

Associative $a + (b + c) = (a + b) + c$

$a(bc) = (ab)c$

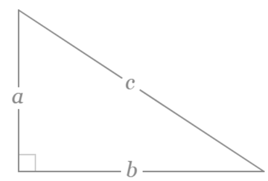
Commutative $a + b = b + a$

$ab = ba$

Distributive $a(b + c) = ab + bc$

Pythagorean Theorem

$a^2 + b^2 = c^2$



In a right triangle
a and b are the legs
c is the hypotenuse

Slope Intercept form

$f(x) = mx + b$ $m = slope,\ b = y - intercept$

Exponential function

$f(x) = a(b)^x$ $a = initial\ value$ $b = base$

Arithmetic Operations Examples

$a\left(\frac{b}{c}\right) = \frac{ab}{c}$ $\frac{a}{b} - \frac{c}{d} = \frac{ad-bc}{bd}$

$\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$ $\frac{ab+ac}{a} = \frac{a(b+c)}{a} = b + c$

$\frac{1}{2}x = \frac{x}{2}$ $\frac{3}{4}(a + b) = \frac{3a+3b}{4}$

Intercepts

$x - intercept$ $(x, 0)$
Where the function crosses the *x*-axis.

$y - intercept$ $(0, y)$
Where the function crosses the *y*-axis.

Inverse Operations (undo each other)

Addition ↔ Subtraction

Multiplication ↔ Division

Square Roots ↔ Squaring

Slope (Rate of Change)

$m = \frac{rise\updownarrow}{run\rightarrow} = \frac{y_2-y_1}{x_2-x_1}$ *given* (x_1, y_1) (x_2, y_2)

Absolute Value

$|a| = |-a|$ $\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$

$|ab| = |a|\,|b|$ $|a| \geq 0$

$|a| = a$, if $a \geq 0$ $|a| = -a$ if $a < 0$

Radical Properties

$\sqrt{x^2} = \pm x$ $\sqrt[n]{a} = a^{\frac{1}{n}}$

$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$ $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

when $a, b \geq 0$, *n is even*

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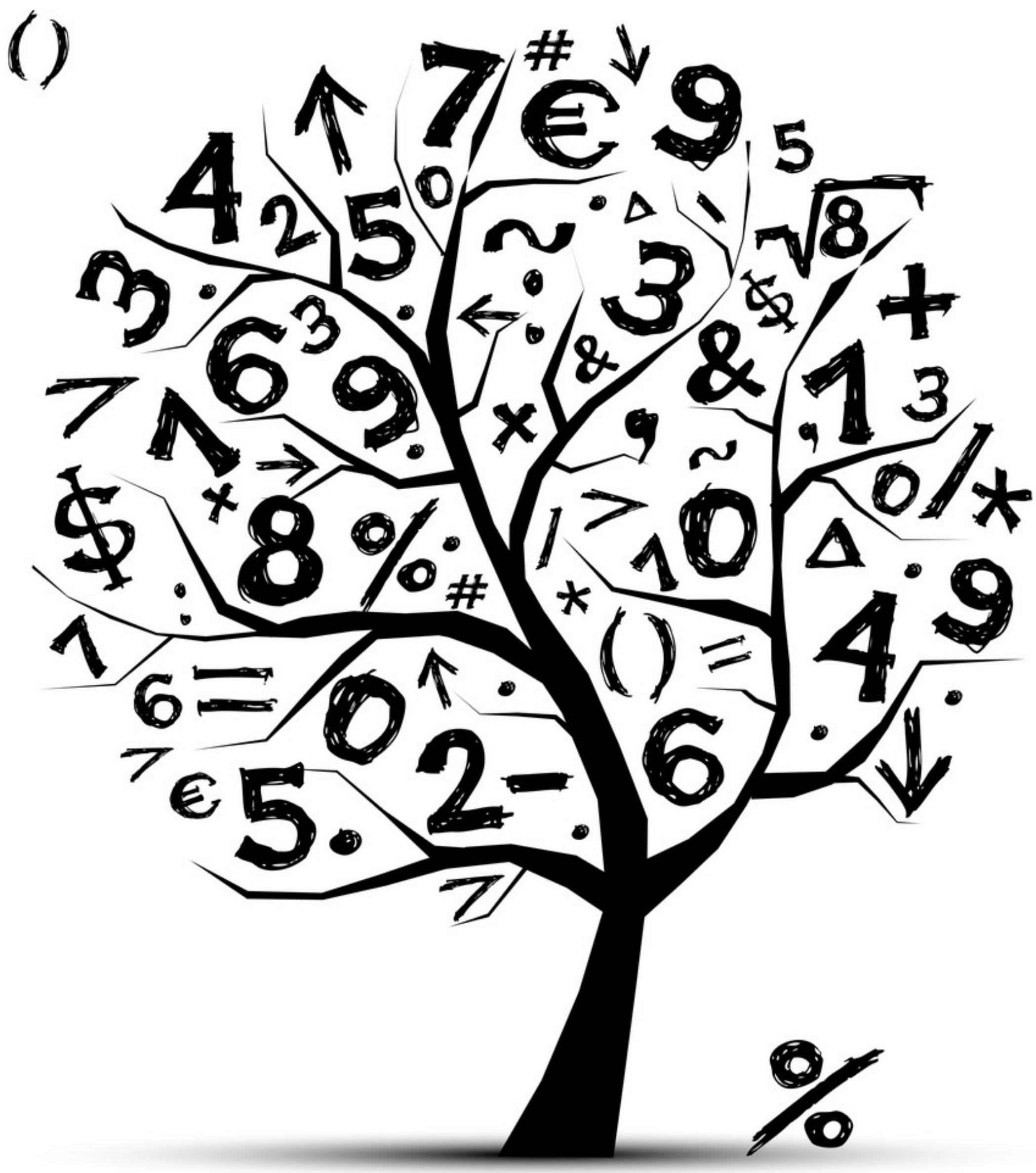
Unit 0 - Notes

Foundational Skill Building (FSB)



0.1: Multiplication Table, Divisibility Rules, and Integer Rules

15 by 15 Multiplication Table

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
11	22	33	44	55	66	77	88	99	110	121	132	143	154	165
12	24	36	48	60	72	84	96	108	120	132	144	156	168	180
13	26	39	52	65	78	91	104	117	130	143	156	169	182	195
14	28	42	56	70	84	98	112	126	140	154	168	182	196	210
15	30	45	60	75	90	105	120	135	150	165	180	195	210	225

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Divisibility Rules

"divisible" means a number is able to be divided evenly with another number with NO remainders!

A number is divisible by…	Definition	Example
2	**The last digit is an even number.**	**2,458** **8 is divisible by 2**
3	**The sum of the digits is divisible by 3.**	**123** **1 + 2 + 3 = 6** **6 is divisible by 3**
4	**The last two digit form a number that is divisible by 4.**	**4,524** **24 is divisible by 4**
5	**The last digit is either a 5 or a 0 (zero).**	**12,390 or 3,475** **both 0 and 5 are divisible by 5**
6	**The number is divisible by BOTH 2 and 3.**	**24** **24 is divisible by BOTH 2 and 3**
7	**You can double the last digit and subtract the sum from the rest of the number, and set an answer that is divisible by 7.**	**672** **2 + 2 = 4** **67 – 4 = 63** **63 is divisible by 7**
8	**The last three digits from the a number that is divisible by 8.**	**1,816** **816 is divisible by 8**
9	**The sum of all the digits is divisible by 9.**	**153** **1 + 5 + 3 = 9** **9 is divisible by 9**
10	**The number ends in a 0 (zero).**	**257,890** **0 (zero) is divisible by 10**

Integer Rules

Addition

Same sign, keep the sign

+ and + = +
- and - = -

Opposite signs, keep the sign of the bigger |number|

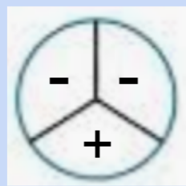
+ and - = + or **-**

Subtraction

Same thing as adding with a negative number

Ex: 8 - 5 = 8 + (-5)

Multiplication / Division



Same sign = +
Opposite signs = -

Two Signs Together, Side by Side

- Multiply, Simplify, Reclassify

3 + − 7 3 − 7	Rule: + • − = − Simplified, Diff Signs	6 − (+ 9) 6 − 9	Rule: − • + = − Simplified, Diff Signs
3 − − 7 3 + 7	Rule: − • − = + Simplified, Same Signs	6 − (− 9) 6 + 9	Rule: − • − = + Simplified, Same Signs

“When Adding, Opposites A~~tt~~ract” Sub

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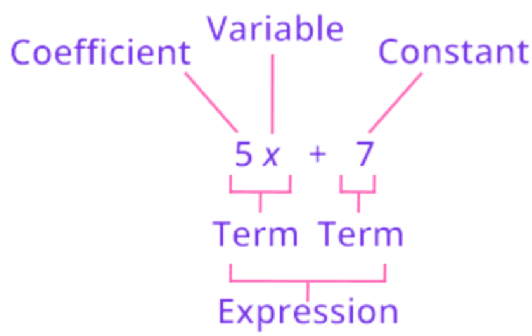
0.2: Foundational Algebra Terms

Essential Question: How can I identify a term in an expression?

Questions & Cues

Key Terms



Variable ≡ a symbol or letter that represents a quantity that varies in an expression or equation. It has no fixed value.

Ex. $y = 3x - 4$ Both x *and* y are variables

Coefficient ≡ a number multiplied by a variable.

Constant ≡ a number that has a fixed numerical value.

Ex. 2, 6, 0, -5, -9, 3/8, 4/9 are all constants

In the expression 3x + 5, the constant is 5.

Terms ≡ are separated by a plus or a minus sign.

Terms are single numbers, variables, or the product of a number and variable.

Like Terms ≡ same variable and same exponent.

Expression ≡ a mathematical sentence that contains one or more terms.

Equation ≡ a mathematical sentence that equates one expression to another. It has an equal sign.

Inequality ≡ a mathematical sentence that compares one expression to another. It has a symbol that shows less than (<, ≤) or greater than (>, ≥). The bar means "or equal to."

Questions & Cues	Guided Practice
	In the following expressions identify the key parts.
	1) $12x - 7$ — What are the terms? _____________ Variable(s) = _____________ Coefficient = _____________ Constant = _____________
	2) $\frac{3}{5}x + 27y - 14$ — What are the terms? _____________ Variable(s) = _____________ Coefficient = _____________ Constant = _____________
	3) Circle or highlight the expressions in the following examples. $9 + 24z$ $32 = \frac{1}{2} - 3x + 2x^2$ $4y + 7 = 8x - 3$ _
	4) Underline the equations in the examples above.

Summary

I can identify a term in an expression by ____

____

____

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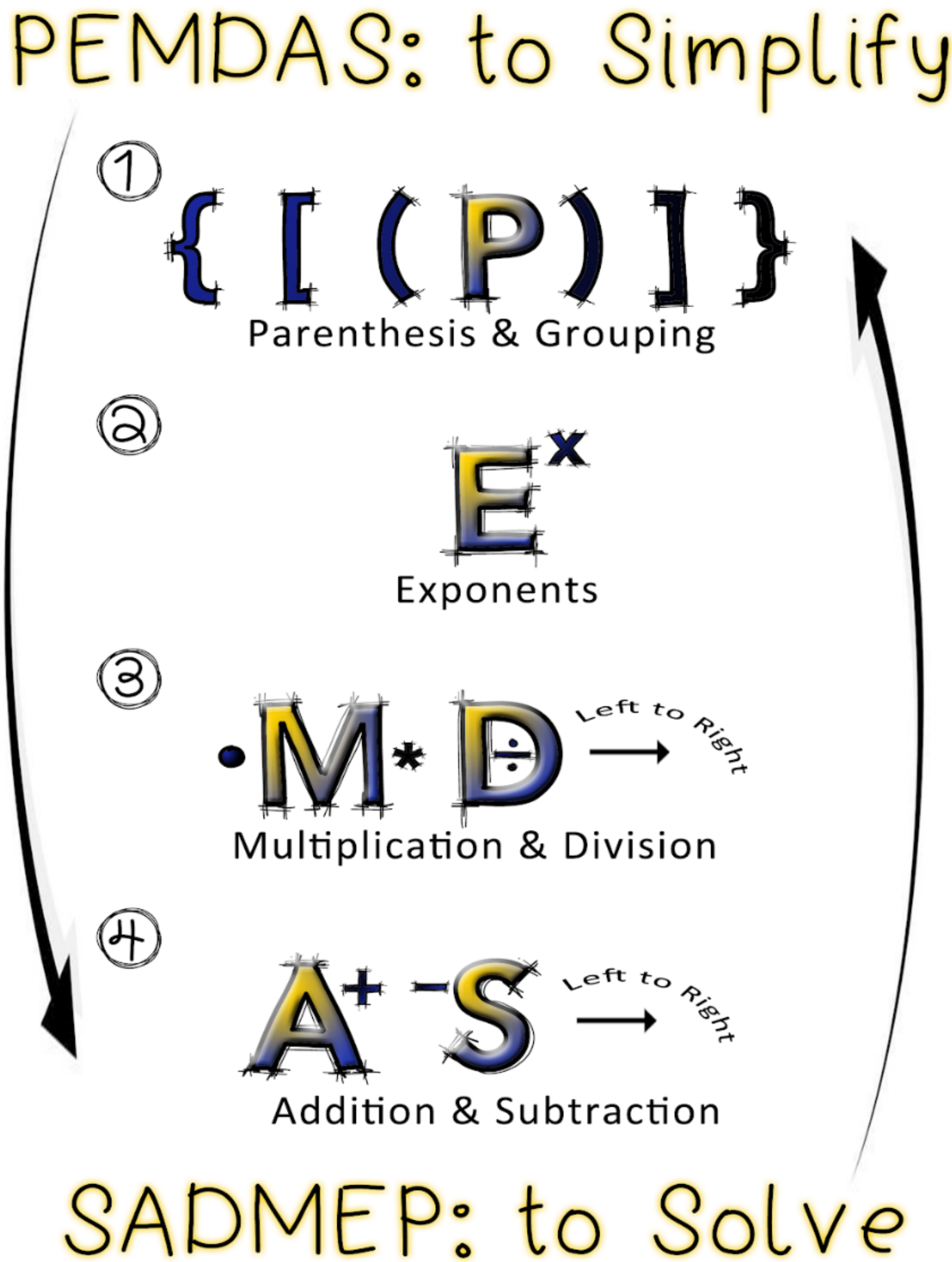
0.3: Order of Operations



Essential Question: How can I simplify an expression?

Questions & Cues

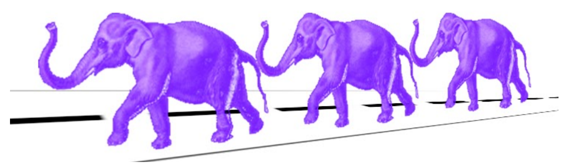
Key Terms

$Simplify \equiv$ to rewrite an expression in its simplest form.

$PEMDAS \equiv$ an acronym to help remember the order of operations used to SIMPLIFY expressions.

It stands for Parenthesis (or grouping), Exponents, Multiplication and Division (from left to right), Addition and Subtraction (from left to right).

To remember this we say, "*Please Excuse My Dear Aunt Sally (from leaving the room)*" or "*Purple Elephants Marching Down A Street*".



$SADMEP \equiv$ an acronym to help remember the order of operations to SOLVE equations. It is PEMDAS backwards, so you will work in reverse order.

Examples of Simplifying

1)	$3 + 7 \cdot 2$	~~PE~~**M**~~D~~**A**~~S~~ Multiply
	$3 + 14$	~~PEMD~~**A**~~S~~ Addition
	17	
2)	$8 - 4^2$	~~P~~**E**~~MDAS~~ Exponents
	$8 - 16$	~~PEMDA~~S Subtraction
	-8	
3)	$8 \div (6 - 2^2)$	**PE**MDAS Parenthesis (Exponents)
	$8 \div (6 - 4)$	**P**~~EMDA~~**S** Parenthesis (Subtraction)
	$8 \div 2$	~~**PE**M~~D~~AS~~ Division
	4	

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Questions & Cues

4) $8 \div 2\,(3 + 1)$ — **P**~~EMD~~**A**~~S~~ Parenthesis (Add)

$8 \div 2\,(4)$ — ~~PE~~**MD**~~AS~~ (Left to Right), Divide

$4\,(4)$ — ~~PE~~**M**~~DAS~~ Multiply

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Examples of Solving

In unit 0.5 and 0.6 solving is explained in depth.
See Unit 0.5 and 0.6.

Guided Practice

1) $5 + 1 \cdot 3 =$ _____________

2) $12 \div (20 - 4^2) =$ _____________

3) $12 \div 3\,(4 + 2) =$ _____________

Summary

I can simplify an expression by ____

____

____

0.4: Inverse Operations

Essential Question: How can I identify inverse operations?

Questions & Cues

Key Terms

$Operation \equiv$ in math is a process involving an action such as addition, subtraction, multiplication, division, squaring, square roots, etc.

$Operators \equiv$ are symbols that represent the operation. Some operators have more than one symbol. The most common in IM1 are below.

Addition:	$+$	Subtraction:	$-$
Multiplication:	$\times$ $\cdot$ $(\ )$ $*$	Division:	$\div$ $/$ $\frac{a}{b}$
Squaring:	a^2 a ^2	Square Root:	$\sqrt{\ }$ *(symbol is called a radical)*

$Inverse\ Operation \equiv$ reverses the effect of the original operation. They are operations that undo each other.

The inverse operations are as follows:

Operation	***Inverse Operation***
Addition	Subtraction
Subtraction	Addition
Multiplication	Division
Division	Multiplication
Squaring	Square Rooting
Square Rooting	Squaring

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Questions & Cues	Examples
	1) $1 + 2 = 3$ $3 - 2 = 1$ Adding 2 to 1 equals 3, but if you then subtract 2 from 3 you get your original number, 1. 2) $2 \cdot 3 = 6$ $6 \div 3 = 2$ Multiplying 2 by 3 equals 6, but if you then divide 6 by 3 you get your original number, 2. 3) $3^2 = 9$ $\sqrt{9} = 3$ Squaring 3 equals 9, but if you take the square root of 9 you get your original number, 3.

Summary

I can identify inverse operations by ____

____

____

0.5: Solving One-Step Equations Using Inverse Operations

Essential Question: How can I solve simple one-step equations?

Questions & Cues

Key Terms

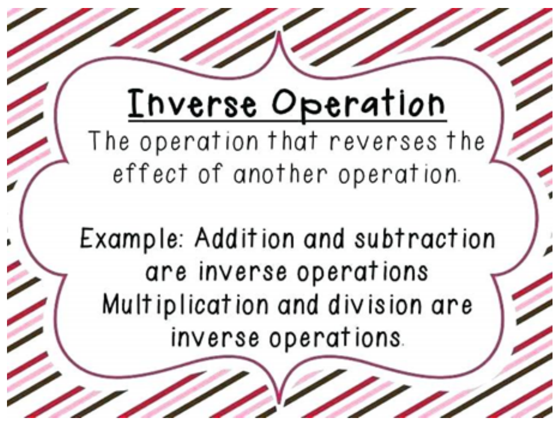
Isolate ≡ rearranging an algebraic equation so that a specific variable is <u>alone</u> on one side of an equation.

Solve ≡ to find the value of a variable that makes an <u>equation</u> true.

Ex. solve $3 + x = 5$ solution is $x = 2$ since $3 + 2 = 5$

One Step Equation ≡ an equation that can be solved in only one step.

Recall



Example

To solve one-step equations you will use inverse operations. This will prepare you for more difficult problems (multi-step equations)

GOAL: isolate the variable.

Steps

1) Identify the variable to isolate and the operation being applied to it.
   ex. x + 4 = 6 — the variable is "x" and the operation is addition (+4)

2) Perform the inverse operation on both sides of the equation.
   ex. $x + 4 - 4 = 6 - 4$, subtract 4 from both sides.

3) Simplify both sides. ex. x = 2

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Questions & Cues	Examples
	Examples Solve the following equations completely. 1) $x - 7 = 8$ — Isolate x, current operation is subtraction $x - 7 + 7 = 8 + 7$ — Apply the inverse operation, addition $x = 15$ — Simplify 2) $3y = -9$ — Isolate y, current operation is multiplication $\frac{3y}{3} = \frac{-9}{3}$ — Apply the inverse operation, division $y = -3$ — Simplify 3) $\frac{r}{3} = 15$ — Isolate r, current operation is division $\frac{r}{3} \cdot 3 = 15 \cdot 3$ — Apply the inverse operation, multipl. $r = 45$ — Simplify 4) $x^2 = 36$ — Isolate x, current operation is squaring $\sqrt{x^2} = \sqrt{36}$ — Apply the inverse operation, square root $x = \pm 6$ — Simplify * Note there are two possible solutions. $x = 6 \quad and \quad x = -6$ **Guided Practice** 1) $b + 7 = 8$ — Isolate ___, current operation is _________ ___________ — Apply the inverse operation, ____________ ___________ — Simplify 2) $5m = 35$ — Isolate ___, current operation is _________ ___________ — Apply the inverse operation, ____________ ___________ — Simplify

Questions & Cues	
	3) $\frac{1}{3}y = -2$ Isolate ___, current operation is __________
	____________ Apply the inverse operation, ______________
	____________ Simplify
	4) $x^2 = 64$ Isolate ___, current operation is ___________
	____________ Apply the inverse operation, ______________
	____________ Simplify

Summary

I can solve simple one-step equations by ____

____

____

Name: ______________________________

Period: ____

0.6: Solving Multi-Step Equations Using Inverse Operations

Essential Question: How can I solve a multi-step equation?	
Questions & Cues	**Key Terms** $Solving \equiv$ to find the value of the unknown in an equation. $SADMEP \equiv$ reverse order of operations (PEMDAS). It is referenced when solving an equation.
	Steps to Solving an Equation with the Variable on One Side PEMDAS is only a tool used to help you remember the order in which to simplify an *expression*. When you want to solve an *equation* you need to go in the reverse order of PEMDAS which is SADMEP, but before you can solve it you must make sure the *expressions* on each side of the *equation* are simplified first. 1) Simplify the expressions on each side of the equations. 2) SA: use the *inverse* of addition or subtraction to eliminate the term being subtracted or added. 3) DM: use the inverse of multiplication or division to eliminate the term being divided or multiplied. 4) E: use the square root which is the inverse of any square. 5) P: Repeat these steps for anything within the parentheses. Remember: when solving an equation… ***What you do to one side*** ***You must do to the other*** Note: To help identify those operations needed use SADMEP and cross out anything not in the equation.

Questions & Cues	**Examples**

SA DM E P

1) $5x + 1 = 16$ — Nothing to simplify

$5x + 1 - 1 = 16 - 1$ — Use subtraction (SA)

$5x = 15$

$\frac{5x}{5} = \frac{15}{5}$ — Use division (DM)

$x = 3$

2) $2(5x) = 12$ — SA DM E P

$10x = 12$ — Simplify

$\frac{10x}{10} = \frac{12}{10}$ — Use division (DM)

$x = \frac{2 \cdot 6}{2 \cdot 5}$ — Always reduce fractions

$x = \frac{6}{5}$

3) $3(d - 5) = -17$ — SA DM E P

$3d - 15 = -17$ — Simplify

$3d - 15 + 15 = -17 + 15$ — Use addition (SA)

$3d = -2$

$\frac{3d}{3} = -\frac{2}{3}$ — Use division (DM)

$d = -\frac{2}{3}$

Guided Practice

1) $8(x + 1) = -5$ — SA DM E P

________________ Simplify

________________ Use ________________

____

________________ Use ________________

________________ Use square root? Yes / No

________________ Simplify parentheses? Yes / No

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Period: ____

Questions & Cues	2) $\frac{3x}{4} = 9$ SA DM E P _______________ Nothing to simplify _______________ Use _______________ _______________ _______________ Use _______________ 3) $\frac{3(x-2)}{7} = 4$ SA DM E P _______________ Simplify _______________ Use _______________ _______________ _______________ Use _______________ _______________ _______________ Use _______________
	Steps to Solving an Equation with Variables on Both Sides This is similar to the above steps, but before you can solve you must move the variable to only one side using inverse operations. 1) Simplify the expressions on each side of the equation. 2) Choose which side of the equation you would like to isolate the variable (Left or Right), and then use the *inverse* operation to move the term with the variable to your chosen side. 3) Now that the variable is on one side, solve using inverse operations (as shown above).

Questions & Cues	**Examples**

Examples

SA DM E P

1) $5x + 2 = 18 + 3x$ — Nothing to simplify

$5x + 2 - 3x = 18 + 3x - 3x$ — Inverse of $+3x$ is $-3x$

$2x + 2 = 18$

$2x + 2 - 2 = 18 - 2$ — Use subtraction (SA)

$2x = 16$

$\frac{2x}{2} = \frac{16}{2}$ — Use division (DM)

$x = 8$

2) $2(5x) = 15 - 5x$ — SA DM E P

$10x = 15 - 5x$ — Simplify

$10x + 5x = 15 - 5x + 5x$ — Inverse of $-5x$ is $-5x$

$15x = 15$

$\frac{15x}{15} = \frac{15}{15}$ — Use division (DM)

$x = 1$

3) $3(2d - 4) = \; -d$ — SA DM E P

$6d - 12 = \; -d$ — Simplify

$6d - 12 + d = \; -d + d$ — Inverse of $-d$ is d

$7d - 12 = 0$

$7d - 12 + 12 = \; +12$ — Use addition (SA)

$7d = 12$

$\frac{7d}{7} = \frac{12}{7}$ — Use division (DM)

$d = \frac{12}{7}$

Guided Practice

1) $9(x + 3) = 5\,x - 5$ — SA DM E P

________________ Simplify

________________ Inverse of _____ is _____

____

________________ Use ________________

____

________________ Use ________________

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Period: ____

Questions & Cues

2) $\frac{3x}{4} + 3 = 9 + 2x$ SA DM E P

__________________ Nothing to simplify

__________________ Inverse of _____ is _____

__________________ Combine Like Terms

__________________ Use _______________

____

__________________ Use _______________

____

__________________ Use _______________

3) $\frac{3(x-2)}{7} = 4x + 2$ SA DM E P

__________________ Simplify

__________________ Since the variable on the left

__________________ is grouped (numerator), it must

__________________ be unwrapped first so the next

__________________ step is to use multiplication.

____

__________________ Use _______________

__________________ Use _______________

__________________ Reduce the fraction

____

Summary

I can solve a multi-step equation by ____

____

____

0.7: Coordinate Planes & Graphing Points

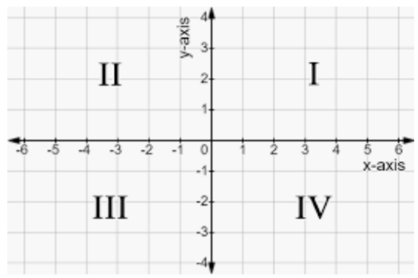
Essential Question: *How can I plot points on a coordinate plane?*

Questions & Cues

Key Terms

Coordinate Plane ≡ a two-dimensional plane formed by the perpendicular intersection of an x- and a y-axis. Usually represented on a grid.

Example:Coordinate Plane



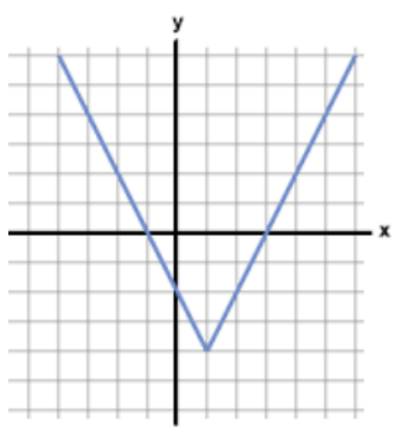
Quadrants ≡ the four sections on a coordinate plane created by the intersection of the x- and y-axes. The x and y values change signs depending on the quadrant the coordinate is in.

Quadrant II $(-,+)$ Quadrant I $(+,+)$

Quadrant III $(-,-)$ Quadrant IV $(+,-)$

Graph ≡ a diagram showing the relationship between variable quantities.

Example: A graph drawn onto a coordinate plane.



$x-axis$ ≡ the horizontal reference line.

$y-axis$ ≡ the vertical reference line.

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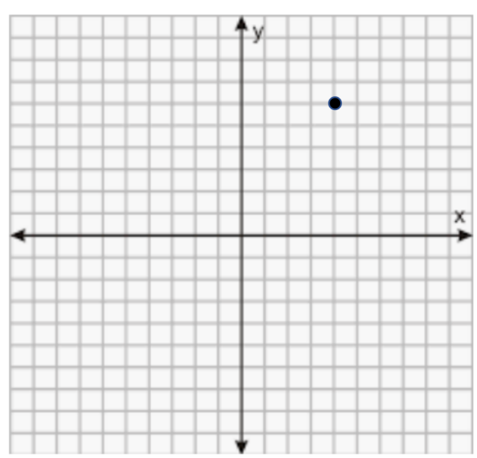
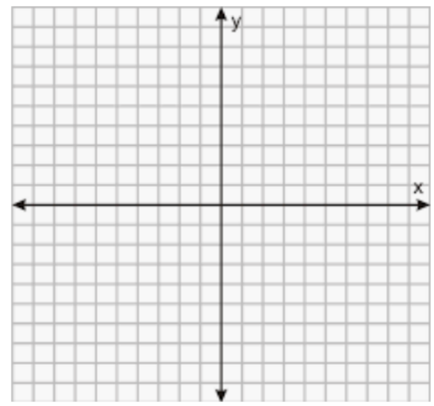
Questions & Cues	
	Origin ≡ the point of intersection of the x- and y-axes, located at $(0,0)$. *Ordered Pair* ≡ the coordinate of a point, (x,y), on a coordinate plane. Notice that these letters are in alphabetical order. • The first number corresponds to the x-coordinate and represents the number of units to move in a horizontal position (right or left) starting from the origin $(0,0)$. • The second number corresponds to the y-coordinate and represents the number of units to move in a vertical position (up or down) starting from the origin $(0,0)$.
	Plotting (Graphing) Points To plot point (x,y) on the coordinate plane follow these steps: 1 - Start at the origin $(0,\ 0)$, in the center of the coordinate plane. 2 - Move x units right $(+)$ or left $(-)$. 3 - Starting from your x position, move y units up $(+)$ or down $(-)$. 4 - Mark the point with a dot and label. The point on the coordinate plane is the ordered pair (,)  Assume each square is 1 unit.

Questions & Cues

Guided Practice

Plot the following points on the coordinate plane.



1) $(4, 6)$

   Move 4 units to the right of the origin.

   Then, move 6 units up.

   Mark & label the point.

2) $(-2, 5)$ Move ____ units left/right from the origin.

   Move ____ units up/down from there.

   Mark & label the point.

3) $(-1, -7)$ Move ____ units left/right from the origin.

   Move ____ units up/down from there.

   Mark & label the point.

4) $(3, -4)$ Move ____ units left/right from the origin.

   Move ____ units up/down from there.

   Mark & label the point.

5) $(3, 0)$ Move ____ units left/right from the origin.

   Move ____ units up/down from there.

   Mark & label the point

6) $(0, -6)$ Move ____ units left/right from the origin.

   Move ____ units up/down from there.

   Mark & label the point.

Summary

I can plot points on a coordinate plane by ____

____

____

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0.8: Properties of Addition & Multiplication

Essential Question: How can I make addition or multiplication simpler?	
Questions & Cues	**Key Terms** $Commute \equiv$ to move around or travel. $Commutative\ Property\ of\ Addition \equiv$ to change the order of the terms being added. It does not change the sum. $a + b = b + a$ $Commutative\ Property\ of\ Multiplication \equiv$ to change the order of the terms being multiplied. It does not change the product. $ab = ba$ $Associate \equiv$ to group $Associative\ Property\ of\ Addition \equiv$ when three or more terms are added, the sum is the same regardless of how the terms are grouped. $a + (b + c) = a + (b + c)$ $Associative\ Property\ of\ Multiplication \equiv$ when three or more terms are multiplied, the product is the same regardless of how the terms are grouped. $a(bc) = (ab)c$
	Examples Commutative Property 1) $2 + 3 = 3 + 2$ $5 = 5$ 2) $5 + 6 + 5 = 5 + 5 + 6$ $11 + 5 = 10 + 6$ $16 = 16$ 3) $3 \cdot 4 = 4 \cdot 3$ $12 = 12$

Questions & Cues	
	4) $2 \cdot 7 \cdot 5 = 2 \cdot 5 \cdot 7$ $14 \cdot 5 = 10 \cdot 7$ $70 = 70$ **Guided Practice** Commutative Property 1) $4 + 7 =$ ___________ _________ = _________ 2) $3 \cdot 8 =$ ____________ _________ = _________ 3) $6 + 19 + 4 =$ ____________ _________ = _________ _________ = _________ 4) $4 \cdot 7 \cdot 5 =$ _____________ _________ = _________ _________ = _________ **Examples** Associative Property 1) $12 + 29 + 8 = 12 + 8 + 29$ $41 + 8 = 20 + 29$ $49 = 49$ 2) $2 + 34 + 18 = 2 + 18 + 34$ $36 + 18 = 20 + 34$ $54 = 54$

Name: ________________________________

Period: ____

Questions & Cues	Guided Practice
	Associative Property 1) $3 + 14 + 7 =$ ____________ ________ $=$ ________ ________ $=$ ________ 2) $19 + 42 + 1 =$ ____________ ________ $=$ ________ ________ $=$ ________ 3) $4 \cdot 12 \cdot 5 =$ ____________ ________ $=$ ________ ________ $=$ ________ 4) $3 \cdot 5 \cdot 5 =$ ____________ ________ $=$ ________ ________ $=$ ________

Summary

I can make addition or multiplication simpler by ______________________________________

____

____

0.9: Distribution

Essential Question: How can I use the distributive property to factor an expression?	
Questions & Cues	**Key Terms** $Distribution \equiv$ multiplying a sum by its factor. This means multiplying each term (addend) separately within the sum by its factor. $Distributive\ Property \equiv$ multiplying a number by a sum is equivalent to multiplying each term in the sum separately. $a(b+c) = ab + ac$
	Numeric Example In the expression below, you have been taught to use the order of operations (PEMDAS). You combine the expression inside the parentheses first, then multiply. $3(4+7)$ $3(4+7) = 3(11) = 33$ Another way is to use the distributive property. Simplify this expression by first distributing (multiplying) the '3' into each term, then combining like terms. $3(4+7) = 3 \cdot 4 + 3 \cdot 7 = 12 + 21 = 33$ **Guided Practice** Use the distributive property to simplify the following expression. 1) $4(3+8) =$ ____ · ____ + ____ · ____=____ + ____ = _____ 2) $5(6+10) =$ ____ · ____ + ____ · ____=____ + ____ = _____ 3) $9(7-3) =$ ____ · ____ + ____ · ____=____ – ____ = _____ So why do it differently when simplifying inside the parenthesis seems so much simpler? It is to prepare you for algebraic distribution when we use variables instead of numbers.

Name: ______________________________

Period: ____

Questions & Cues	Algebraic Example
	The expression below is in distributive property format. You cannot add the expression in the parenthesis first because the terms are not like terms. You *must* distribute the factor (number or expression outside the parentheses). $$3(4x + 7)$$ Again, you must distribute the '3' into each term inside the parenthesis. $$3(4x + 7) = 3 \cdot 4x + 3 \cdot 7 = 12x + 21$$ Since 12x and 21 are not like terms, this is the final simplified expression. **Guided Practice** Use the distributive property to simplify the following expressions. 1) $x(3 + 8) =$ ____ $\cdot$ ____ $+$ ____ $\cdot$ ____ $=$ ______ $+$ _____ $=$ _____ 2) $9(7x - 3) =$ ____ $\cdot$ ____ $+$ ____ $\cdot$ ____ $=$ _____ $-$ _____ 3) $3x(7 + 4) =$ ____ $\cdot$ ____ $+$ ____ $\cdot$ ____ $=$ _____ $+$ _____ $=$ _____

Summary

I can use the distributive property to factor an expression by ____________________________

____

____

0.10: Factoring (GCF) & Binomials

Essential Question: How can I factor a binomial?	
Questions & Cues	**Key Terms** $Factor \equiv$ one part of a product. It is a number, variable, or expression you multiply to get a product. $3 \cdot 4 = 12$ 3 is a factor of 12 4 is a factor of 12 12 is the product of multiplying the factors $Greatest\ Common\ Factor\ (GCF) \equiv$ the largest number or expression that can be evenly divided out of two or more terms. $9x + 12$ 3 is a factor of 9x; multiplying 3 and 3x equals 9x 3 is a factor of 12; multiplying 3 and 4 equals 12 3 is the largest factor of both 9x and 12 therefore, 3 is the Greatest Common Factor (GCF) $Factoring \equiv$ the act of writing a term (a product) as two or more factors. $18 = 3 \cdot 6 \quad or$ $18 = 2 \cdot 9$ 18 is factored in both of these examples. $Prime\ Factorization \equiv$ factoring a number until all factors are prime numbers. $12 = 2 \cdot 2 \cdot 3$ 2 and 3 are the prime factors of 12. $12 = 2^2 \cdot 3$ is another way to write the simplified expression.

Name: ______________________________

Period: ____

Questions & Cues

Prime Factorization Examples

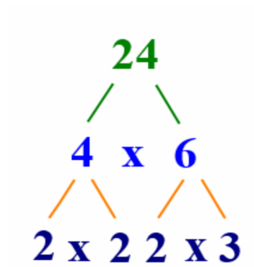
To find the prime factors of a number it helps to use a *prime factorization tree* as in *example 1 and 2* below.

1) Find the prime factors of 24.

The prime factors are all the numbers at the end of the branches.

$24 = 2 \cdot 2 \cdot 2 \cdot 3$

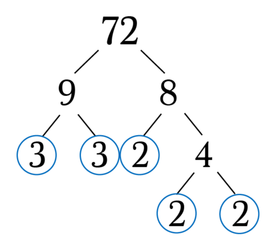
$24 = 2^3 \cdot 3$



2) Find the prime factors of 72.

$72 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

$72 = 2^3 \cdot 3^2$



Guided Practice

Find the prime factors of the numbers and expressions below and then write it in factored form.

1) 36

$36 =$ __________

36

/ \

2) 75

$75 =$ __________

75

/ \

3) 25x

$25x =$ ______ $\cdot\, x$

25

/ \

Questions & Cues	**Greatest Common Factor Examples**

Find the greatest common factor of the following numbers and expressions.

1) 12 and 39

Step 1) Find the prime factors of each.

$$12 = 2 \cdot 2 \cdot 3$$

$$12 = 2^2 \cdot 3$$

```
   12
   / \
  4   3
 / \
2   2
```

$$36 = 2 \cdot 2 \cdot 3 \cdot 3$$

$$36 = 2^2 \cdot 3^2$$

```
     36
     / \
   12   3
   / \
  4   3
 / \
2   2
```

Step 2) Circle each common factor every time that factor appears in both terms.

Circle two 2's and one 3.

Step 3) Multiply the common factors together.

$2 \cdot 2 \cdot 3 = 12$ so, 12 is the GCF

2) 20 and $8x$

Step 1) Find the prime factors of each.

$$20 = 2 \cdot 2 \cdot 5$$

$$20 = 2^2 \cdot 5$$

```
   20
   / \
  4   5
 / \
2   2
```

$$8x = 2 \cdot 2 \cdot 2 \cdot x$$

$$8x = 2^3 \cdot x$$

```
     8x
     / \
    8   x
   / \
  4   2
 / \
2   2
```

Name: ________________________________

Period: ____

Questions & Cues	
	Step 2) Circle each common factor every time that factor appears in both. Circle two 2's Step 3) Multiply the common factors together. $2 \cdot 2 = 4$ so, 4 is the GCF **Guided Practice** Find the greatest common factor of the following numbers and expressions. 1) 6 and 15 2) 24 and 36x **Steps to Factoring a Binomial** 1) Find the greatest common factor (GCF) of each term in the binomial. 2) Rewrite the expression as a sum of the factored terms. 3) Put the GCF in front of the expression and put the remaining sum in parenthesis. *Note: This is like doing distribution in reverse order.*

Questions & Cues	Examples
	1) Factor the following binomial completely. $4x + 6$ 1. Factor each term to find the GCF. $4x = 2 \cdot 2 \cdot x = 2(2x)$ $6 = 2 \cdot 3 = 2(3)$ GCF is 2 2. Rewrite the expression as a sum of the factored terms. $2(2x) + 2(3)$ 3. Put the GCF in front of the expression and put the remaining sum in parenthesis. $2(2x + 3)$ 2) Factor the following binomial completely. $30x + 42$ 1. Factor each term to find the GCF. $30x = 2 \cdot 3 \cdot 5 \cdot x = 6(5x)$ $42 = 2 \cdot 3 \cdot 7 = 6(7)$ GCF is $2 \cdot 3 = 6$ 2. Rewrite the expression as a sum of the factored terms. $6(5x) + 6(7)$ 3. Put the GCF in front of the expression and put the remaining sum in parenthesis. $6(5x + 7)$

Name: ______________________________

Period: ____

Questions & Cues	**Guided practice**
	1) Factor the following binomial completely. $14x + 21$ 1. Factor each term to find the GCF. ______________________ ______________________ GCF is __________ 2. Rewrite the expression as a sum of the factored terms. ______________________ 3. Put the GCF in front of the expression and put the remaining sum in parenthesis. ______________________ 2) Factor the following binomial completely. $24x + 8$ 1. Factor each term to find the GCF. ______________________ ______________________ GCF is __________________ 2. Rewrite the expression as a sum of the factored terms. ______________________ 3. Put the GCF in front of the expression and put the remaining sum in parenthesis. ______________________

Summary

I can factor a binomial by ____

____

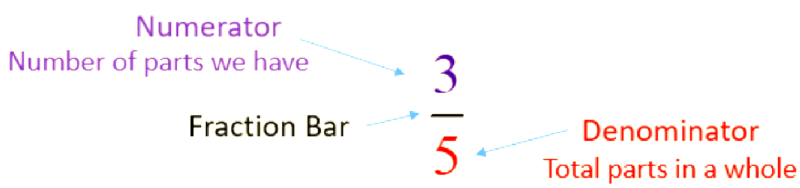
____

0.11: Fractions

Essential Question: How can I add two fractions with uncommon denominators?

Questions & Cues

Key Terms



$Fraction \equiv$ number of equal parts of a whole. It represents division.

Examples:

- $\frac{1}{4}$ represents 1 part of 4 equal parts.
- $\frac{3}{4}$ represents 3 parts of 4 equal parts.
- $\frac{4}{4}$ represents 4 parts of 4 equal parts to yield 1 whole.

$Numerator \equiv$ the top number of a fraction. It represents the number of equal parts.

$Denominator \equiv$ the divisor. It is the bottom number of a fraction. It represents the number of equal parts needed to make a whole.

$Common\ Denominator \equiv$ when two or more fractions have the same denominator.

$Least\ Common\ Denominator \equiv$ when two or more fractions have the least common multiple of all the denominators.

$Reduce \equiv$ rewriting a fraction in its simplest form. <u>Always reduce</u>!

Name: ______________________________

Period: ____

Questions & Cues

Finding a Common Denominator

To find the common denominator you can do one of 2 things:

1) Find the least common multiple of all the denominators.

2) Multiply the denominators together.

The second method is easiest to learn and will be used in these notes.

Steps to Adding and Subtracting Fractions

1) Find a common denominator.

2) Convert the fractions into equivalent forms to make the denominators the same.

3) Add or subtract the numerators and keep the denominator.

4) Reduce the fraction if possible.

Examples

1) $\frac{1}{2} + \frac{1}{4}$

$2 \cdot 4 = 8$ — Find a common denominator

$\frac{1}{2} \cdot \frac{4}{4} + \frac{1}{4} \cdot \frac{2}{2} = \frac{4}{8} + \frac{2}{8}$ — Convert into equivalent forms

$\frac{4+2}{8} = \frac{6}{8}$ — Add the numerators

$\frac{6}{8} = \frac{2 \cdot 3}{2 \cdot 4} = \frac{3}{4}$ — Reduce the fraction

2) $\frac{10}{15} - \frac{3}{10}$

$15 \cdot 10 = 150$ — Find a common denominator

$\frac{10}{15} \cdot \frac{10}{10} - \frac{3}{10} \cdot \frac{15}{15} = \frac{100}{150} - \frac{45}{150}$ — Convert into equivalent forms

$\frac{45-100}{150} = \frac{55}{150}$ — Subtract the numerators

$\frac{55}{150} = \frac{5 \cdot 11}{5 \cdot 30} = \frac{11}{30}$ — Reduce the fraction

Questions & Cues	Guided Practice

Guided Practice

1) $\frac{2}{3} + \frac{4}{5}$

_____________________ Find the common denominator

_____________________ Convert into equivalent forms

_____________________ Add or Subtract the numerators

_____________________ Reduce the fraction if possible

2) $\frac{7}{9} - \frac{2}{4}$

_____________________ Find the common denominator

_____________________ Convert into equivalent forms

_____________________ Add or Subtract the numerators

_____________________ Reduce the fraction if possible

Steps to Multiplying Fractions

1) Multiply numerators (straight across)
2) Multiply denominators (straight across)
3) Reduce if possible

Examples

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

$\frac{1 \cdot 1}{2 \cdot 4}$ $\frac{\textit{Multiply numerators}}{\textit{Multiply denominators}}$

$\frac{1}{8}$ Reduce if possible

2) $\frac{2}{3} \cdot \frac{5}{4}$

$\frac{2 \cdot 5}{3 \cdot 4}$ $\frac{\textit{Multiply numerators}}{\textit{Multiply denominators}}$

$\frac{10}{12} = \frac{2 \cdot 5}{2 \cdot 6} = \frac{5}{6}$ Reduce if possible

Name: ______________________________

Period: ____

Questions & Cues	Guided Practice

Guided Practice

1) $\frac{3}{2} \cdot \frac{6}{7}$

_______________ $\dfrac{\textit{Multiply numerators}}{\textit{Multiply denominators}}$

_______________ Reduce if possible

2) $\frac{3}{4} \cdot \frac{1}{6}$

_______________ $\dfrac{\textit{Multiply numerators}}{\textit{Multiply denominators}}$

_______________ Reduce if possible

Reduce Before Multiplying

It is possible to reduce a fraction prior to multiplication. Since the fractions are already in a factored state it can save time.

1) Find the common factors before multiplying. Look for identical factors in the numerator and denominator to eliminate.
2) Simplify.

Examples

1) $\frac{3}{2} \cdot \frac{4}{9}$

$\frac{3 \cdot 2 \cdot 2}{2 \cdot 3 \cdot 3}$ Find the common factors & eliminate

$\frac{2}{3}$ Simplify the fraction

2) $\frac{15}{6} \cdot \frac{9}{10}$

$\frac{3 \cdot 5 \cdot 3 \cdot 3}{2 \cdot 3 \cdot 2 \cdot 5}$ Find the common factors & eliminate

$\frac{3 \cdot 3}{2 \cdot 2} = \frac{9}{4}$ Simplify the fraction

Questions & Cues	Guided Practice
	1) $\frac{3}{2} \cdot \frac{6}{7}$ __________________ Find the common factors & eliminate __________________ Simplify the fraction 2) $\frac{3}{4} \cdot \frac{1}{6}$ __________________ Find the common factors & eliminate __________________ Simplify the fraction

Summary

I can add two fractions with uncommon denominators by ________________________________

____

____

Name: ______________________________

Period: ____

0.12: Mean, Median, Mode, & Range

Essential Question: How is the mean different from the median?	
Questions & Cues	**Key Terms**

$Mean \equiv$ is the average value of a set of numbers.

x̄ is the symbol for mean. It is computed by adding all of the numbers in the data set together, then dividing by the number of elements contained in the set.

- Ex. Data Set: 2, 5, 9, 3, 5, 4, 7
  - # of Elements in Data Set: 7
  - Mean x̄: $\frac{(2+5+9+7+5+4+3)}{7} = 5$

$Median \equiv$ is the middle of a data set.

It is dependent on whether the number of elements in the data set is odd or even.

- To find the median, reorder the data set from the smallest to the largest.

  If the number of elements are **<u>odd</u>**, the median is the element in the middle of the data set.

  - Ex. Data Set: 2, 5, 9, 3, 5, 4, 7

    Reordered: 2, 3, 4, **<u>5</u>**, 5, 7, 9

    Median: 5

  If the number of elements are **<u>even</u>**, the median is the average (mean) of the two middle numbers.

  - Ex. Data Set: 2, 5, 9, 3, 5, 4

    Reordered: 2, 3, **<u>4, 5</u>**, 5, 9

    Median: $\frac{4+5}{2} = \frac{9}{2} = 4.5 \approx 5$ *(If rounding)*

Questions & Cues	

$Mode \equiv$ is the number that occurs the most often in a data set.

- Ex. Data Set: 2, 5, 9, 3, 5, 5, 4, 2, 7

  Mode: 5

- It is not uncommon for a data set to have more than one mode. This happens when two or more elements occur with equal frequency in the data set.
  - A data set with two modes is called bimodal.

    Ex. Data Set: 2, 5, 2, 3, 5, 4, 7

    Modes: 2 and 5
  - A data set with three modes is called trimodal.

    Ex. Data Set: 2, 5, 2, 7, 5, 4, 7

    Modes: 2, 5, and 7
  - A data set with more than three *modes* is considered not to have a mode.

$Range\ of\ a\ Data\ Set \equiv$ is the difference between the largest value and smallest value contained in the data set.

- To find the range, reorder the data set from smallest to largest. Then, subtract the first element from the last.
  - Ex. Data Set: 2, 5, 9, 3, 5, 4, 7

    Reordered: 2, 3, 4, 5, 5, 7, 9

    Range: 9 - 2 = 7

Name: ______________________________

Period: ____

Questions & Cues	**Guided Practice**
	1) Find the mean, median, mode, and range of the following data set: {3, 7, 5, 8, 8} a) Mean: ________ c) Mode: ________ b) Median: ________ d) Range: ________ 2) Find the mean, median, mode, and range of the following data set: {2, 4, 7, 7, 10, 10} a) Mean: ________ c) Mode: ________ b) Median: ________ d) Range: ________

Summary

The difference between the mean and the median is ______________________________

____

____

0.13: Properties of Exponents

Essential Question: How can I simplify an exponential expression?

Questions & Cues

Key Terms

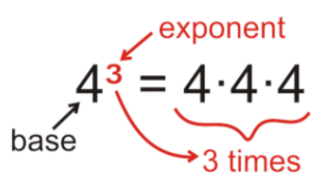
$Exponent$ $\equiv$ A number, x, that a base is raised to. The base is multiplied by itself x number of times.

$Base\ (of\ a\ Power)$ $\equiv$ The number or variable being multiplied.

$Power$ $\equiv$ a base with an exponent.

Expanded Form of a Power

A power written in expanded form is when the base of the power is written as repeated multiplication. The exponent of the power indicates the number of times the base is multiplied by itself.



Properties of Exponents

$Product\ Rule$: When multiplying powers with the same base (b), add the exponents.

$$b^x \cdot b^y = b^{x+y}$$

Example: $4^2 \cdot 4^3 = 4^{2+3} = 4^5$

Expanded form: $4^2 \cdot 4^3 = (4 \cdot 4) \cdot (4 \cdot 4 \cdot 4) = 4^5$

DHS GOLDEN EAGLES

Name: ______________________________

Period: ____

Questions & Cues	
	Quotient Rule : When dividing powers with the same base (b), subtract the exponents.

$$\frac{b^x}{b^y} = b^{x-y}$$

Example: $\frac{4^5}{4^2} = 4^{5-2} = 4^3$

Expanded form: $\frac{4^5}{4^2} = \frac{4\cdot4\cdot4\cdot4\cdot4}{4\cdot4} = \frac{4\cdot4\cdot4}{1} = 4^3$

Power Rule : When raising a power to a power, multiply the exponents.

$$(b^x)^y = b^{xy}$$

Example: $(4^2)^3 = 4^{2\cdot3} = 4^6$

Expanded form:

$$(4^2)^3 = (4^2)(4^2)(4^2) = (4\cdot4)(4\cdot4)(4\cdot4) = 4^6$$

Zero Exponent Rule : When the exponent of a power is zero, the expression will simplify to 1 (base $\neq$ 0).

$$b^0 = 1$$

Examples: $4^0 = 1$

$(3xy)^0 = 1$

Explanation: $\frac{b^x}{b^x} = b^{x-x} = b^0 = 1$

Negative Exponent Rule : When a base is raised to a negative exponent, the expression can be rewritten as the reciprocal fraction with a positive exponent (base $b \neq 0$).

$$b^{-x} = \frac{b^{-x}}{1} = \frac{1}{b^x}$$

Example: $4^{-3} = \frac{4^{-3}}{1} = \frac{1}{4^3}$

Questions & Cues	Guided Practice
	Simplify the following expressions. 1st by using expansion, then the exponent rule.
	1) $3^3 \cdot 3^5$
	Expansion: ______________________________________
	______________ Rule: $3^3 \cdot 3^5 = 3^{3+5} = 3^8$
	2) $x^4 \cdot x^6$
	Expansion: ______________________________________
	______________ Rule: ___________________________
	3) $(2x)^2 \cdot (2x)^4$
	Expansion: ______________________________________
	______________ Rule: ___________________________
	4) $\frac{3^3}{3^5}$
	Expansion: ______________________________________
	______________ Rule: ___________________________
	5) $\frac{(3x)^5}{(3x)^2}$
	Expansion: ______________________________________
	______________ Rule: ___________________________

Name: ______________________________

Period: ____

Questions & Cues	
	6) $(8^3)^4 = 8^{3\cdot4}$ Expansion: ______________________________ ______________________________ __________ Rule: ____________________ 7) $((5y)^3)^2$ Expansion: ______________________________ ______________________________ __________ Rule: ____________________ 8) 12^0 ______________________________ __________ Rule: ____________________ 9) $(27x)^0$ ______________________________ __________ Rule: ____________________ 10) $27(x)^0$ ______________________________ __________ Rule: ____________________ 11) 7^{-3} Expansion: ______________________________ __________ Rule: ____________________

Questions & Cues	
	12) $\left(\frac{2}{3}\right)^{-4}$ Expansion: ____ ______________ Rule: ____________________________ 13) $\frac{5}{6}^{-4}$ Expansion: ____ ______________ Rule: ____________________________

Summary

I can simplify an exponential expression by ____

____

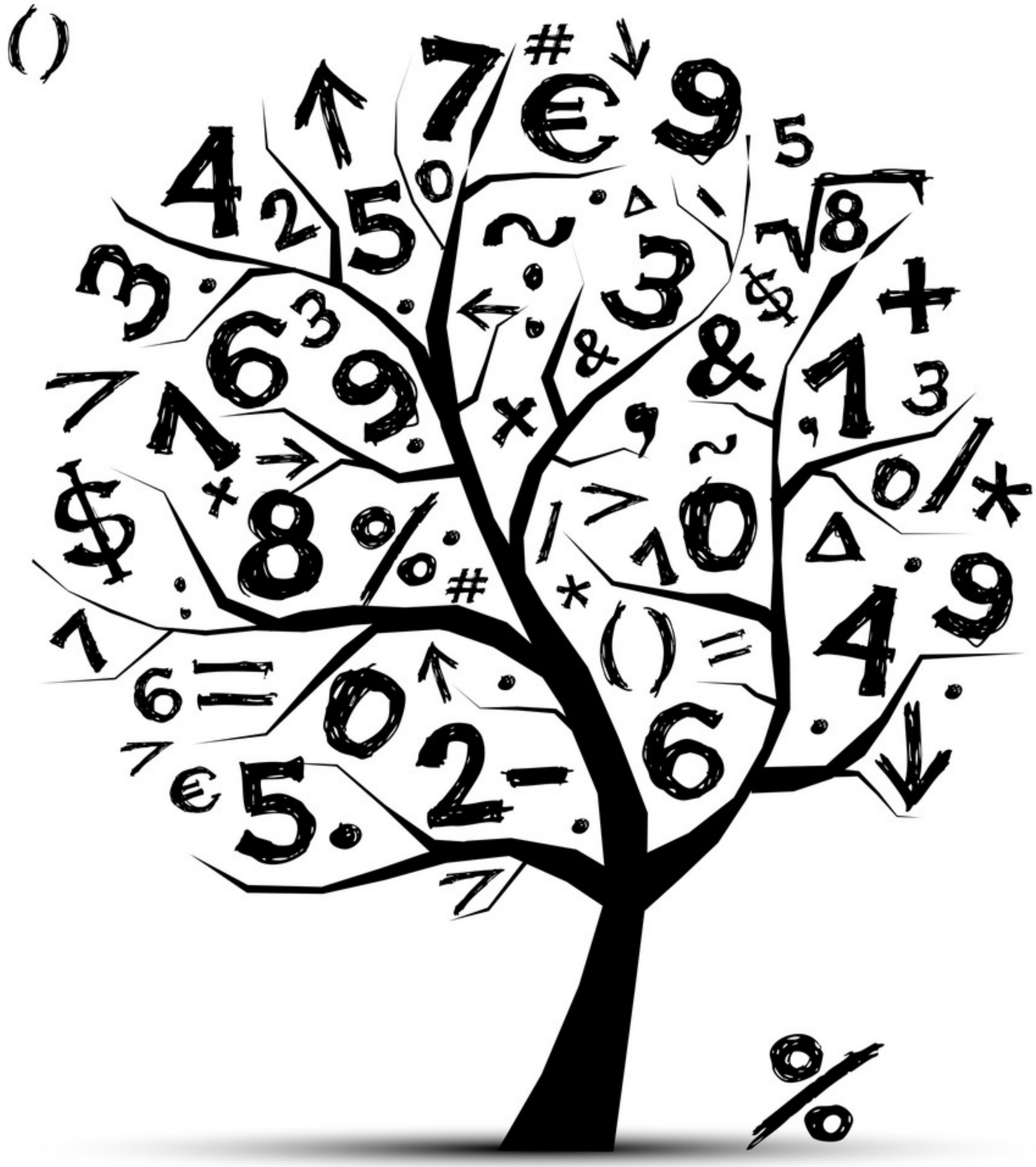
____

Name: ______________________________

Period: ____

Unit 0 - Practice Worksheets

Foundational Skill Building (FSB)



0.1: Practice - Multiplication, Divisibility Rules, and Integer Rules

Key Terms

Divisibility refers to a number's quality of being evenly ______________ by another ______________, without a remainder left over.

Key Concept

Divisibility: To determine if a number is divisible by 3 you must _______ all of the digits of that number. Repeat until you get a ________ digit.

If that digit is equal to ____, ____ or _____ then it is divisible by ____.

Practice

In the table below put an x in the box if the number is divisible by that stated in the row.

	72	96	240	45	81	49	132
Divisible by 2							
Divisible by 3							
Divisible by 5							
Divisible by 6							
Divisible by 9							
Divisible by 10							

	54	67	492	525	111	912	105
Divisible by 2							
Divisible by 3							
Divisible by 5							
Divisible by 6							
Divisible by 9							

Name: ______________________________

Period: ____

Key Terms

When multiplying or dividing a positive and a negative number, the solution will be

____

When adding a positive and a negative number, you must _____________

When adding two negative numbers, the solution will be

____

When multiplying or dividing two negative numbers, the solution will be _____________

Key Concept

Integers: Subtraction is the same thing as

______________ a positive and a ______________ number.

Practice

1) $-10 - 2 =$ _______

2) $-14 - (-5) =$ _______

3) $-6(-2)(-3) =$ _______

4) $5 + -4 =$ _______

5) $-10 + -2 =$ _______

6) $\frac{-12}{-3} =$ _______

7) $-\frac{24}{4} =$ _______

8) $\frac{18}{-6} =$ _______

9) $6(-5) =$ _______

10) $-3(-7) =$ _______

0.2: Practice - Foundational Algebra Terms

Key Terms

Term is something ______________ by a ___ or a ___.

Like Terms have same ______________ and same ______________ .

Coefficient is a number ______________ by a variable.

Constant is a number that has a ______________ numerical value.

Key Concept

A Variable is a ______________ or letter that represents an unknown ________________ that varies in an expression or ______________ .

In the following expressions identify the key parts.

1) $2 + y - 7$

The terms ______________________

Variable(s): ________

Coefficient: ________

Constant(s): __________

2) $3x^2 + 4x - 9$

The terms ______________________

Variable(s): __________

Coefficient(s): ________

Constant(s): __________

3) $5x - 6y + 2z - 14$

The terms ______________________

Variable(s): __________

Coefficient(s): ________

Constant(s): __________

4) $55 - 9x + 3y + 4$

The terms ______________________

Variable(s): __________

Coefficient(s): ________

Constant(s): __________

Name: ______________________________

Period: ____

Practice (continued)

5) Circle the expression in the following examples:

$4x + 9z$ $\quad (21 - 13)b = 4y + 56$ $\quad 33 + 7 = x$ $\quad 85 \div 27 = \frac{6-\sqrt{2x}}{43 \div 9}$

6) Circle the equations in the following examples:

$4x + 9z$ $\quad (21 - 13)b = 4y + 56$ $\quad 33 + 7x$ $\quad 85 \div 27 = \frac{6-\sqrt{2x}}{43 \div 9}$

$\sqrt{97} + 1 = 51x - \frac{1}{3}$ $\quad 2 + 3 = 5$ $\quad 3\beta - 5\pi$ $\quad 17$ $\quad x = 0$

7) In your own words, explain the difference between an expression and an equation.

An expression is ____

____

An equation is ____

____

0.3: Practice - Order of Operations

Key Terms

PEMDAS is an acronym to help us remember the ______________ of ______________ used to simplify expressions.

It stands for

P _________________

E _________________

M ________________

D _________________

A _________________

S _________________

Key Concept

The acronym PEMDAS is remembered by saying, "Please Excuse My ______________ Aunt Sally" but is followed by "From Leaving The ______________ " (FLTR). This second phrase is important because we must apply it when we are ______________ and ______________ and also when we are ______________ and ______________ from left to right (FLTR).

Practice

Simplify the following expressions:

1) $2(6 + (-4)) - 8$ ______________

2) $6[13 - 5(4 + 3)]$ ______________

3) $4 + 9(15 - 11)$ ______________

4) $12 \div 4(-4 + 7)$ ______________

5) $(-5)^2 - 2 \cdot (-9) + 6$ ______________

6) $3 \cdot 10 + 8 - 4^2 =$ ______________

Name: ______________________________

Period: ____

Practice

7) $(-9) - (-8) + 2 \cdot 4^2$ ____________

8) $(-3)^2 - 2 + 8 \div (-8)$ ____________

9) $8 \div (-4) \cdot (-6)^2 + 7$ ____________

10) $4(-8) + 6 - (-2)^3$ ____________

11) $2^3 \cdot 10 - 3 + (-2)$ ____________

12) $(-5) \cdot (7 - 4 \cdot 2^3)$ ____________

13) $10 + 6 \cdot 2 - (-3)^3$ ____________

14) $10 \cdot 5 - (-6)^2 + (-8)$ ____________

15) $(-5)^2 \cdot 3 \div 5 + 9$ ____________

16) $(10 \div (-5) - (-2)) \cdot (-3)^2$ ____________

17) $\cdot (-6) \div 8 + 3^2$ ____________

18) $(5^2 - 6 + (-5)) \cdot 2$ ____________

19) $9 \cdot (-10) - (-3)^3 + 10$ ____________

20) $-7 \cdot 9 \div (-5 - (-2)^2)$ ____________

0.4: Practice - Inverse Operations

Key Terms

Operators are _______________ that represent the _______________ .

Inverse Operations undo or _______________ the effect of the original operation.

Key Concept

An operation in math is a process involving an action such as addition, _______________ ,

Multiplication, _______________ , squaring,

__________________ , etc.

Practice

Name the operation represented by the symbols below.

Symbol	Operation
$\cdot$	
$+$	
()()	
^	
$\sqrt{}$	
/	

Name: _______________________________

Period: ____

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0.5: Practice - Solving One-Step Equations Using Inverse Operations

Key Terms

Define in your own words.

Variable: ______________

____

____

Constant: ______________

____

____

Isolate: ________________

____

____

Inverse Operations are operations that _________ each other.

Key Concept

Use ______________ operations to isolate the ______________ (unknown).

- The inverse of subtraction is ___________________
- The inverse of multiplication is _________________
- The inverse of a fraction is ____________________
- The inverse of squaring is _____________________

Steps: 1. ____

2. ____

3. ____

Practice

Solve the following equations. Show your work.

1) $x - 4 = 8$ 2) $y + 7 = 8$ 3) $g - 11 = 3$

4) $2x = 26$ 5) $3y = 27$ 6) $6r = 5$

7) $\frac{1}{2}x = 3$ 8) $\frac{1}{4}y = 3$ 9) $\frac{1}{5}w = 7$

Name: ______________________________

Period: ____

Key Concept

Use inverse ______________ to solve for the ______________.

- The inverse of Addition is ________________________
- The inverse of division is _________________________
- The inverse of a square root is _____________________

Practice

Solve the following equations. Show your work.

10) $x + 4 = 32$

11) $5x = 45$

12) $\frac{1}{6}y = 4$

13) $\frac{1}{4}x = 12$

14) $x = \sqrt{16r^2}$

15) $7m = 49$

16) $w + 12 = 25$

17) $x = \sqrt{(4x)^2}$

18) $\frac{1}{8}w = 5$

19) $x = \sqrt{36}$

20) $9y = 54$

21) $y - 2 = 18$

22) $-42 + x = -19$

23) $9 = x + 7$

24) $x^2 = 25$

0.6: Practice - Solving Multi-Step Equations / Inverse Operations

Key Terms

To solve means to find the value of the ____________ in an ______________ .

What you do to one ______________ of the equation you must do to the ______________ .

.

Key Concept

Before you can solve an equation with variables on both sides, you must get the ______________ to only _________ ________.

Practice

Solve the following equations.

1) $6x + 7x = -13$

2) $-5y - 3y = 16$

3) $4d + 7 + 2 = 17$

4) $-3x - 8x = 0$

5) $9w + 12w = 42$

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

Name: ______________________________

Period: ____

Practice

7) $3(-6+3y)=18$

14) $30=-5(6w+3)$

8) $6x+7=13+7x$

15) $13-4x=1-x$

9) $-7w-3w+2=-8w-8$

16) $-8-r=r-4r$

10) $-14+6y+7-2y=1+5y$

17) $x+2=-14-n$

11) $14-4x=x-3x$

18) $7y-3=3+6y$

12) $5+2d=2d+6$

19) $-10+d+4-5=7d-5$

13) $-8x+4(1+5x)=-6x-14$

20) $-6x-20=-2x+4(1-3x)$

0.7: Practice - Coordinate Planes & Graphing Points

Key Terms

x-axis is the ____________ reference line.

y-axis is the ____________ reference line.

Ordered Pair - an ___ and a ___ value written in order as (___, ___).

Origin - where the x *and* y axes ______________ , at (___, ___).

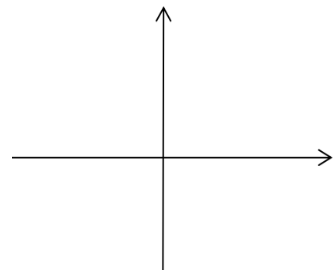
Key Concept

Identify the parts of the coordinate plane.

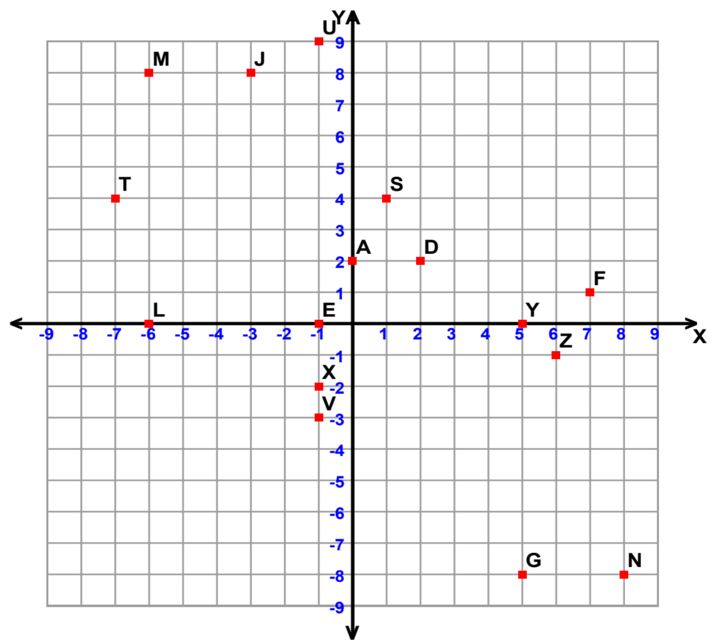
2) Label the *x* and *y* axes.

3) Label the origin

4) Label the 4 quadrants with I, II, III & IV



Practice



Write the corresponding point of the ordered pairs below.

1) $(-6, 0)$ ____ 2) $(-7, 4)$ _____ 3) $(7, 1)$ ____

4) $(2, 2)$ ____ 5) $(-1, 9)$ ____ 6) (1,4) ____

Write the ordered pair for each given point.

7) G ________ 8) A ________ 9) N ________

10) M ________ 11) X ________ 12) V ________

Plot the following points on the coordinate plane above.

13) H $(4, -6)$ 14) Q $(0, 8)$ 15) B $(4, 5)$

16) C $(1, -2)$ 17) K $(-9, 0)$ 18) R $(9, 7)$

Name: ______________________________

Period: ____

Key Terms

Define in your own words.

Coordinate Plane: _______

____

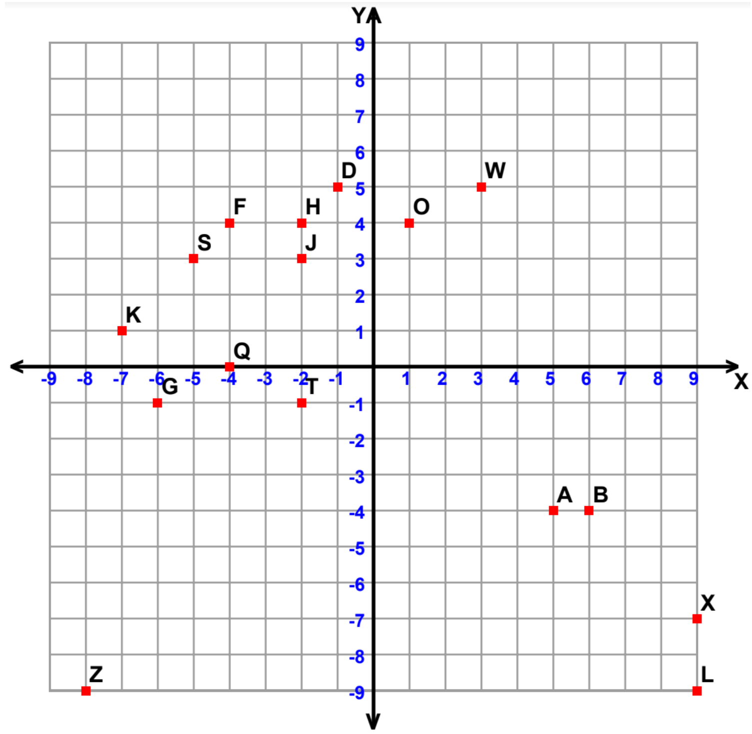
____

____

Graph: _______________

____

____



Practice

Write the corresponding point of the ordered pairs below.

19) $(-4,4)$ ____ 20) $(-4,0)$ ____ 21) $(-1,5)$ ____

22) $(9,-7)$ ____ 23) $(-6,-1)$ ____ 24) (3,5) ____

Write the ordered pair for each given point.

25) B _______ 26) J _______ 27) T _______

28) K _______ 29) H _______ 30) Z _______

31) O _______ 32) A _______

Plot the following points on the coordinate plane above.

33) Y $(9,2)$ 34) R $(-3,-1)$ 35) M $(6,0)$

36) R $(-5,-2)$ 37) U $(-3,8)$ 38) V $(7,9)$

39) I $(-1,1)$ 40) N $(-4,6)$

0.8: Practice - Properties of Addition & Multiplication

Key Terms

The *Commutative Property* changes the ____________ of the terms being ________________ or ________________ .

It does not _____________ the sum or product.

To Associate means to ________________ .

Key Concept

You use the ________________ *property or the* ________________ *property to make an expression easier to* ________________ *.*

Practice

Use the Commutative properties to simplify the following expressions.

1) $15 + 21 =$ ______________

___________ = ___________

2) $5 \cdot 12 =$ ______________

___________ = ___________

3) $16 + 37 + 4 =$ ______________

___________ = ___________

___________ = ___________

4) $8 \cdot 3 \cdot 5 =$ ______________

___________ = ___________

___________ = ___________

5) $3 \cdot 11 \cdot 4 =$ ______________

___________ = ___________

___________ = ___________

Name: ______________________________

Period: ____

Practice

Use the Associative properties to simplify the following expression.

6) $3 + 38 + 17 =$ __________________

____________ = ____________

____________ = ____________

7) $12 + 73 + 18 =$ __________________

____________ = ____________

____________ = ____________

8) $4 \cdot 12 \cdot 5 =$ __________________

____________ = ____________

____________ = ____________

9) $3 \cdot 3 \cdot 4 \cdot 4 =$ __________________

____________ = ____________

____________ = ____________

10) $3 \cdot 5 \cdot 5 =$ ____________________

____________ = ____________

____________ = ____________

11) $5 + 16 + 25 =$ __________________

____________ = ____________

____________ = ____________

12) $6 \cdot 2 \cdot 6 =$ __________________

____________ = ____________

____________ = ____________

0.9: Practice - Distribution

Key Terms

Distributive Property is multiplying a number by a _________________ , is equivalent to _________________ each term separately.

Key Concept

To use the distributive _________________ you must distribute the outside _________________ each _________________ inside the parenthesis.

Practice

Use the distributive property to simplify the following expression.

1) $4(3+10) = \_\_\_ \cdot \_\_\_ + \_\_\_ \cdot \_\_\_ = \_\_\_ + \_\_\_ = \_\_\_\_$

2) $3(1-8) =$

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

4) $r(2+9) =$

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

6) $7x(8+1) =$

Name: ______________________________

Period: ____

Key Concept

Be sure you multiply the outside factor to _______________ the terms inside the _______________ .

Practice

Use the distributive property to simplify the following expression.

7) $x(10-2y)=$

8) $3x(100-p)=$

9) $4(3x+10y)=$

10) $8x(5m+3b)=$

11) $-7(-3-3x)=$

12) $-(10x-1)=$

13) $\frac{1}{2}(16+98x)=$

14) $\frac{1}{3}(6+x)=$

15) $\frac{1}{5}(10x-2)=$

0.10: Practice - Factoring (GCF) & Binomials

Key Terms

Factor is one part of a ________________ , and is a ________________ , variable or expression you ________________ to get the product.

The largest number that can divide evenly into two or more other numbers is called the ______________ ________________ ________________.

Prime Factorization - factoring a number until all factors are _____________ ________________.

Key Concept

Greatest Common Factor is the ________________ number or ________________ that can be evenly ________________ out of two or more terms.

Steps for prime factorization

1. Find the ______________ ______________ of each term.
2. Circle each ______________ ______________ each time it appears in both numbers.
3. ________________ the common factors.

Practice

Find the greatest common factor of the following numbers and expressions.

1) 15 and 36

2) 35 and 21

3) 72 and 48

4) 24 and 96

5) 27 and 81

Name: ______________________________

Period: ____

Steps to Factoring Binomials

To factor a binomial...

1. Find the _______________ _______________ _______________ of each term in the _______________ .
2. Rewrite the expression as a __________ of the factored terms.
3. Put the __________ in front of the expression and put the remaining __________ in parenthesis.

Note: This is like doing distribution in reverse order.

Practice

Factor the following binomials completely.

6) $4x + 22 =$ _______________

7) $24y - 45 =$ _______________

8) $20b - 30b =$ _______________

9) $69w + 48 =$ _______________

10) $72m + 36 =$ _______________

0.11: Practice - Fractions

Key Terms

A fraction is another way to write _______________.

The total number of ________________ parts is represented by the ________________ .

The number of equal parts is represented by the ________________ .

Key Concept

In order to add or subtract fractions it is necessary to have a ________________ ________________ .

Practice

Simplify the following expressions completely.

1) $\frac{1}{3}+\frac{4}{5}$

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

3) $\frac{2}{5}+\frac{1}{4}$

4) $\frac{1}{5}+\frac{2}{3}$

5) $\frac{2}{10}-\frac{2}{4}$

6) $\frac{3}{4}+\frac{1}{2}+\frac{1}{3}$

Name: ________________________________

Period: ____

Key Terms	Key Concept
To reduce a fraction means to rewrite it in its _______________ form.	The simplest way to reduce a fraction is to _______________ the numerator and denominator before _______________ , simplify, and then _______________ anything remaining. 

Practice

Simplify the following expressions completely.

7) $\frac{1}{3} \cdot \frac{4}{5}$

8) $\frac{1}{2} \cdot \frac{2}{4}$

9) $\frac{2}{5} \cdot \frac{1}{4}$

10) $\frac{3}{10} \cdot \frac{1}{5}$

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

12) $\frac{3}{8} \cdot \frac{32}{6}$

13) $\frac{3}{4} \cdot \frac{1}{2} \cdot \frac{1}{3}$

14) $\frac{1}{2} \cdot \frac{12}{5}$

15) $\frac{24}{5} \cdot \frac{10}{4}$

16) $\frac{3}{10} \cdot \frac{5}{6}$

17) $\frac{10}{12} \cdot \frac{9}{4}$

18) $\frac{20}{7} \cdot \frac{14}{5}$

0.12: Practice - Mean, Median, Mode, & Range

Key Terms

The Mean of a data set is the _______________ value of the set of numbers.

The Median is the _______________ number of a data set.

The Mode is the _______________ that occurs most often in a data set. There can be no more than ____ modes in a data set.

Key Concept

To find the median of a data set you should first renumber the elements from ________________ to ________________ . When a data set has an even number of elements the median is the ________________ of the middle two numbers.

Practice

Find the mean, median, mode, and range of the following data sets. Round to the nearest whole number.

1) {13, 71, 13, 54, 36, 48, 21}

   a) Mean: c. Mode:

   b) Median: d. Range:

2) {2, 2, 4, 4, 7, 7, 10, 10}

   a) Mean: c. Mode:

   b) Median: d. Range:

3) {28, 27, 15, 19, 21}

   a) Mean: c. Mode:

   b) Median: d. Range:

Name: ______________________________

Period: ____

Practice

Find the mean, median, mode, and range of the following data sets. Round to the nearest whole number.

4) {40, 25, 35, 20, 80, 20}

a) Mean: c. Mode:

b) Median: d. Range:

5) {48, 42, 44, 47, 47, 42, 40}

a) Mean: c. Mode:

b) Median: d. Range:

6) {103, 101 105, 107}

a) Mean: c. Mode:

b) Median: d. Range:

7) {9, 5, 7, 1, 5, 6, 5, 6}

a) Mean: c. Mode:

b) Median: d. Range:

0.13: Practice - Properties of Exponents

Key Terms

The *Base of a Power* is the ________________ or ________________ being multiplied.

An *Exponent* is a number, x, that a ______________ is raised to. The base is multiplied by __________ x number of times.

A *Power* is a base with an ________________ .

Key Concept

To write a power in expanded form means to write the _____________ of the power as _______________ multiplication by itself, the same number of times as specified by the ________________ .

Practice

Expand the following powers.

1) 4^6 ____________________________________

2) x^3 ____________________________________

3) $4^6 \cdot x^3$ ________________________________

4) $(4x)^3$ _________________________________

5) $4x^3$ ___________________________________

Simplify using the *Product* rule. $x^m \cdot x^n = x^{m+n}$

6) $x^5 \cdot x^6$ _______________________________

7) $2^3 \cdot 2^4$ _______________________________

8) $(x^2y)(x^4y^5)$ ___________________________

Simplify using the *Quotient* rule. $\frac{x^m}{x^n} = x^{m-n}$

9) $\frac{3^6}{3^2}$ __________________________________

10) $\frac{x^7}{x^4}$ _________________________________

11) $\frac{3^6x^7}{3^2x^4}$ ______________________________

Name: ______________________________

Period: ____

Practice

Simplify using the *Power* rule. $(x^m)^n = x^{mn}$

14) $(4^6)^3$ ______________________________

15) $(w^5)^7$ ______________________________

16) $(2x^3)^8$ ______________________________

Simplify using the *Zero Exponent* rule. $x^0 = 1$

17) 132^0 ___________________

18) $463(x)^0$ _________________

19) $2(5xy)^0$ _________________

Simplify using the *Negative Exponent* rule. $x^{-m} = \frac{1}{x^m}$

20) 7^{-3} ______________________

21) $-(43)^{-4}$ _________________

22) $(\frac{2}{3})^{-7}$ ___________________

Appendix A: Study Guide

"By failing to prepare, you are preparing to fail." Benjamin Franklin

Teachers are always telling you, "be sure to study," but what does this really mean? If you don't understand *how* to study you will not be effective at actually studying. Below are several topics that should help you better prepare yourself for success.

What does studying mean? It means giving *time and attention* to what you learned in class in order *to gain knowledge*. It isn't something you have to do, it is something you should want to do in order to be successful in school.

Study Habits

Studying is specific and focused. The following tips should be considered:

1. Studying must be planned and deliberate. Set aside specific times each day in a place that is free of distractions. Saying that you'll study when you have time equates to never having time.
2. Daily review. Set aside a specific time each school day and take a few minutes to review your notes and the day's lesson. Identify what you didn't understand so that you can ask questions during the next class or tutoring session.
3. Short daily sessions of 20 to 30 focused minutes. This can be more effective than 1 or 2 hours all at once.
4. Find a place where you can focus best. It may be a quiet room or it could be a noisy Starbucks. Find what works best for you.
5. Eliminate distractions. Multitasking has been shown to be ineffective when it comes to studying. Put away your phone and other electronics.
6. Music may help you or hinder your concentration. Studies show that the majority of people do not study well when lyrics are sung. Your brain only focuses on one thing at a time. So ask yourself, *"is this really helping me."*
7. Actively study by saying the material out loud.
8. Become a teacher. A great way to learn is to teach. Explain to another student, or even your cat, the steps needed to complete a problem. This has the added benefit of identifying areas of struggle in order to ask specific questions for clarification.

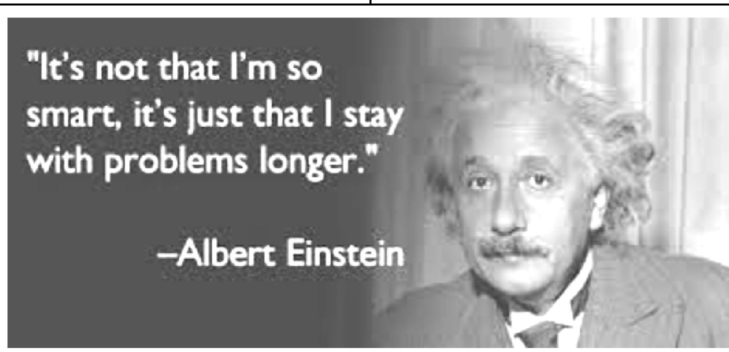
DHS GOLDEN EAGLES

Name: ______________________________

Period: ____

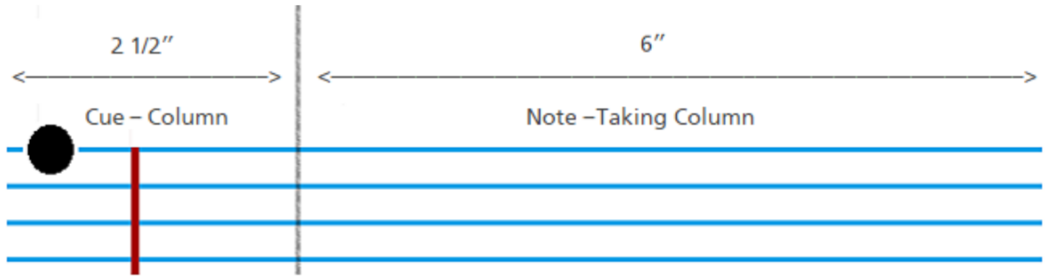
Study Strategies

Effective Strategies	**Ineffective Strategies**
• Work through practice problems and verify your answers are correct. • Work and rework through pre-assessments until you can complete them without help. • Quiz yourself using your notes. Flashcards are helpful for key terms and concepts. Only 10% of your study time should be devoted to flashcards. • Rewrite the directions in your own words to reinforce and ensure understanding. Highlighting action words is also helpful. • Watch online tutorials, pause and work along with the tutorial. Practice related problems to deepen understanding. • Write a reflection after each study session. Be specific and target your learning objectives. Use academic language (key terms). • Form a study group to work with regularly. Learning with and from others deepens understanding through varied perspectives.	• Work completed during class time is new learning, not "studying." • Practice assignments provide opportunities to learn what you were taught during class. Studying is "focused attention with a goal of understanding & retention" that requires more work than just the assignments provided can offer. • Taking notes is not enough. Notes can help you study, but you must review notes while practicing to deepen understanding & make connections. • Reading or rereading notes is different from studying notes for understanding. • "Going over what we learned in class" is not enough. Study uses a specific method of focus. • Writing reflections that are overly general serve no purpose. • "Cramming" the day before a test does not help you retain information or make deep connections to other math concepts.

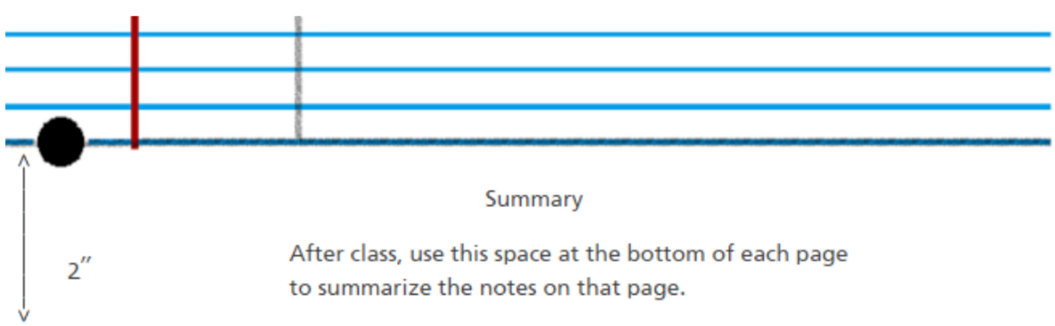


Note Taking

There are many forms of "Note Taking;" however, in this class, we use Cornell Notes. It is proven highly effective in making connections and enforcing conceptual understanding. Many college professors also require notes in this format. See the format & example below.



1. Record: During the lecture, use the note-taking column to record the lecture using telegraphic sentences.
2. Questions: As soon after class as possible, formulate questions based on the notes in the right-hand column. Writing questions helps to clarify meanings, reveal relationships, establish continuity, and strengthen memory. Also, the writing of questions sets up a perfect stage for exam-studying later.
3. Recite: Cover the note-taking column with a sheet of paper. Then, looking at the questions or cue-words in the question and cue column only, say aloud, in your own words, the answers to the questions, facts, or ideas indicated by the cue-words.
4. Reflect: Reflect on the material by asking yourself questions, for example: "What's the significance of these facts? What principle are they based on? How can I apply them? How do they fit in with what I already know? What's beyond them?
5. Review: Spend at least ten minutes every week reviewing all your previous notes. If you do, you'll retain a great deal for current use, as well as, for the exam.



*Taken from *The Learning Strategies Center* at Cornell University

Youtube link for Study Skills - Note Taking
https://www.youtube.com/watch?v=E7CwqNHn_Ns&disable_polymer=true

Cornel notes explained
http://lsc.cornell.edu/study-skills/cornell-note-taking-system/

Name: ______________________________

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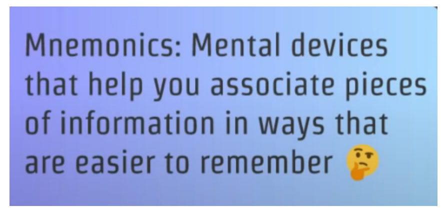
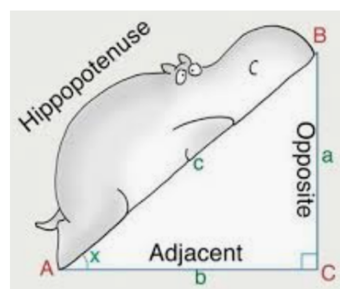
Improving Your Memory

Memory isn't just something you have, it is something you can improve. Below is a list of strategies to use to help you remember. Use as many strategies as possible to improve your memory!

1. Space your study sessions out throughout the week. Studying a little bit every day increases your retention and recall.
2. Organize and structure your material. Put similar items together, create outlines or color code using highlighters.
3. Use mnemonic devices such as PEMDAS. An example with $domain$ and range is: alphabetically, domain (d) comes before range (r) and x comes before y. The domain is represented by x and the range by y. Alphabetically they correspond.



4. Avoid cramming, or last minute studying. Material "crammed" into your brain at last minute gets stored in short term memory and will be easily forgotten. You must study over many days to shift the short term memory to long term.
5. Relate New Information to Things You Already Know.
6. Focus all your attention on what you are studying. Turn off your electronics, study in a room without distractions from siblings or others, etc.
7. Visualize concepts by drawing graphs or pictures, or imagining a humorous diagram. Even flashcards can be beneficial for this.



8. Teaching the material to someone or something else helps with better recall. At the very least read out loud.
9. Rehearse and elaborate by, for example, reading the definition of a key term, studying that definition, and then reading a more detailed description of the term. After repeating this a few times try writing the definition down in your own words. You will be amazed at what you recall.

Youtube link for Study Skills: Memory

https://www.youtube.com/watch?v=SZbdK9e9bxs&list=PL8dPuuaLjXtNcAJRf3bE1IJU6nMfHj86W&t=0s

All material paraphrased from *Study Skills Crash Course, by* Thomas Frank.

Studying for Assessments

"By failing to prepare, you are preparing to fail." ~ Benjamin Franklin

To really be successful in high school it is important to study. Showing up for class and doing your homework are not usually enough to do well on exams. Learning takes time and does not happen overnight. If you plan to do well on assessments, good study habits are important. The following tips will help:

1. Build a study schedule (how often?, where?, which days?, with whom?, etc.).
2. Create specific study sessions (with goals to master specific concepts).
3. Start studying at least 2 weeks prior to the assessment.
4. Replicate the test conditions as much as possible, and take practice tests when available. Try not to look up information if possible.
5. When ready, quiz yourself by using recall (do not look up information this time).
6. Use the study guide (pre-assessment), notes, and practice assignments.
7. Create flashcards for facts and vocabulary (a maximum of 10% of your study time should be focused here).
8. Allow yourself time off: take breaks, eat healthy, and get adequate sleep.

If you encounter problems you don't understand, avoid saying, "I don't get this," as this causes your brain to shut down. Instead, write down the specific part of the problem that is causing confusion. Take a short break, then spend 10 - 15 minutes trying to rework the problem on your own, using notes & examples. Work the problems line by line through until you know precisely where you are stuck. Write down all the solutions you have come up with so far. This will provide context to others who may be able to help you.

Youtube link for Study Skills - Exams:
https://www.youtube.com/watch?v=mLhwdITTrfE&list=PL8dPuuaLjXtNcAJRf3bE1IJU6nMfHj86W&index=8

All material paraphrased from *Study Skills Crash Course, by* Thomas Frank.

Name: ______________________________

Period: ____

Test Anxiety

Anxiety is often an indication that what you are doing is important. It is common to become anxious while taking a test. There are some things that you can do to reduce test anxiety. According to Thomas Frank from *Study Skills Crash Course,* there are three main causes of test anxiety.

1) The fear of repeating past failures

- Remember that you are not defined by your past fears or failures.
- Identify what you were doing incorrectly in the past so that you can improve.
- Review past exams until you understand your errors.
- Ask for feedback and rework problems correctly before reassessing.
- Every failure is an opportunity to learn, but only when followed by a plan of how you will avoid the same mistakes in the future.

2) The fear of the unknown

- Be prepared. Study as much of the material as you can, and don't wait until the day before an assessment to begin studying.
- When studying, attempt mastery of the problems so that, when taking the test, you are more likely to remember the material. Adequately studying for a test removes most test anxiety.
- Replicate test conditions as much as possible when you study.
- Use the study guides (pre-assessments) and worksheets to practice problems solving. Ask for extra help outside of class to begin understanding any material you are challenged by.
- If possible, study in a classroom that is similar to where you will be tested.

3) The fear of the stakes

- Know that you can recover from a single test. You will have an opportunity to reassess and demonstrate your understanding (which can lead to a grade increase).
- Reassess soon after any failed test. It is important to get feedback and prepare while the material is still fresh, and before learning more complex concepts.
- Know that *"Failure is a great teacher, and often a better one than success."*

The Mayo Clinic released this quick reference guide to reduce test anxiety:

1. Learn how to study efficiently
2. Study early and in similar places
3. Establish a consistent pretest routine
4. Talk to your teacher
5. Learn relaxation techniques
6. Don't forget to eat and drink
7. Get some exercise
8. Get plenty of sleep

If these steps don't improve your test anxiety be sure to ask for further help. You do not need to face this alone.

Youtube link for Study Skills - Test Anxiety

https://www.youtube.com/watch?v=t-9cqaRJMP4&list=PL8dPuuaLjXtNcAJRf3bE1IJU6nMfHj86W&index=9

All material paraphrased from *Study Skills Crash Course, by* Thomas Frank.

Name: ___________________________

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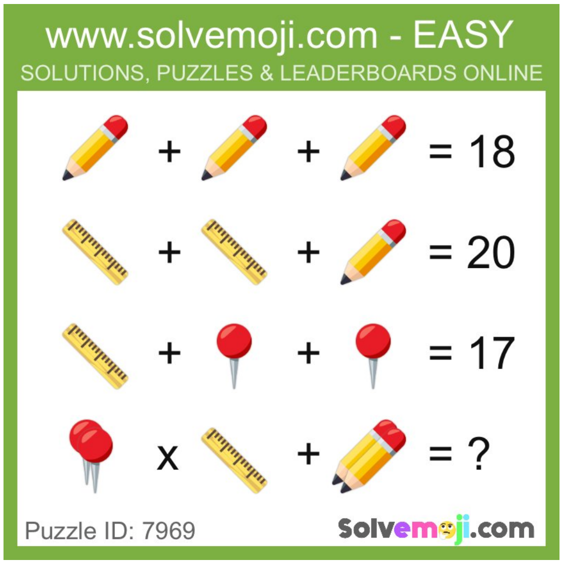
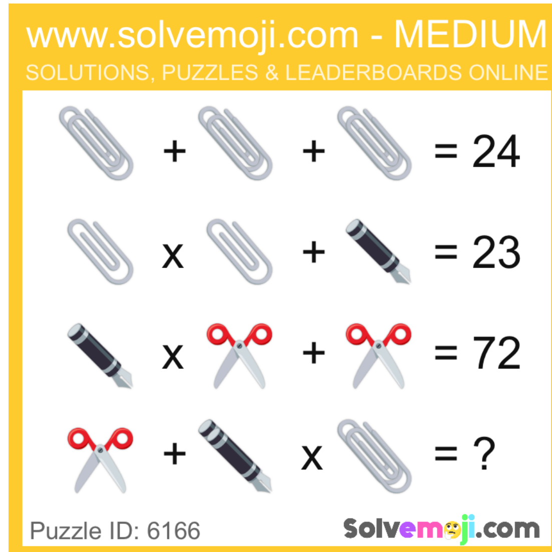
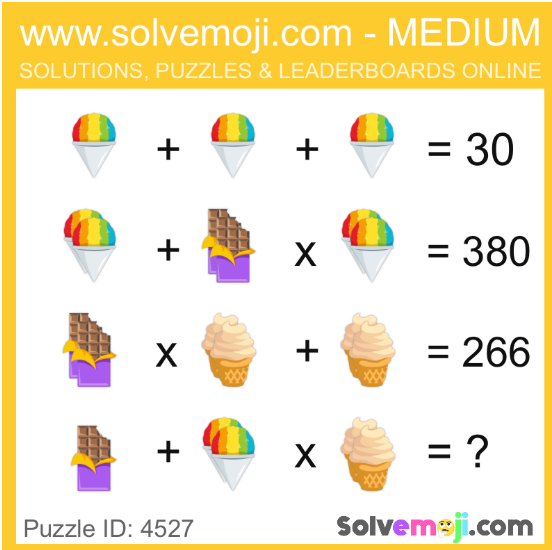
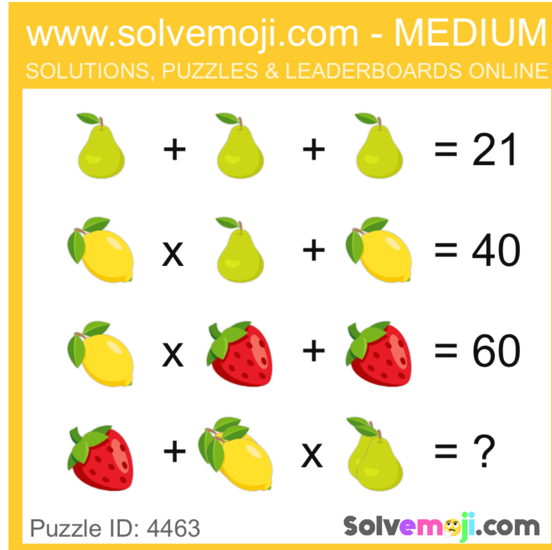
Appendix B: Math Puzzle Challenges

1. 	**2.** 
Pencil: P + P + P = 18 **3P = 18** **(3P)/3 = 18/3** **P = 6**	**Paperclip:**
Ruler: R + R + 6 = 20 **2R + 6 = 20** **-6 -6** **2R = 14** **(2R)/2 = 14/2** **R = 7**	**Calligraphy Pen:**
Thumbtack: 7 + T + T = 17 **7 + 2T = 17** **-7 -7** **2T = 10** **(2T)/2 = 10/2** **T = 5**	**Scissors:**
Total: 2(5) · 7 + 2(6) **10 · 7 + 12 => 70 + 12 => 82**	**Total:**

3.	4.
	
Flavored Ice:	**Pear:**
Chocolate:	**Lemon:**
Ice Cream:	**Strawberry:**
Total:	**Total:**

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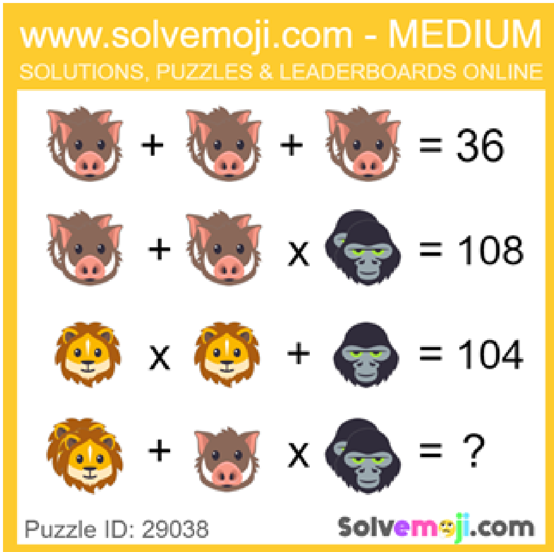
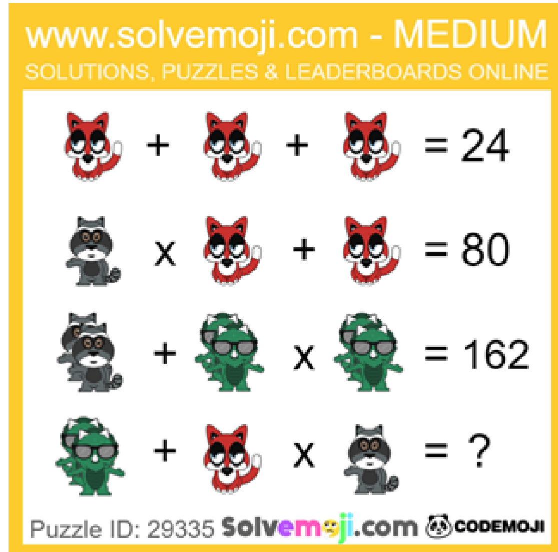
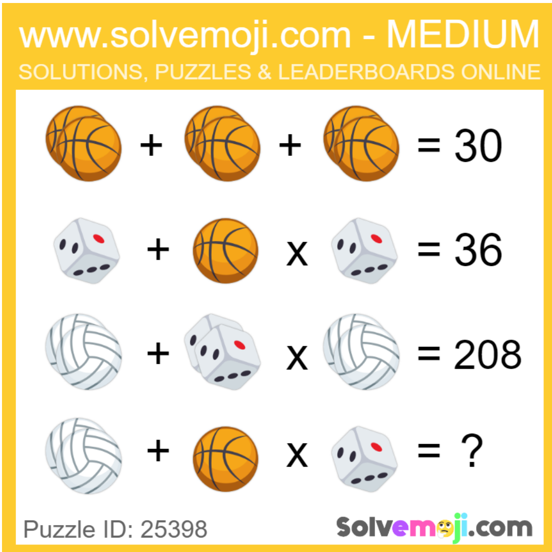
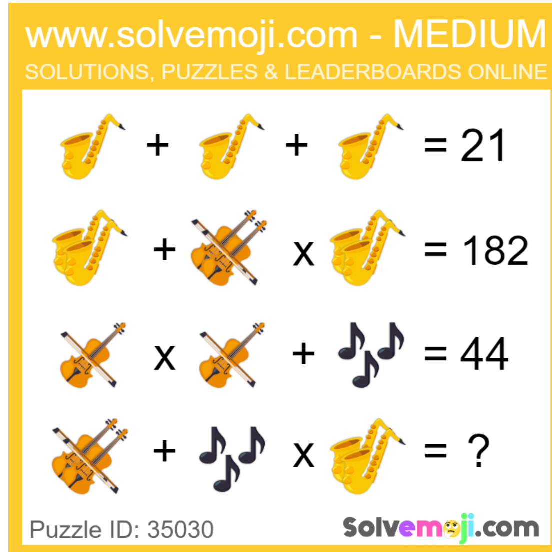
5.	6.
	
Boar:	**Fox:**
Gorilla:	**Raccoon:**
Lion:	**Monster:**
Total:	**Total:**

7.	8.
	
Basketball:	**Saxophone:**
Dice:	**Violin:**
Volleyball:	**Music Notes:**
Total:	**Total:**

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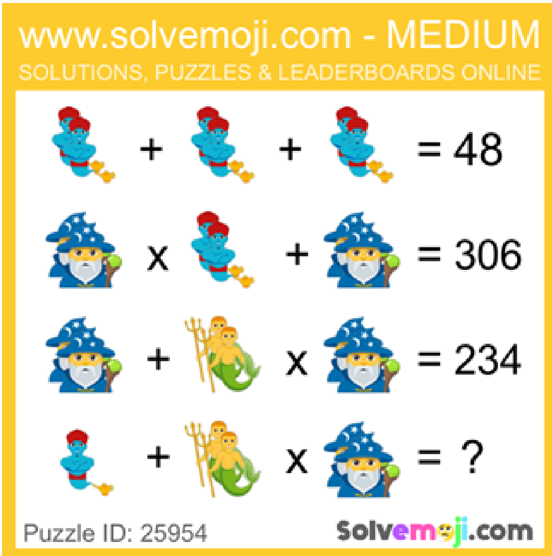
9.



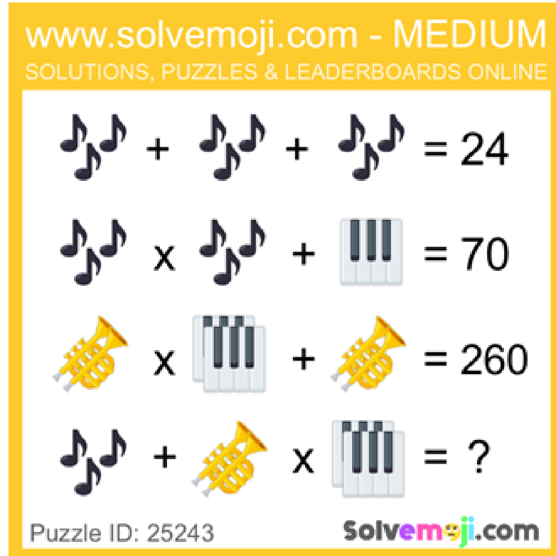
Genie:

Wizard:

Merperson:

Total:

10.

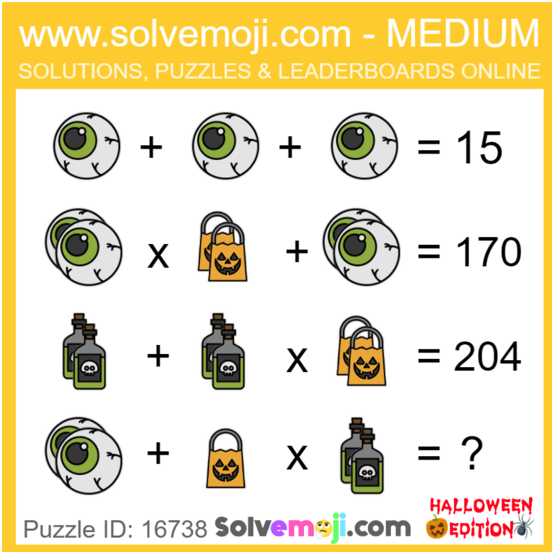
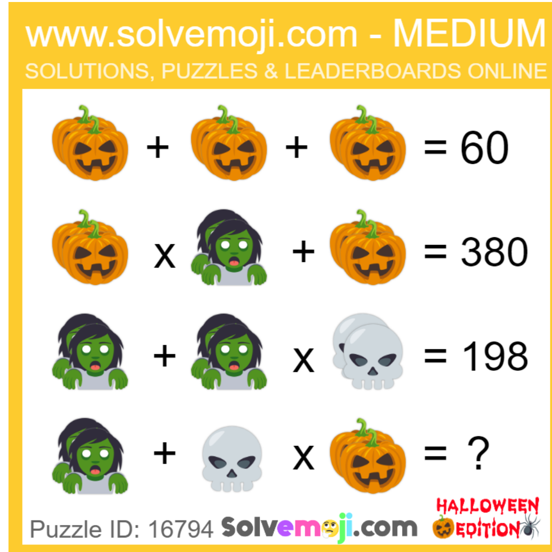


Music Notes:

Keys:

Horns:

Total:

11.	12.
	
Eyeball:	**Jack-O-Lantern:**
Treat Bag:	**Zombie:**
Potion:	**Skull:**
Total:	**Total:**

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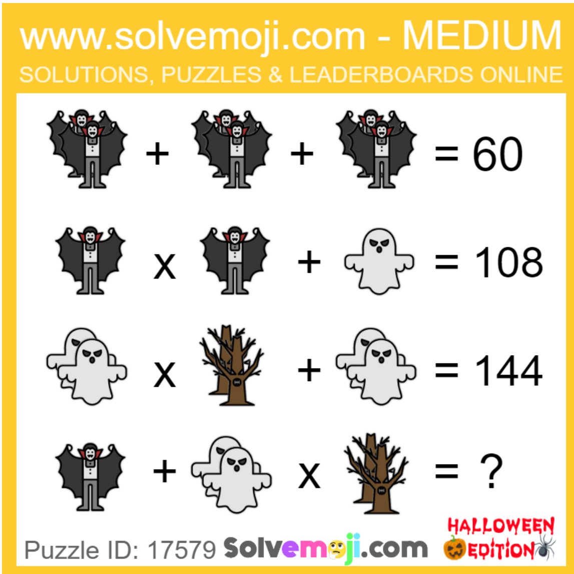
13.



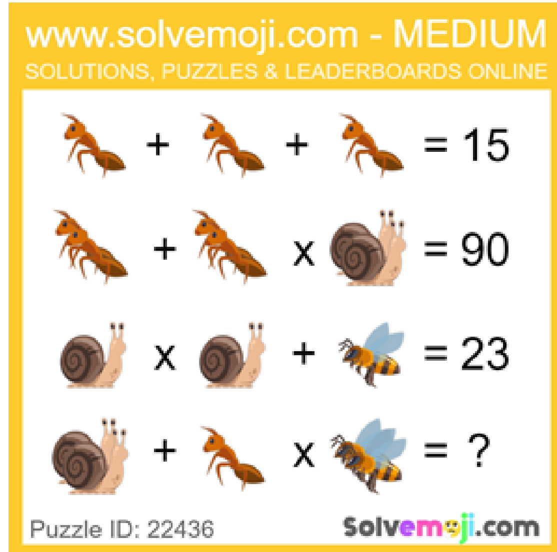
Vampire:

Ghost:

Tree:

Total:

14.

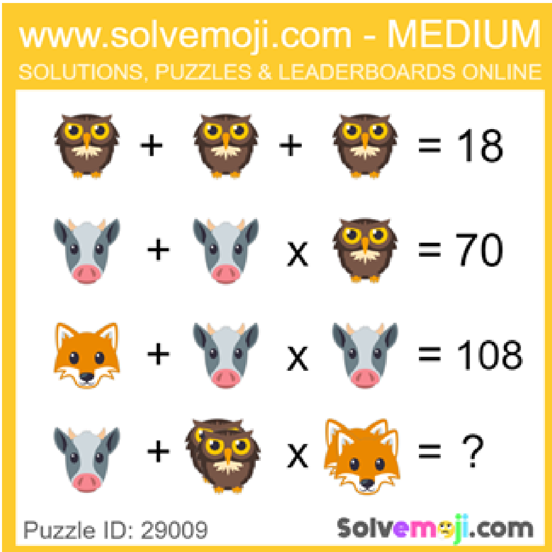
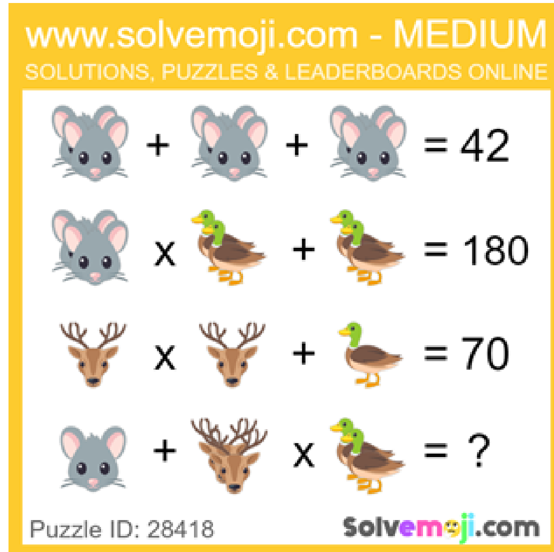


Ant:

Snail:

Bee:

Total:

15.	16.
	
Owl:	**Mouse:**
Cow:	**Duck:**
Fox:	**Reindeer:**
Total:	**Total:**

DHS GOLDEN EAGLES

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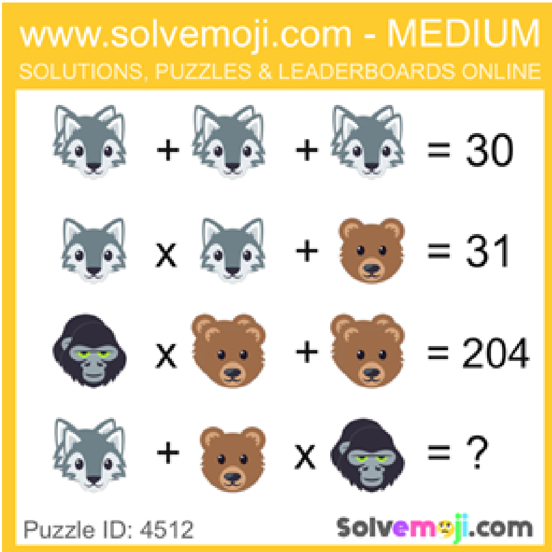
17.



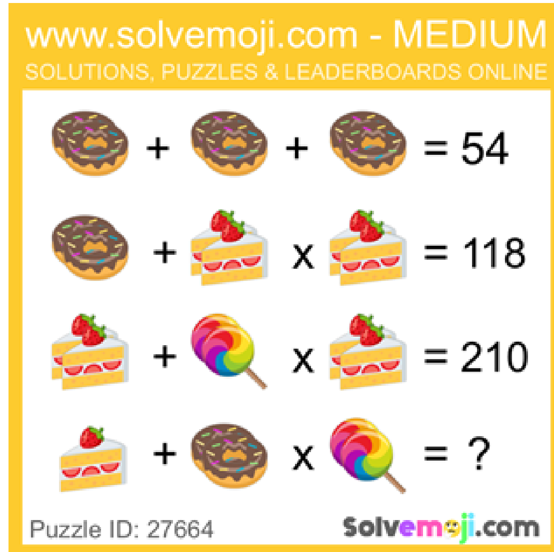
Wolf:

Bear:

Gorilla:

Total:

18.



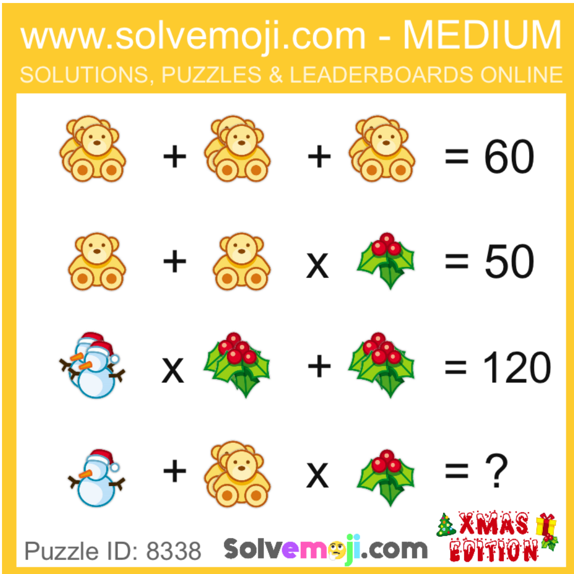
Donut:

Cake:

Lollipop:

Total:

19.



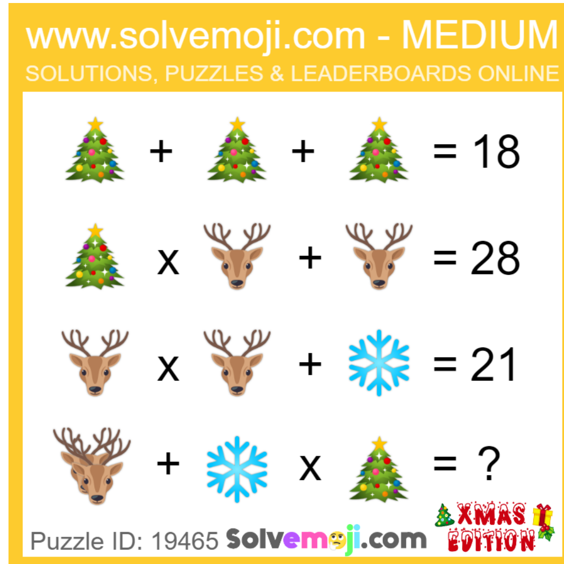
Teddybear:

Holly:

Snow-person:

Total:

20.



Tree:

Reindeer:

Snowflake:

Total:

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Appendix C: Interactive Glossary

Definition	*Student Example or Drawing*
Associate To **Associate** is to group.	
Associative Property of Addition The **Associative Property of Addition** is to rearrange three or more addition terms (addends). The sum is the same regardless of how the terms are grouped. $a + (b + c) = a + (b + c)$	
Associative Property of Multiplication The **Associative Property of Multiplication** is to rearrange three or more terms that are multiplied, the product is the same regardless of how the terms are grouped. $a(bc) = (ab)c$	
Base The ***Base*** (of a Power) is the number or variable being multiplied.	
Coefficient *The* ***Coefficient*** is a number multiplied by a variable.	
Common Denominator When two or more fractions have the same denominator they are said to have a ***Common Denominator***.	

Commute *To* ***Commute*** *is* to move around or travel.	
Commutative Property of Addition The **Commutative Property of Addition** is to change the order of the terms being added. It does not change the sum. $a + b = b + a$	
Commutative Property of Multiplication The **Commutative Property of Multiplication**is to change the order of the terms being multiplied. It does not change the product. $ab = ba$	
Constant A ***Constant*** is a symbol that has a fixed numerical value. For example: 2, 6, 0, -5, -9, 3/8, 4/9 are all constants In the expression 3x + 5, the constant is 5.	
Coordinate Plane A ***Coordinate Plane*** a two-dimensional plane formed by the perpendicular intersection of an x- and a y-axis. Usually represented on a grid.	
Denominator The ***Denominator*** is the divisor. It is the bottom number of a fraction and represents the number of equal parts needed to make a whole.	

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Distribution ***Distribution*** is multiplying a sum by its factor, by multiplying each term (addend) separately within the sum by its factor.	
Distributive Property ***Distributive Property*** is multiplying a number by a sum is equivalent to multiplying each term in the sum separately.	
Equation An ***Equation*** is a mathematical sentence that equates one expression to another. It has an equal sign.	
Expanded Form A power is written in ***Expanded Form*** when the base of the power is written as repeated multiplication. The exponent of the power indicates the number of times the base is multiplied by itself.	
Exponent An ***Exponent*** is a number, x, that a base is raised to. The base is multiplied by itself x number of times.	
Expression An ***Expression*** is a mathematical sentence that contains one or more terms.	
Factor A ***Factor*** is one part of a product. It is a number, variable or expression you multiply to get a product.	

Factoring ***Factoring*** is the act of writing a number or expression as a product of two or more factors.	
Fraction A ***Fraction*** is a number of equal parts of a whole. It represents division.	
Graph A ***Graph*** is a diagram showing the relationship between variable quantities.	
Greatest Common Factor (GCF) The ***Greatest Common Factor*** is the largest number or expression that can be evenly divided out of two or more terms.	
Inequality An ***Inequality*** is a mathematical sentence that compares one expression to another. It has a symbol that shows less than (<, ≤) or greater than (>, ≥). The bar means "or equal to."	
Inverse Operations ***Inverse Operations*** reverse the effect of the original operation. They are operations that undo each other.	
Isolate To ***Isolate*** a variable is to rearrange an algebraic equation so that a specific variable is alone on one side of an equation.	

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Least Common Denominator When two or more fractions have the least common multiple of all the denominators it is called the ***Least Common Denominator***.	
Like Terms ***Like Terms*** have the same variable(s) and same exponent.	
Mean The ***Mean*** is the average value of a set of numbers.	
Median The ***Median*** is the middle value of a data set.	
Mode The ***Mode*** is the number that occurs the most often in a data set.	
Numerator The ***Numerator*** is the top number of a fraction and represents the amount of equal parts.	
One Step Equation A ***One Step Equation*** is an equation that can be solved in only one step.	
Operation An ***Operation*** in math is a process involving an action such as addition, subtraction, multiplication, division, squaring, square roots, etc.	

Operators ***Operators*** are represented by symbols. Some operators have more than one symbol.	
Ordered Pair An ***Ordered Pair*** the coordinate of a point, (x,y), on a coordinate plane.	
Origin The ***Origin*** the point of intersection of the x- and y-axes, located at (0,0).	
PEMDAS ***PEMDAS*** is an acronym to help remember the order of operations used to SIMPLIFY expressions. It stands for Parenthesis (or grouping), Exponents, Multiplication and Division (from left to right), Addition and Subtraction (from left to right).	
Power A ***Power*** is a base with an exponent.	
Prime Factorization ***Prime Factorization*** is factoring a number until all factors are prime numbers.	
Quadrants ***Quadrants*** are the four sections on a coordinate plane created by the intersection of the x- and y-axes. The x and y values change signs depending on the quadrant the coordinate is in.	

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Range of a Data Set The ***Range of a Data Set*** is the difference between the largest value and smallest value contained in the data set.	
Reduce To ***Reduce*** is to rewrite a fraction in its simplest form.	
SADMEP ***SADMEP*** is an acronym to help remember the order of operations to SOLVE equations. It is PEMDAS backwards, so you will work in reverse order.	
Simplify To ***Simplify*** is to rewrite an expression in its simplest form.	
Solve To ***Solve*** is to find the value of a variable that makes an equation true.	
Solving ***Solving*** means to find the value of the unknown in an equation.	
Terms ***Terms*** are separated by a plus or a minus sign. Terms are single numbers, variables, or the product of a number and variable.	
Variable A ***Variable*** a symbol or letter that represents a quantity that varies in an expression or equation. It has no fixed value.	

X-axis The ***x-axis*** is the horizontal reference line.	
Y-axis The ***y-axis*** is the vertical reference line.	

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Appendix D: Justifications

Justification	Hints	Example	Notes
Associative (grouping)	You *associate* with different groups.	$3 + (12 + 5)$ $= (3 + 12) + 5$ $2(3 \cdot 4)$ $= (2 \cdot 3) \cdot 4$	Works with addition and multiplication *not* subtraction or division.
Commutative (ordering)	Since *commutative* has an "o" in it, think order.	$2 + 3 = 3 + 2$ $4 \cdot 5 = 5 \cdot 4$	Works with addition and multiplication *not* subtraction or division.
Distributive (through parentheses)	Think of distributing something to each your friends.	$3(4 + 7) =$ $3(4) + 3(7)$ $-2(5 - 6) =$ $-2(5) - (-2)(6)$	When negatives are on the outside of the parenthesis, make sure you distribute the negative to the second number too.
Identity (staying the same)	You always come back to your identity.	$9 + 0 = 9$ $9 \cdot 1 = 9$	Additive identity is 0. Multiplicative identity is 1.
Inverse (undoing)	When you put your car in "inverse" you go backwards.	$9 + (-9) = 0$ $9 \cdot \frac{1}{9} = 1$	Additive inverse is -1, since -a + a = 0. Multiplicative inverse is $\frac{1}{a}$, since $\frac{1}{a} \cdot \frac{a}{1} = 1$. The inverse of $\frac{a}{b}$ is $\frac{b}{a}$ because $\frac{a}{b} \cdot \frac{b}{a} = 1$.
Property of Equality / Inequality (= , <. >)	What you do (operation) to one side of the equal / inequality sign you must do to the other.	$3 + b = 7$ $3 + b - 3 = 7 - 3$ $b = 4$ $4 + 2b = 10$ $\frac{4}{2} + \frac{2b}{2} = \frac{10}{2}$ $2 + b = 5$	Works for all operations. When multiplying or dividing you must perform the operation on ALL terms.

Reduce / Simplify a Fraction	Rewrite the numerator and denominator in their *smallest* equivalent numbers.	$\frac{2}{6} = \frac{2}{2 \cdot 3} = \frac{1}{3}$	Factor the numerator and denominator to find common factors to remove.
Zero Product Property	If the product of two or more terms equals zero then at least one of the factors must be zero.	$ab = 0$ then $a = 0$ or $b = 0$ $(2x+3)(x-4) = 0$ Then $2x+3 = 0$ or $x-4 = 0$	This is true even if *a* or *b* is an expression.

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X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	30	40	50	60	70	80	90	100
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	30	40	50	60	70	80	90	100
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	40	60	80	100	120	140	160	180	200
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	60	90	120	150	180	210	240	270	300
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	80	120	160	200	240	280	320	360	400
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	100	150	200	250	300	350	400	450	500
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	120	180	240	300	360	420	480	540	600
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	140	210	280	350	420	490	560	630	700
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	160	240	320	400	480	560	640	720	800
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	180	270	360	450	540	630	720	810	900
10	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	200	300	400	500	600	700	800	900	1000
11	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	220	330	440	550	660	770	880	990	1100
12	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	240	360	480	600	720	840	960	1080	1200
13	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	260	390	520	650	780	910	1040	1170	1300
14	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	280	420	560	700	840	980	1120	1260	1400
15	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	300	450	600	750	900	1050	1200	1350	1500
20	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	400	600	800	1000	1200	1400	1600	1800	2000
30	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	600	900	1200	1500	1800	2100	2400	2700	3000
40	40	80	120	160	200	240	280	320	360	400	440	480	520	560	600	800	1200	1600	2000	2400	2800	3200	3600	4000
50	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	1000	1500	2000	2500	3000	3500	4000	4500	5000
60	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	1200	1800	2400	3000	3600	4200	4800	5400	6000
70	70	140	210	280	350	420	490	560	630	700	770	840	910	980	1050	1400	2100	2800	3500	4200	4900	5600	6300	7000
80	80	160	240	320	400	480	560	640	720	800	880	960	1040	1120	1200	1600	2400	3200	4000	4800	5600	6400	7200	8000
90	90	180	270	360	450	540	630	720	810	900	990	1080	1170	1260	1350	1800	2700	3600	4500	5400	6300	7200	8100	9000
100	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	2000	3000	4000	5000	6000	7000	8000	9000	10000