Big Bend Community College

Beginning Algebra

MPC 095

Lab Notebook

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Table of Contents

MPC 095 Module A:
Linear Equations

Order of Operations – Introduction

The order: 1. 2. 3. 4. To remember:	
Example A $5-3(2+4^2)$	Example B $30 \div 5(2)+(4-7)^2$
Practice A	Practice B

Order of Operations – Parenthesis

<table>
<tr><td colspan="2">Different types of parenthesis:

Always do ____________________________ first!</td></tr>
<tr><td>Example A

$(4 + 2) - [5^2 \div (2 + 3)]$</td><td>Example B

$7\{2^2 + 2[20 \div (4 + 6)]\}$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Order of Operations – Fractions

When simplifying fractions, always simplify ____________ and ____________ first, then _____________	
Example A $$\frac{-4^2 - (4 + 2 \cdot 3)}{5 + 3(5 - 4)}$$	Example B $$\frac{(4 + 5)(2 - 9)}{2^3 - (2^2 + 3)}$$
Practice A	Practice B

Order of Operations – Absolute Value

<table>
<tr><td colspan="2">Absolute Value – just like _________________, make positive ______________________</td></tr>
<tr><td>Example A

$-3|2^4 - (5+4)^2|$</td><td>Example B

$2 - 4|3^2 + (5^2 - 6^2)|$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Simplify Algebraic Expressions – Evaluate

Variables – Dozen is _______________ as 12 To Evaluate:	
Example A $4x^2 - 3x + 2 \quad when\ x = -3$	Example B $4b(2x + 3y) \quad when\ b = -2, x = 5, y = -7$
Practice A	Practice B

Simplify Algebraic Expressions – Combine Like Terms

Terms: Like Terms: When we have like terms we can ____________ the coefficients of ___________________	
Example A $4x^3 - 2x^2 + 5x^3 + 2x - 4x^2 - 6x$	Example B $4y - 2x + 5 - 6y + 7x - 9$
Practice A	Practice B

Simplify Algebraic Expressions – Distributive Property

<table>
<tr><td colspan="2">Distributive Property:

We use the distributive property to ___________________________</td></tr>
<tr><td>Example A

$-2(5x - 4y + 3)$</td><td>Example B

$4x(7x^2 - 6x + 1)$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Simplify Algebraic Expressions – Distribute and Combine

Order of operations tells us that _______________ comes before ______________________ So we will always ____________________ first and then _________________________ last	
Example A $4(3x-7)-7(2x+1)$	Example B $2(7x-3)-(8x+9)$
Practice A	Practice B

Linear Equations – One Step Equations

Show that $x = -3$ is the solution to $4x + 5 = -7$ We solve by working ______________________, using the inverse or ____________________ operations!	
Example A $x + 5 = 7$	Example B $9 = x - 7$
Example C $5x = 35$	Example D $\frac{x}{4} = 3$
Practice A	Practice B
Practice C	Practice D

Linear Equations – Two Step Equations

When solving we do Order of Operations in _________________________	
First we will ___________ and _____________ . Then we will ________________ and _______________	
Example A $5 - 7x = 26$	Example B $14 = -2 + 4x$
Practice A	Practice B

Linear Equations - General

Move variables to one side by ________________________________.   Sometimes we may have to ________________ first.   Simplify by _______________ and __________________ on each side.

Example A $2x + 7 = -5x - 3$	Example B $4(2x - 5) + 3 = 5(4x - 1) - 10x$
Practice A	Practice B

Linear Equations – Fractions

Clear fractions by multiplying ______________ by the ___________________________________ Important: Multiply ________________ including ______________________

Example A $$\frac{3}{4}x - \frac{1}{2} = \frac{5}{6}$$	Example B $$\frac{3}{5}x - \frac{7}{10} = -4 + \frac{7}{15}x$$
Practice A	Practice B

Linear Equations – Distributing with Fractions

Important: Always ________________ first and ____________________________ second	
Example A $$\frac{1}{2}=\frac{3}{4}\left(2x-\frac{4}{9}\right)$$	Example B $$\frac{2}{3}(x+4)=5\left(\frac{5}{6}x-\frac{7}{15}\right)$$
Practice A	Practice B

Formulas – Two Step Formulas

Solving Formulas: Treat other variables like ___________________. Final answer is an ______________________ Example: $3x = 15$ and $wx = y$

Example A $wx + b = y \quad for\ x$	Example B $ab + cd = wx + y \quad for\ b$
Practice A	Practice B

Strategy:	
Example A $a(3x + b) = by \quad for\ x$	Example B $3(a + 2b) + 5b = -2a + b \quad for\ a$
Practice A	Practice B

Formulas – Fractions

Clear fractions by ____________________________________ May have to ________________________ first!	
Example A $$\frac{5}{x} + 4a = \frac{b}{x} \quad for\ x$$	Example B $$A = \frac{1}{2}h(b + c) \quad for\ b$$
Practice A	Practice B

Absolute Value – Two Solutions

What is inside the absolute value can be _______________ or ________________ This means we have _____________________	
Example A $\|2x - 5\| = 7$	Example B $\|7 - 5x\| = 17$
Practice A	Practice B

Absolute Value – Isolate Absolute

Before we look at our two solutions, we must first ______________________________ We do this by ________________________________

Example A	Example B
$5 + 2\|3x - 4\| = 11$	$-3 - 7\|2 - 4x\| = -32$
Practice A	Practice B

Absolute Value – Two Absolutes

With two absolutes, we need ____________________________ The first equation is ____________________________ The second equation is ______________________________

Example A $$\lvert 2x-6\rvert = \lvert 4x+8\rvert$$	Example B $$\lvert 3x-5\rvert = \lvert 7x+2\rvert$$
Practice A	Practice B

Word Problems – Number Problems

Translate: • Is/Were/Was/Will Be: • More than: • Subtracted from/Less Then:	
Example A Five less than three times a number is nineteen. What is the number?	Example B Seven more than twice a number is six less than three times the same number. What is the number?
Practice A	Practice B

Word Problems – Consecutive Integers

Consecutive Numbers: First: Second: Third:	
Example A Find three consecutive numbers whose sum is 543.	Example B Find four consecutive integers whose sum is -222
Practice A	Practice B

Word Problems – Consecutive Even/Odd

Consecutive Even:	Consecutive Odd:
First:	First:
Second:	Second:
Third:	Third:
Example A Find three consecutive even integers whose sum is 84.	Example B Find four consecutive odd integers whose sum is 152.
Practice A	Practice B

Word Problems – Triangles

<table>
<tr><td colspan="2">Angles of a triangle add to _________________</td></tr>
<tr><td>Example A

Two angles of a triangle are the same measure. The third angle is 30 degrees less than the first. Find the three angles.</td><td>Example B

The second angle of a triangle measures twice the first. The third angle is 30 degrees more than the second. Find the three angles.</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Word Problems – Perimeter

Formula for Perimeter of a rectangle: Width is the _______________ side	
Example A A rectangle is three times as long as it is wide. If the perimeter is 62 cm, what is the length?	Example B The width of a rectangle is 6 cm less than the length. If the perimeter is 52 cm, what is the width?
Practice A	Practice B

Age Problem – Variable Now

<table>
<tr><td colspan="2">Table:

Equation is always for the ________________________</td></tr>
<tr><td>Example A

Sue is five years younger than Brian. In seven years the sum of their ages will be 49 years. How old is each now?</td><td>Example B

Maria is ten years older than Sonia. Eight years ago Maria was three times Sonia's age. How old is each now?</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Age Problem – Sum Now

Consider: Sum of 8… When we have the sum now, for the first box we use ______ and the second we use _______________	
Example A The sum of the ages of a man and his son is 82 years. How old is each if 11 years ago, the man was twice his son's age?	Example B The sum of the ages of a woman and her daughter is 38 years. How old is each if the woman will be triple her daughter's age in 9 years?
Practice A	Practice B

Age Problems – Variable Time

If we don't know the time:	
Example A A man is 23 years old. His sister is 11 years old. How many years ago was the man triple his sister's age?	Example B A woman is 11 years old. Her cousin is 32 years old. How many years until her cousin is double her age?
Practice A	Practice B

MPC 095 Module B:
Graphing Linear Equations

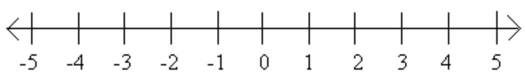
Inequalities:

- Less Than
- Less Than or Equal To
- Greater Than
- Greater Than or Equal To

Graphing on Number Line – Use for less/greater than and use when its “or equal to”

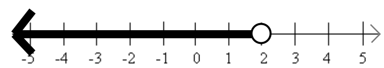
Example A

Graph $x \geq -3$



Example B

Give the inequality



Practice A

Practice B

Inequalities – Interval Notation

Interval notation:

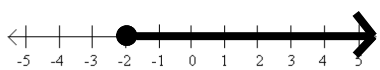
(,   )

Use   for less/greater than and use   when its "or equal to"

∞ and $-\infty$ always use a

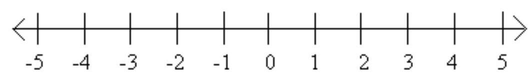
Example A

Give Interval Notation



Example B

Graph the interval $(-\infty, -1)$



Practice A

Practice B

Inequalities - Solving

Solving inequalities is just like ___________________________________

The only exception is if you _______________ or ________________ by a _____________, you must

____

Example A	Example B
$7 - 5x \leq 17$	$3(x + 8) + 2 > 5x - 20$
Practice A	Practice B

Inequalities - Tripartite

Tripartite Inequalities:

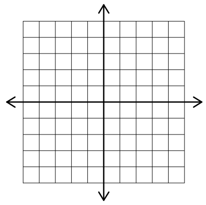
When solving ____________________________________

When graphing ___________________________________

Example A	Example B
$2 \leq 5x + 7 < 22$	$5 < 5 - 4x \leq 13$
Practice A	**Practice B**

Graphing and Slope – Points and Lines

The coordinate plane:

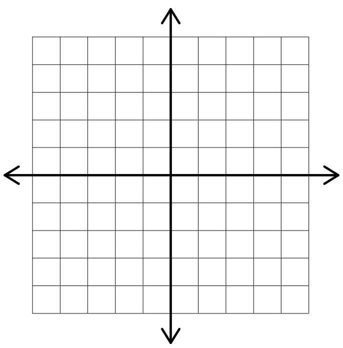


Give ____________________ to a point going _______________ then __________________ as __________

Example A

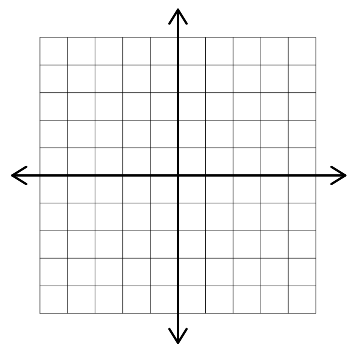
Graph the points

$(-2,3), (4,-1), (-2,-4), (0,3), and\ (-1,0)$

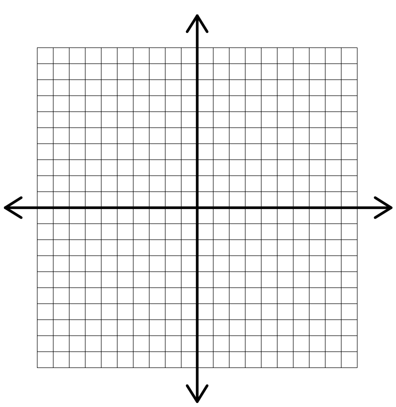


Example B

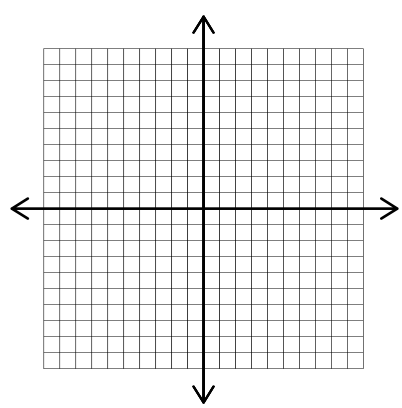
Graph the line: $y = 0.5x - 2$



Practice A



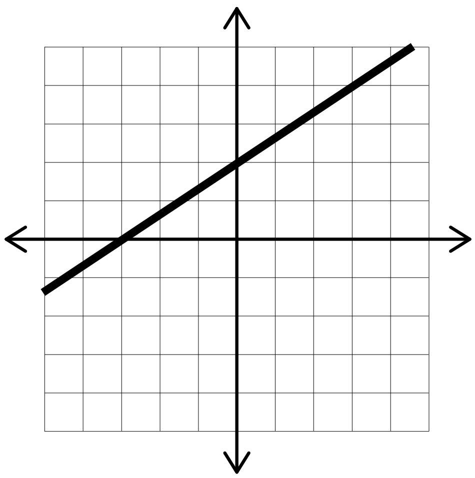
Practice B



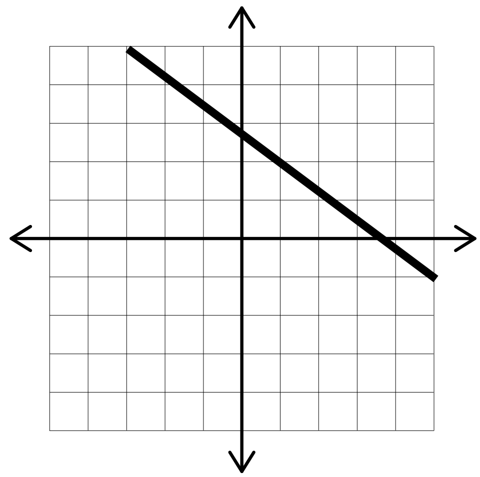
Graphing and Slope – Slope from a graph

Slope:

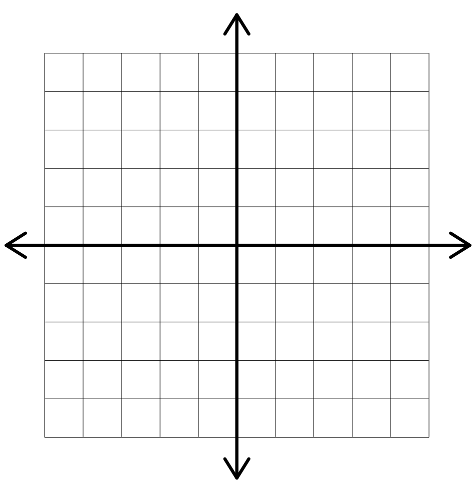
Example A



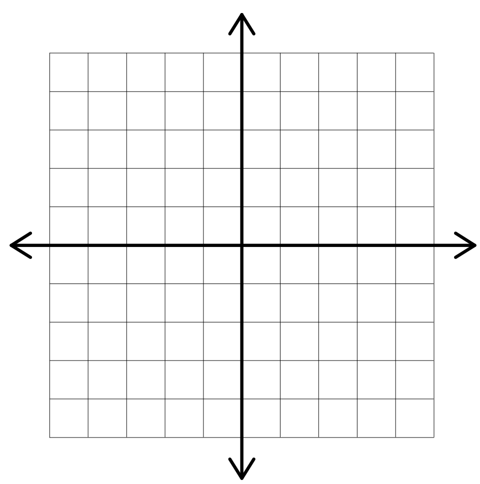
Example B



Practice A



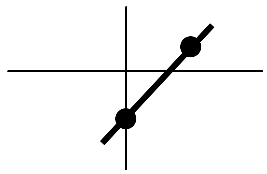
Practice B

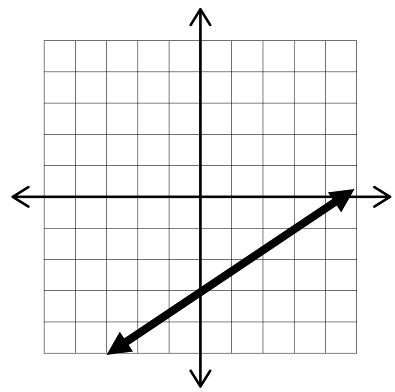


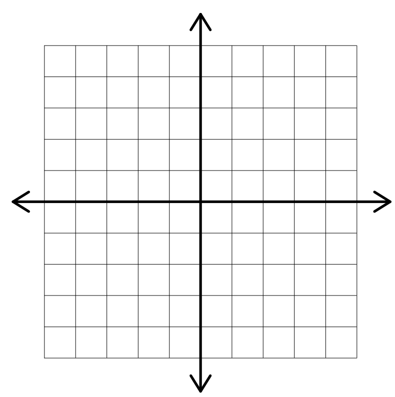
Graphing and Slope – Slope from two points

Slope:	
Example A Find the slope between $(7,2)\ and\ (11,4)$	Example B Find the slope between $(-2,-5)\ and\ (-17,4)$
Practice A	Practice B

Slope-Intercept Equation:



Example A	Example B
Give the equation with a slope of $-\frac{3}{4}$ and y-intercept of 2	Give the equation of the graph 

Practice A	Practice B
	

Equations – Put in Intercept Form

<table>
<tr><td colspan="2">We may have to put an equation in intercept form.

To do this we ________________________________</td></tr>
<tr><td>Example A

Give the slope and y-intercept
$5x + 8y = 17$</td><td>Example B

Give the slope and y-intercept
$y + 4 = \frac{2}{3}(x - 4)$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Equations - Graph

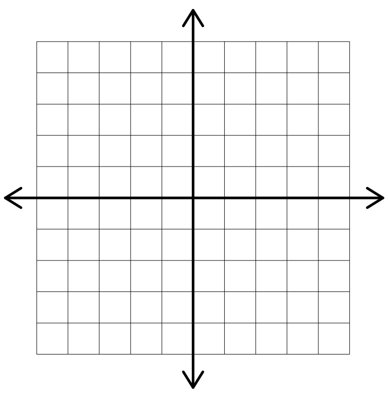
We can graph an equation by identifying the ____________________ and _______________________

Start at the _____________________ and use the ___________________________ to change

Remember slope is ________________ over _____________________

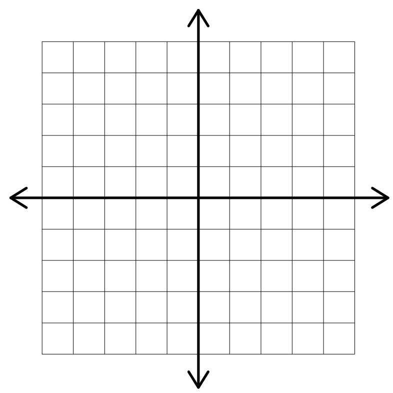
Example A

Graph $y = -\frac{3}{4}x + 2$

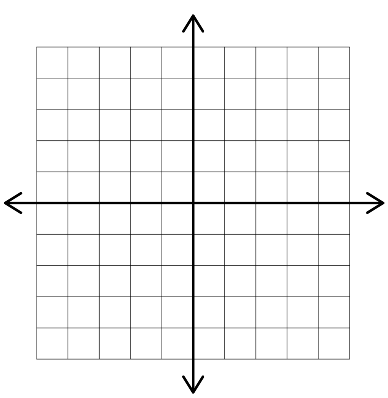


Example B

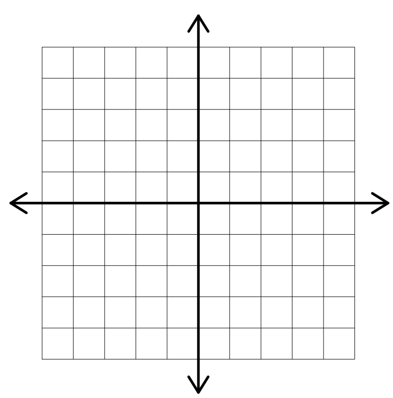
Graph $3x - 2y = 2$



Practice A



Practice B



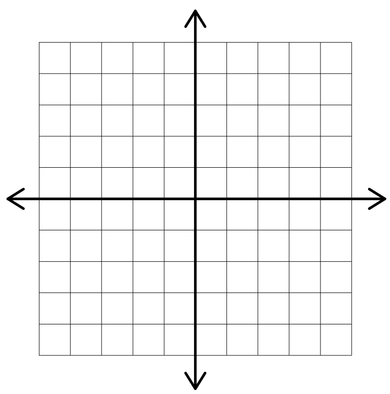
Equations – Vertical/Horizontal

Vertical Lines are always _______ equals the ___________

Horizontal Lines are always __________ equals the ___________

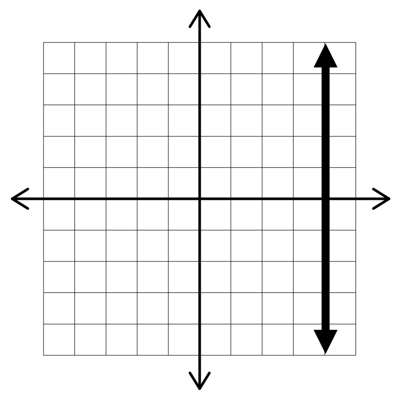
Example A

Graph $y = -2$

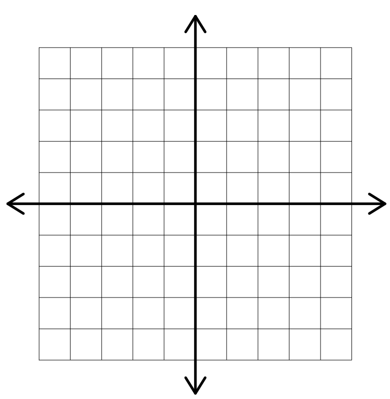


Example B

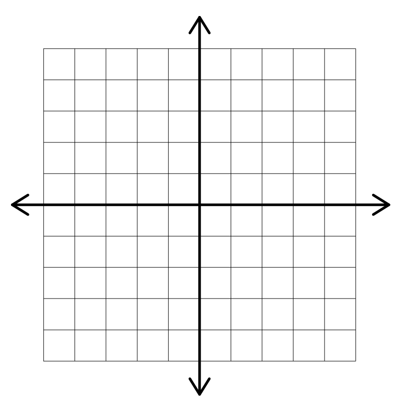
Find the equation



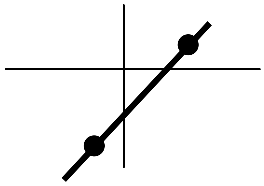
Practice A



Practice B



Equations – Point Slope

<table>
<tr><td colspan="2">Point Slope Equation:
</td></tr>
<tr><td>Example A

Give the equation of the line that passes through $(-3,5)$ and has a slope of $-\frac{2}{3}$</td><td>Example B

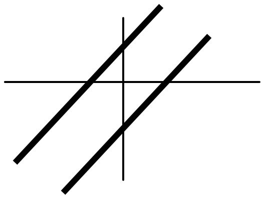
Give the equation of the line that passes through $(6,-2)$ and has a slope of 4. Give your final answer in slope-intercept form.</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Equations – Given Two Points

To find the equation of a line you must have the ___________________ Recall the formula for slope:	
Example A Find the equation of the line through $(-3,-5)$ and $(2,5)$.	Example B Find the equation of the line through $(1,-4)$ and $(3,5)$. Give answer in slope-intercept form.
Practice A	Practice B

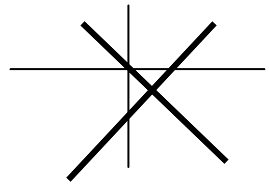
Parallel and Perpendicular - Slope

Parallel Lines:



Slope:

Perpendicular Lines:



Slope:

Example A

One line goes through $(5,2)$ and $(7,5)$. Another line goes through $(-2,-6)$ and $(0,-3)$. Are the lines parallel, perpendicular, or neither?

Example B

One line goes through $(-4,1)$ and $(-1,3)$. Another line goes through $(2,-1)$ and $(6,-7)$. Are the lines parallel, perpendicular, or neither?

Practice A

Practice B

Parallel and Perpendicular - Equations

Parallel lines have the ___________ slope, Perpendicular lines have __________________________ slopes Once we know the slope and a point we can use the formula:	
Example A Find the equation of the line parallel to the line $2x - 5y = 3$ that goes through the point $(5,3)$	Example B Find the equation of the line perpendicular to line $3x + 2y = 5$ that goes through the point $(-3,-4)$
Practice A	Practice B

Distance – Opposite Directions

<table>
<tr><td colspan="2">The distance Table:

Opposite Directions:</td></tr>
<tr><td>Example A

Brian and Jennifer both leave the convention at the same time traveling in opposite directions. Brian drove 35 mph and Jennifer drove 50 mph. After how much time were they 340 miles apart?</td><td>Example B

Maria and Tristan are 126 miles apart biking towards each other. If Maria bikes 6 mph faster than Tristan and they meet after 3 hours, how fast did each ride?</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Distance – Catch Up

A head start: _______________ the head start to his/her _____________ Catch Up:	
Example A Raquel left the party traveling 5 mph. Four hours later Nick left to catch up with her, traveling 7 mph. How long will it take him to catch up?	Example B Trey left on a trip traveling 20 mph. Julian left 2 hours later, traveling in the same direction at 30 mph. After how many hours does Julian pass Trey?
Practice A	Practice B

Distance – Total Time

<table>
<tr><td colspan="2">Consider: Total time of 8…

When we have a total time, for the first box we use _______ and the second we use _______________</td></tr>
<tr><td>Example A

Lupe rode into the forest at 10 mph, turned around and returned by the same route traveling 15 mph. If her trip took 5 hours, how long did she travel at each rate?</td><td>Example B

Ian went on a 230 mile trip. He started driving 45 mph. However, due to construction on the second leg of the trip, he had to slow down to 25 mph. If the trip took 6 hours, how long did he drive at each speed?</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

MPC 095 Module C:
Polynomials

Exponents – Product Rule

<table>
<tr><td colspan="2">$a^3 \cdot a^2 =$

Product Rule: $a^m \cdot a^n =$</td></tr>
<tr><td>Example A

$(2x^3)(4x^2)(-3x)$</td><td>Example B

$(5a^3b^7)(2a^9b^2c^4)$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Exponents – Quotient Rule

$\frac{a^5}{a^3} =$ Quotient Rule: $\frac{a^m}{a^n} =$	
Example A $$\frac{a^7b^2}{a^3b}$$	Example B $$\frac{8m^7n^4}{6m^5n}$$
Practice A	Practice B

Exponents – Power Rules

<table>
<tr><td colspan="2">

$(ab)^3 =$

Power of a Product: $(ab)^m =$

$\left(\frac{a}{b}\right)^3 =$

Power of a Quotient: $\left(\frac{a}{b}\right)^m =$

$(a^2)^3 =$

Power of a Power: $(a^m)^n =$

</td></tr>
<tr><td>

Example A

$(5a^4b)^3$

</td><td>

Example B

$\left(\frac{5m^3}{9n^4}\right)^2$

</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Exponents - Zero

$\frac{a^3}{a^3} =$

Zero Power Rule: $a^0 =$

Example A	Example B
$(5x^3yz^5)^0$	$(3x^2y^0)(5x^0y^4)$
Practice A	Practice B

Exponents – Negative Exponents

$\frac{a^3}{a^5} =$

Negative Exponent Rules: $a^{-m} =$ $\frac{1}{a^{-m}} =$ $\left(\frac{a}{b}\right)^{-m} =$

Example A	Example B
$\frac{7x^{-5}}{3^{-1}yz^{-4}}$	$\frac{2}{5a^{-4}}$
Practice A	Practice B

Exponents - Properties

$a^m a^n =$	$\frac{a^m}{a^n} =$	$(ab)^m =$
$\left(\frac{a}{b}\right)^m =$	$(a^m)^n =$	$a^0 =$
$a^{-m} =$	$\frac{1}{a^{-m}} =$	$\left(\frac{a}{b}\right)^{-m} =$

To simplify:

Example A	Example B
$(4x^5y^2z)^2(2x^4y^{-2}z^3)^4$	$\frac{(2x^2y^3)^4(x^4y^{-6})^{-2}}{(x^{-6}y^4)^2}$

Practice A	Practice B

Scientific Notation - Convert

<table>
<tr><td colspan="2">$a \times 10^b$
• a
• b
• b positive
• b negative</td></tr>
<tr><td>Example A
Convert to Standard Notation
5.23×10^5</td><td>Example B
Convert to Standard Notation
4.25×10^{-4}</td></tr>
<tr><td>Example C
Convert to Scientific Notation
8150000</td><td>Example C
Convert to Scientific Notation
0.00000245</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
<tr><td>Practice C</td><td>Practice D</td></tr>
</table>

Scientific Notation – Close to Scientific

Put number ______________________________________ Then use __________________________________ on the 10's	
Example A 523.6×10^{-8}	Example B 0.0032×10^{5}
Practice A	Practice B

Scientific Notation – Multiply/Divide

Multiply/Divide the ______________________________________

Use _________________________________ on the 10's

Example A	Example B
$(3.4 \times 10^{5})(2.7 \times 10^{-2})$	$\frac{5.32 \times 10^{4}}{1.9 \times 10^{-3}}$
Practice A	Practice B

Scientific Notation – Multiply/Divide where answer not scientific

If your final answer is not in scientific notation ____	
Example A $(6.7 \times 10^{-6})(5.2 \times 10^{-3})$	Example B $\frac{2.352 \times 10^{-6}}{8.4 \times 10^{-2}}$
Practice A	Practice B

Polynomials - Evaluate

Term:

Monomial:

Binomial:

Trinomial:

Polynomial:

Example A	Example B
$5x^2 - 2x + 6$ when $x = -2$	$-x^2 + 2x - 7$ when $x = 4$
Practice A	Practice B

Polynomials – Add/Subtract

To add polynomials: To subtract polynomials:

Example A $(5x^2 - 7x + 9) + (2x^2 + 5x - 14)$	Example B $(3x^3 - 4x + 7) - (8x^3 + 9x - 2)$
Practice A	Practice B

Polynomials – Multiply by Monomials

To multiply a monomial by polynomial:	
Example A $5x^2(6x^2 - 2x + 5)$	Example B $-3x^4(6x^3 + 2x - 7)$
Practice A	Practice B

Polynomials – Multiply by Binomials

To multiply a binomial by a binomial: This process is often called __________ which stands for ______________________________________	
Example A $(4x - 2)(5x + 1)$	Example B $(3x - 7)(2x - 8)$
Practice A	Practice B

Polynomials – Multiply by Trinomials

Multiplying trinomials is just like ________________ we just have ______________________________	
Example A $(2x-4)(3x^2-5x+1)$	Example B $(2x^2-6x+1)(4x^2-2x-6)$
Practice A	Practice B

Polynomials – Multiply Monomials and Binomials

Multiply ___________________________ first, then ____________________ the _____________________	
Example A $4(2x-4)(3x+1)$	Example B $3x(x-6)(2x+5)$
Practice A	Practice B

Polynomials – Sum and Difference

<table>
<tr><td colspan="2">$(a + b)(a - b) =$

Sum and Difference Shortcut:</td></tr>
<tr><td>Example A

$(x + 5)(x - 5)$</td><td>Example B

$(6x - 2)(6x + 2)$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Polynomials – Perfect Square

<table>
<tr><td colspan="2">$(a+b)^2 =$

Perfect Square Shortcut:</td></tr>
<tr><td>Example A

$(x-4)^2$</td><td>Example B

$(2x+7)^2$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Division – By Monomials

Long Division Review:

$5\overline{)2632}$

Example A

$$\frac{3x^5 + 18x^4 - 9x^3}{3x^2}$$

Example B

$$\frac{15a^6 - 25a^5 + 5a^4}{5a^4}$$

Practice A

Practice B

Division – By Polynomials

On division step, only focus on the ________________________	
Example A $$\frac{x^3 - 2x^2 - 15x + 30}{x + 4}$$	Example B $$\frac{4x^3 - 6x^2 + 12x + 8}{2x - 1}$$
Practice A	Practice B

Division – Missing Terms

<table>
<tr><td colspan="2">The exponents MUST ________________________________

If one is missing we will add _______________</td></tr>
<tr><td>Example A

$$\frac{3x^3 - 50x + 4}{x - 4}$$</td><td>Example B

$$\frac{2x^3 + 4x^2 + 9}{x + 3}$$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

MPC 095 Module D:
Factoring

GCF and Grouping – Find the GCF

<table>
<tr><td colspan="2">Greatest Common Factor:

On variables we use ________________________________</td></tr>
<tr><td>Example A

Find the Common Factor

$15a^4 + 10a^2 - 25a^5$</td><td>Example B

Find the Common Factor

$4a^4b^7 - 12a^2b^6 + 20ab^9$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

GCF and Grouping – Factor GCF

<table>
<tr><td colspan="2">

$a(b + c) =$

Put ________ in front, and divide. What is left goes in the ____________________________

</td></tr>
<tr><td>

Example A

$$9x^4 - 12x^3 + 6x^2$$

</td><td>

Example B

$$21a^4b^5 - 14a^3b^7 + 7a^2b^4$$

</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

GCF and Grouping – Binomial GCF

GCF can be a ______________________	
Example A $5x(2y-7)+6y(2y-7)$	Example B $3x(2x+1)-7(2x+1)$
Practice A	Practice B

GCF and Grouping - Grouping

<table>
<tr><td colspan="2">Grouping: GCF of the ____________ and _______________
then factor out ____________________ (if it matches!)</td></tr>
<tr><td>Example A
$$15xy + 10y - 18x - 12$$</td><td>Example B
$$6x^2 + 3xy + 2x + y$$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

GCF and Grouping – Change Order

If binomials don't match:	
Example A $12a^2 - 7b + 3ab - 28a$	Example B $6xy - 20 + 8x - 15y$
Practice A	Practice B

Trinomials – $a \neq 1$

$ax^2 + bx + c$ AC Method: Find a pair of numbers that multiply to ______ and add to ______ Using FOIL, these numbers come from __ and __	
Example A $3x^2 + 11x + 10$	Example B $12x^2 + 16xy - 3y^2$
Practice A	Practice B

Trinomials – $a \neq 1$ with GCF

Always factor the _________ first!	
Example A $18x^4 - 21x^3 - 15x^2$	Example B $16x^3 + 28x^2y - 30xy^2$
Practice A	Practice B

Trinomials – $a = 1$

If there is a ______ in front of x^2, the ac method gives us _______________	
Example A $x^2 - 2x - 8$	Example B $x^2 + 7xy - 8y^2$
Practice A	Practice B

Trinomials – $a = 1$ with GCF

Always do the ________ first!!	
Example A $7x^2 + 21x - 70$	Example B $4x^4y + 36x^3y^2 + 80x^2y^3$
Practice A	Practice B

Special Products – Difference of Squares

$(a+b)(a-b) =$ Difference of Squares:	
Example A $a^2 - 81$	Example B $49x^2 - 25y^2$
Practice A	Practice B

Special Products – Sum of Squares

<table>
<tr><td colspan="2">Factor: $a^2 + b^2$

Sum of Squares is always ________________</td></tr>
<tr><td>Example A

$x^2 + 9$</td><td>Example B

$16a^2 + 25b^2$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Special Products – Difference of 4th Powers

<table>
<tr><td colspan="2">The square root of x^4 is ______________

With fourth powers we can use _______________________________ twice!</td></tr>
<tr><td>Example A

$a^4 - 16$</td><td>Example B

$81x^4 - 256$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Special Products – Perfect Squares

Using the ac method if the numbers ____________________ then it factors to __________________	
Example A $x^2 - 10x + 25$	Example B $9x^2 + 30xy + 25y^2$
Practice A	Practice B

Special Products – Cubes

Sum of Cubes: Difference of Cubes:	
Example A $m^3 + 125$	Example B $8a^3 - 27y^3$
Practice A	Practice B

Always factor the ____________ first!!	
Example A $8x^3 - 18x$	Example B $2x^2y - 12xy + 18y$
Practice A	Practice B

Factoring Strategy - Strategy

<table>
<tr><td colspan="2">Always do _________ First

2 terms: 3 terms: 4 terms:</td></tr>
<tr><td>Example A

Which method would you use?

$25x^2 - 16$</td><td>Example B

Which method would you use?

$x^2 - x - 20$</td></tr>
<tr><td>Example C

Which method would you use?

$xy + 2y + 5x + 10$</td><td>Practice A</td></tr>
<tr><td>Practice B</td><td>Practice C</td></tr>
<tr><td>Practice D</td><td>Practice E</td></tr>
</table>

Solve by Factoring – Zero Product Property

Zero Product Rule: To solve we set each _________________ equal to __________________	
Example A $(5x-1)(2x+5)=0$	Example B $2x(x-6)(2x+3)=0$
Practice A	Practice B

Solve by Factoring – Need to Factor

If we have x^2 and x in an equation, we need to _______________ before we ______________	
Example A $x^2 - 4x - 12 = 0$	Example B $3x^2 + x - 4 = 0$
Practice A	Practice B

Solve by Factoring – Equal to Zero

Before we factor, the equation must equal ______________.

To make factoring easier, we want the _____________________ to be _____________________.

Example A	Example B
$5x^2 = 2x + 16$	$-2x^2 = x - 3$
Practice A	Practice B

Solve by Factoring - Simplify

Before we make the equation equal zero, we may have to ______________________ first.	
Example A $2x(x+4) = 3x - 3$	Example B $(2x-3)(3x+1) = -8x - 1$
Practice A	Practice B

MPC 095 Module E:
Rational Expressions

Reduce - Evaluate

<table>
<tr><td colspan="2">Rational Expressions: Quotient of two ______________________________</td></tr>
<tr><td>Example A
$$\frac{x^2-2x-8}{x-4} \quad when\ x=-4$$</td><td>Example B
$$\frac{x^2-x-6}{x^2+x-12} \quad when\ x=2$$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Reduce – Reduce Fractions

To reduce fractions we ______________________ common _________________________	
Example A $$\frac{24}{15}$$	Example B $$\frac{48}{18}$$
Practice A	Practice B

Reduce - Monomials

Quotient Rule of Exponents: $\frac{a^m}{a^n} =$	
Example A $$\frac{16x^5}{12x^9}$$	Example B $$\frac{15a^3b^2}{25ab^5}$$
Practice A	Practice B

Reduce - Polynomials

To reduce we ______________________ common _________________________

This means we must first ____________________________

Example A	Example B
$$\frac{2x^2+5x-3}{2x^2-5x+2}$$	$$\frac{9x^2-30x+25}{9x^2-25}$$
Practice A	**Practice B**

Multiply and Divide - Fractions

First ______________________ common ___________________________________
Then multiply ____
Division is the same, with one extra step at the start: __________________ by the ________________

Example A	Example B
$\frac{6}{35} \cdot \frac{21}{10}$	$\frac{5}{8} \div \frac{10}{4}$

Practice A	Practice B

Multiply and Divide - Monomials

With monomials we can use ___________________________

$a^m \cdot a^n =$

$\frac{a^m}{a^n} =$

Example A	Example B
$\frac{6x^2y^5}{5x^3} \cdot \frac{10x^4}{3x^2y^7}$	$\frac{4a^5b}{9a^4} \div \frac{6ab^4}{12b^2}$
Practice A	Practice B

Multiply and Divide - Polynomials

To divide out factors, we must first ________________________	
Example A $$\frac{x^2+3x+2}{4x-12}\cdot\frac{x^2-5x+6}{x^2-4}$$	Example B $$\frac{3x^2+5x-2}{x^2+3x+2}\div\frac{6x^2+x-1}{x^2-3x-4}$$
Practice A	Practice B

Multiply and Divide – Both at Once

To divide: Be sure to ___________________________ before ________________________	
Example A $$\frac{x^2+3x-10}{x^2+6x+5}\cdot\frac{2x^2-x-3}{2x^2+x-6}\div\frac{8x+20}{6x+15}$$	Example B $$\frac{x^2-1}{x^2-x-6}\cdot\frac{2x^2-x-15}{3x^2-x-4}\div\frac{2x^2+3x-5}{3x^2+2x-8}$$
Practice A	Practice B

<table>
<tr><td colspan="2">Prime Factorization:

To find the LCD use _______________ factors with ________________ exponents.</td></tr>
<tr><td>Example A

$20 \ and \ 36$</td><td>Example B

$18, 54 \ and \ 81$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

LCD - Monomials

Use ________________ factors with ____________________ exponents	
Example A $5x^3y^2 \quad and \quad 4x^2y^5$	Example B $7ab^2c \quad and \quad 3a^3b$
Practice A	Practice B

LCD - Polynomials

Use ________________ factors with ____________________ exponents This means we must first _________________________

Example A $x^2 + 3x - 18 \quad and \quad x^2 + 4x - 21$	Example B $x^2 - 10x + 25 \quad and \quad x^2 - x - 20$
Practice A	Practice B

Add and Subtract - Fractions

<table>
<tr><td colspan="2">To add or subtract we ____________ the denominators by _________________ by the missing

_______________________.</td></tr>
<tr><td>Example A

$$\frac{5}{20}+\frac{7}{15}$$</td><td>Example B

$$\frac{8}{14}-\frac{3}{10}$$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Add and Subtract – Common Denominator

Add the ___________________________ and keep the ___________________________

When subtracting we will first ________________________ the negative

Don't forget to ____________________

Example A	Example B
$\frac{x^2+4x}{x^2-2x-15}+\frac{x+6}{x^2-2x-15}$	$\frac{x^2+2x}{2x^2-9x-5}-\frac{6x+5}{2x^2-9x-5}$
Practice A	Practice B

Add and Subtract – Different Denominators

To add or subtract we ____________ the denominators by _________________ by the missing

_______________________.

This means we may have to ____________________ to find the LCD!

Example A	Example B
$\frac{2x}{x^2-9}+\frac{5}{x^2+x-6}$	$\frac{2x+7}{x^2-2x-3}-\frac{3x-2}{x^2+6x+5}$

Practice A	Practice B

Dimensional Analysis – Convert Single Unit

Multiply by ___ and value does not change

$1 =$

Ask questions:

1.

2.

3.

Example A	Example B
5 feet to meters	3 miles to yards

Practice A	Practice B

Dimensional Analysis – Convert Two Units

“Per” is the ______________________________ Clear ____________ unit at a time!	
Example A 100 feet per second to miles per hour	Example B 25 miles per hour to kilometers per minute
Practice A	Practice B