Big Bend Community College

Intermediate Algebra

MPC 099

Lab Notebook

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MPC 099 Module A:
Compound Inequalities and
Systems of Equations

Compound Inequalities - AND

Compound Inequality: AND: Solving Inequalities is just like solving _______________, just be sure to _____________________ when we __________________________ by a ___________________________

Example A $6x + 5 < 11$ AND $-7x + 2 \leq 44$	Example B $11x - 10 > 3x - 2$ AND $2(9x + 3) - 2 \geq 10x + 52$
Practice A	Practice B

Compound Inequalities - OR

OR: Don't forget to __________________________ when _______________________ by a __________________ To represent two parts of a graph in interval notation we use _____

Example A $4x + 7 < -5$ OR $-4x - 8 \leq -20$	Example B $8x + 9 < 4x - 19$ OR $2(6x - 8) - 2 \leq 8x - 50$
Practice A	Practice B

Compound Inequalities - Tripartite

<table>
<tr><td colspan="2">Tripartite Inequalities:

Be sure when solving to balance on ____</td></tr>
<tr><td>Example A

$-5 \leq 2x - 17 < 9$</td><td>Example B

$4 < 4 - 3x \leq 7$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Absolute Value Inequalities - Simple

Absolute Value:

Consider: $|x| < 2$ $|x| > 2$

Example A $|x| \geq 8$	Example B $|x| \leq 5$
Practice A	Practice B

Absolute Value Inequalities - Solving

To solve we first set up a ____________________________ then ___________ it!	
Example A $\lvert 3x - 5 \rvert > 8$	Example B $\lvert 2x - 7 \rvert \leq 3$
Practice A	Practice B

Absolute Value Inequalities - Isolate Absolute

Before we can set up a compound inequality, we must first ______________ the absolute value!

Beware: with absolute value we cannot ____________________ or _______________________________

Example A	Example B
$2 - 7\|3x + 4\| < -19$	$5 + 2\|4x - 1\| \leq 17$

Practice A	Practice B

Systems of Equations - Introduction to Substitution

System of Equations: Several _______________ and several _____________ working _______________

The solution to a system of equations is given as an _________________________ written _______

Substitution: replace the _____________ with what it ______________________

Example A	Example B
$x = -3$ $2x - 3y = 12$	$4x - 7y = 11$ $y = -1$
Practice A	Practice B

Systems of Equations - Substitute Expression

Just as we can replace a variable with a number, we can also replace it with an ____________________   Whenever we substitute it is important to remember ______________________

Example A $y = 5x - 3$ $-x - 5y = -11$	Example B $2x - 6y = -24$ $x = 5y - 22$
Practice A	Practice B

Systems of Equations - Solve for a Variable

To use substitution we may have to ________________ a lone variable If there are several lone variables _____________________	
Example A $6x + 4y = -14$ $x - 2y = -13$	Example B $-5x + y = -17$ $7x + 8y = 5$
Practice A	Practice B

Systems of Equations - Substitution with Special Cases

If the variables subtract out to zero then it means either

there is ____________________________ or ____________________________

Example A	Example B
$x + 4y = -7$ $21 + 3x = -12y$	$5x + y = 3$ $8 - 3y = 15x$
Practice A	Practice B

Systems of Equations - Addition

If there is no lone variable, it may be better to use ___________________ This method works by adding the ______________ and _______________ sides of the equations together!	
Example A $-8x - 3y = -12$ $2x + 3y = -6$	Example B $-5x + 9y = 29$ $5x - 6y = -11$
Practice A	Practice B

Systems of Equations - Addition with Multiplication

Addition only works if one of the variables have ______________________________ To get opposites we can multiply __________________ of an equation to get the values we want! Be sure when multiplying to have a _________________ and ___________________ in front of a variable.	
Example A $2x - 4y = -4$ $4x + 5y = -21$	Example B $-5x - 3y = -3$ $-7x + 12y = 12$
Practice A	Practice B

Systems of Equations - Multiplying Two Equations

Sometimes we may have to multiply ___________________ by something to get opposites

The opposite we look for is the ___________ of both coefficients.

Example A	Example B
$-6x + 4y = 26$ $4x - 7y = -13$	$3x + 7y = 2$ $10x + 5y = -30$
Practice A	Practice B

Systems of Equations - Special Cases with Addition

If the variables subtract out to zero then it means either there is ______________________________ or ______________________________	
Example A $2x - 4y = 16$ $3x - 6y = 20$	Example B $-10x + 4y = 6$ $25x - 10y = 15$
Practice A	Practice B

Systems of 3 Variables - Simple

To solve systems with three variables we must _____________________ the ____________________ variable _____________________ This will give us ______ equations with ________ variables we can then solve for!	
Example A $$-x + 2y + 4z = -20$$ $$-2x - 2y - 3z = 5$$ $$4x - 2y - 2z = 26$$	Example B $$3x - 3y + 5z = 16$$ $$2x - 6y - 5z = 35$$ $$-5x - 12y + 5z = 28$$
Practice A	Practice B

3 Variables - Multiplying to Eliminate Variables

To eliminate a variable, we may have to _______________ one or more equations to get ______________
Example A $$2x - 2y - z = 8$$ $$6x - 3y - 3z = 27$$ $$-3x - 5y - z = -15$$
Practice A

Value/Interest Problems - Value with 1 Variable

Value Table:

The equation always comes from the ____________________________

Example A	Example B
Brian has twice as many dimes as quarters. If the value of the coins is $4.95, how many of each does he have?	A child has three more nickels than dimes in her piggy-bank. If she has $1.95 in the bank, how many of each does she have?
Practice A	Practice B

Value/Interest Problems - Interest with 1 Variable

Interest Table:

The equation always comes from the ___________________________

Example A	Example B
Sophia invested $1900 in one account and $1500 in another account that paid 3% higher interest rate. After one year she had earned $113 in interest. At what rates did she invest?	Carlos invested $2500 in one account and $1000 in another which paid 4% lower interest. At the end of a year he had earned $345 in interest. At what rates did he invest?
Practice A	Practice B

Value/Interest Problems - Value with 2 Variables

With two variables the equations will come from the _______________ and ________________ columns.	
Example A Scott has $2.15 in his pocket made up of eleven quarters and dimes. How many of each coin does he have?	Example B If 105 people attended a concert and tickets for adults cost $2.50 while tickets for children cost $1.75 and total receipts for the concert were $228, how many children and how many adults went to the concert?
Practice A	Practice B

Value/Interest - Interest with 2 Variables

With two variables the equations will come from the ______________ and _______________ columns.	
Example A A woman invests $4600 in two different accounts. The first paid 13%, the second paid 12% interest. At the end of the first year she had earned $586 in interest. How much was in each account?	Example B A bank loaned out $4900 to two different companies. The first loan had a 4% interest rate; the second had a 13% interest rate. At the end of the first year the loan had accrued $421 in interest. How much was loaned at each rate?
Practice A	Practice B

Mixture Problems - Known Starting Amount

Mixture Table:

The equation always comes from the ___________________________

Example A	Example B
A store owner wants to mix chocolate an nuts to make a new candy. How many pounds of chocolate costing \$8.50 per pound should be mixed with 25 pounds of nuts that cost \$2.50 per pound to make a mixture worth \$4.33 per pound?	You need a 55% alcohol solution. On hand, you have 600 mL of 10% alcohol mixture. You also have a 95% alcohol mixture. How much of the 95% mixture should you add to obtain your desired solution?
Practice A	Practice B

Mixture - Unknown Starting Amount

With two variables the equations will come from the _______________ and ________________ columns.	
Example A A chemist needs to create 100 mL of a 38% acid solution. On hand she has a 20% acid solution and a 50% acid solution. How many mL of each should she use?	Example B A coffee distributor needs to mix a coffee blend that normally sells for $8.90 per pound with another coffee blend that normally sells for $11.30 per pound. If the distributor wishes to create 70 pounds of coffee that can sell for $11.16 per pound, how many pounds of each kind of coffee should the mix?
Practice A	Practice B

Mixture - Pure Solutions

The percentage of acid (or other chemical) in pure acid is ________

The percentage of acid (or other chemical) in water is ________

Example A	Example B
You need 1425 mL of 10% alcohol solution. On hand you have a 5% alcohol mixture and pure alcohol. How much of each should you use?	You need a 60% methane solution. On hand you have 180 mL of an 85% methane solution. How much water will you need to add to obtain the desired solution?
Practice A	**Practice B**

MPC 099 Module B:
Radicals

Simplify Radicals - Prime Factorization

Prime Factorization: To find a prime factorization we _________________ by ________________ A few prime numbers:	
Example A 1350	Example B 168
Practice A	Practice B

Simplify Radicals - Perfect Roots

Roots: $\sqrt[n]{m}$ where n is the ____________________	
Roots of an expression with exponents: _______________ the _______________ by the _______________	
Example A $\sqrt{46656}$	Example B $\sqrt[5]{1889568}$
Practice A	Practice B

Simplify Radicals - Not Perfect Radicals

To take roots we ________________ the __________________ by the _______________________

$\sqrt{a^2b} =$

$\sqrt[n]{a^nb =}$

When we divide if there is a remainder, the remainder ____

Example A	Example B
$\sqrt{72}$	$\sqrt[3]{750}$

Practice A	Practice B

Simplify Radicals - With Coefficients

If there is a coefficient on the radical: ___________________ by what ___________________________	
Example A $-8\sqrt{600}$	Example B $3\sqrt[5]{-96}$
Practice A	Practice B

Simplify Radicals - Variables

Variables in Radicals: ___________________ the __________________ by the ______________________ Remainders ____	
Example A $\sqrt[4]{a^{13}b^{23}c^{10}d^{3}}$	Example B $\sqrt{125x^{4}yz^{5}}$
Practice A	Practice B

Add/Subtract/Multiply - Adding Like Radicals

Simplify: $2x - 5y + 3x + 2y$

Simplify: $2\sqrt{3} - 5\sqrt{7} + 3\sqrt{3} + 2\sqrt{7}$

When adding and subtracting radicals we can ____

Example A	Example B
$-4\sqrt{6} + 2\sqrt{11} + \sqrt{11} - 5\sqrt{6}$	$\sqrt[3]{5} + 3\sqrt{5} - 8\sqrt[3]{5} + 2\sqrt{5}$
Practice A	Practice B

Add/Subtract/Multiply - Simplify and Add

Before adding radicals together ___________________	
Example A $4\sqrt{50x} + 5\sqrt{27} - 3\sqrt{2x} - 2\sqrt{108}$	Example B $\sqrt[3]{81x^3y} - 3y\sqrt[3]{32x^2} + x\sqrt[3]{24y} - \sqrt[3]{500x^2y^3}$
Practice A	Practice B

Product Rule: $a\sqrt[n]{b} \cdot c\sqrt[n]{d} =$ Always be sure your final answer is ___________________________	
Example A $4\sqrt{6} \cdot 2\sqrt{15}$	Example B $-3\sqrt[4]{8} \cdot 7\sqrt[4]{10}$
Practice A	Practice B

Add/Subtract/Multiply - Distributing with Radicals

<table>
<tr><td colspan="2">Recall: $a(b+c)=$

Always be sure your final answer is ___________________________</td></tr>
<tr><td>Example A

$5\sqrt{10}\left(2\sqrt{6}-3\sqrt{15}\right)$</td><td>Example B

$7\sqrt{3}\left(\sqrt{6}+9\right)$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Add/Subtract/Multiply - FOIL with Radicals

Recall: $(a+b)(c+d) =$ Always be sure your final answer is ______________________	
Example A $\left(3\sqrt{7}-2\sqrt{5}\right)\left(\sqrt{7}+6\sqrt{5}\right)$	Example B $\left(2\sqrt[3]{9}+5\right)\left(4\sqrt[3]{3}-1\right)$
Practice A	Practice B

Recall: $(a+b)(a-b)=$

Always be sure your final answer is ___________________________

Example A $(4+2\sqrt{7})(4-2\sqrt{7})$	Example B $(4\sqrt{3}-5\sqrt{6})(4\sqrt{3}+5\sqrt{6})$
Practice A	Practice B

Add/Subtract/Multiply - Perfect Square

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

Always be sure your final answer is ___________________________</td></tr>
<tr><td>Example A

$\left(\sqrt{6}-\sqrt{2}\right)^2$</td><td>Example B

$\left(2+3\sqrt{7}\right)^2$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Rationalize Denominators - Simplifying with Radicals

<table>
<tr><td colspan="2">Expressions with Radicals: Always _________________ the ___________________ first

Before _______________ with fractions, be sure to _________________ first</td></tr>
<tr><td>Example A

$$\frac{15+\sqrt{175}}{10}$$</td><td>Example B

$$\frac{8-\sqrt{48}}{6}$$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Rationalize Denominators - Quotient Rule

Quotient Rule:

Often it is helpful to reduce the _____________ first, then reduce the _________________

Example A	Example B
$$\frac{\sqrt{48}}{\sqrt{150}}$$	$$\sqrt{\frac{225x^7y^2}{20x^3y^8}}$$
Practice A	Practice B

Rationalize Denominators - Monomial Square Root

Rationalize Denominators: No __________________ in the _________________________

To clear radicals: ________________ by extra needed factors in denominator (multiply by same on top!)

It may be helpful to _______________ first (both _____________ and ______________)

Example A	Example B
$$\frac{\sqrt{7ab}}{\sqrt{6ac^2}}$$	$$\sqrt{\frac{5xy^3}{15xyz}}$$
Practice A	Practice B

Rationalize Denominators - Monomial Higher Root

Use the ______________________________ To clear radicals: ________________ by extra needed factors in denominator (multiply by same on top!) Hint: ________________ numbers	
Example A $$\frac{5}{\sqrt[7]{b^2}}$$	Example B $$\sqrt[3]{\frac{7}{9a^2b}}$$
Practice A	Practice B

Rationalize Denominators - Binomial Denominators

What doesn't work: $\frac{1}{2+\sqrt{3}}$

Recall: $(2+\sqrt{3})($ $\qquad\qquad$ $)$

Multiply by the ________________________________

Example A	Example B
$$\frac{6}{5-\sqrt{3}}$$	$$\frac{3-5\sqrt{2}}{4+2\sqrt{2}}$$

Practice A	Practice B

Rational Exponents - Convert

If we divide the exponent by the index, then $\sqrt[n]{a^m} =$ The index is the __________________________	
Example A Write as an exponent: $\sqrt[7]{m^5}$	Example B Write as a radical: $(ab)^{2/3}$
Example C Write as a radical: $x^{-4/5}$	Example D Write as an exponent $\frac{1}{(\sqrt[3]{4x})^5}$
Practice A	Practice B
Practice C	Practice D

Rational Exponents - Evaluate

To evaluate a rational exponent ____	
Example A $81^{3/4}$	Example B $125^{-4/3}$
Practice A	Practice B

Rational Exponents - Simplify

Recall Exponent 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

$$\frac{x^{4/3}y^{2/7}x^{5/4}y^{3/7}}{x^{1/2}y^{2/7}}$$

Example B

$$\left(\frac{x^{3/2}y^{-1/3}}{x^{1/4}y^{2/3}x^{-5/2}}\right)^{-1/8}$$

Practice A

Practice B

Mixed Index - Reduce Index

<table>
<tr><td colspan="2">Using Rational Exponents: $\sqrt[8]{x^6y^2}$

To reduce the index ________________ the ______________ and _____________ by _________

Without using rational exponents: $\sqrt[8]{x^6y^2}$

Hint: _______________ any numbers</td></tr>
<tr><td>Example A

$\sqrt[15]{x^3y^9z^6}$</td><td>Example B

$\sqrt[25]{32a^{10}b^5c^{20}}$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Mixed Index - Multiply

Using Rational Exponents: $\sqrt[3]{a^2b} \cdot \sqrt[4]{ab^2}$

Get a ______________________ by __________________ the _____________ and __________________

Without using rational exponents: $\sqrt[3]{a^2b} \cdot \sqrt[4]{ab^2}$

Hint: ________________ any numbers

Always be sure your final answer is __________________________

Example A	Example B
$\sqrt[4]{m^3n^2p} \cdot \sqrt[6]{mn^2p^3}$	$\sqrt[3]{4x^2y} \cdot \sqrt[5]{8x^4y^2}$

Practice A	Practice B

Mixed Index - Divide

<table>
<tr><td colspan="2">Division with mixed index – Get a ______________________________

Hint: ________________ any numbers

May have to ___________________________________</td></tr>
<tr><td>Example A

$$\frac{\sqrt{ab^3}}{\sqrt[3]{ab^2}}$$</td><td>Example B

$$\frac{\sqrt[6]{2x^4y^2}}{\sqrt[8]{128xy^6}}$$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

MPC 099 Module C: Quadratics

Complex Numbers – Square Roots of Negatives

Define: $\sqrt{-1} =$ and therefore, $i^2 =$

Now we can calculate: $\sqrt{-25}$

Expressions with Radicals: Always _________________ the ___________________ first

Before _______________ with fractions, be sure to _________________ first

Example A	Example B
$\frac{15+\sqrt{-300}}{5}$	$\frac{20+\sqrt{-80}}{8}$
Practice A	Practice B

Complex Numbers – Add/Subtract

i works just like ______________________	
Example A $(5-3i)+(6+i)$	Example B $(-5-2i)-(3-6i)$
Practice A	Practice B

Complex Numbers – Multiply

i works just like ______________________ Remember $i^2 =$	
Example A $(-3i)(6i)$	Example B $2i(5-2i)$
Example C $(4-3i)(2-5i)$	Example D $(3+2i)^2$
Practice A	Practice B
Practice C	Practice D

Complex Numbers – Rationalize Monomials

If $i =$ _______ then we can rationalize it by just multiplying by ________	
Example A $$\frac{5+3i}{4i}$$	Example B $$\frac{2-i}{-3i}$$
Practice A	Practice B

Complex Numbers – Rationalize Binomials

Similar to other radicals we can rationalize a binomial by multiplying by the ______________________

$(a + bi)(a - bi) =$

Example A	Example B
$$\frac{4i}{2-5i}$$	$$\frac{4-2i}{3+5i}$$
Practice A	Practice B

Equations with Radicals – Odd Roots

The opposite of taking a root is to do an ____________________ $\sqrt[3]{x} = 4$ then $x =$

Example A	Example B
$\sqrt[3]{2x-5} = 6$	$\sqrt[5]{4x-7} = 2$

Practice A	Practice B

Equations with Radicals – Even Roots

The opposite of taking a root is to do an ____________________ With even roots: _______________ in the original equation! Recall: $(a+b)^2 =$	
Example A $x = \sqrt{5x + 24}$	Example B $\sqrt{40 - 3x} = 2x - 5$
Practice A	Practice B

Equations with Radicals – Isolate Radical

Before we can clear a radical it must first be ________________	
Example A $4 + 2\sqrt{2x - 1} = 2x$	Example B $2\sqrt{5x + 1} - 2 = 2x$
Practice A	Practice B

Equations with Radicals – Two Roots

With two roots, first ________________ one root and ________________ both sides

Then ___________________ the term with the other root and ______________ both sides.

Example A	Example B
$$\sqrt{x}+1=\sqrt{x+12}$$	$$\sqrt{1-8x}-\sqrt{-16x-12}=1$$

(practice problems on the next page)

Practice A	Practice B

Equations with Exponents – Odd Exponents

The opposite of taking an exponent is to do a ______________________ If $x^3 = 8$, then $x =$

Example A	Example B
$$(3x + 5)^5 = 32$$	$$(2x - 1)^3 = 64$$
Practice A	Practice B

Equations with Exponents – Even Exponents

Consider: $(5^2) =$ and $(-5)^2 =$ When we clear an even root we have ______________________

Example A $(5x-1)^2 = 49$	Example B $(3x+2)^4 = 81$
Practice A	Practice B

Equations with Exponents – Isolate Exponent

Before we can clear an exponent it must first be ________________	
Example A $4 - 2(2x+1)^2 = -46$	Example B $5(3x-2)^2 + 6 = 46$
Practice A	Practice B

Equations with Exponents – Rational Exponents

To multiply to one: $\frac{a}{b} * \left(\frac{}{}\right) = 1$

We clear a rational exponent by using a ___________________

Recall: $a^{m/n} =$

Recall: Check answer if _____________________, two answer if _______________________________

Example A	Example B
$$(3x-6)^{2/3} = 64$$	$$(5x+1)^{5/4} = 32$$
Practice A	Practice B

Complete the Square – Find c

$a^2 + 2ab + b^2$ is easily factored to ____________________________ To make $x^2 + bx + c$ a perfect square, $c =$	
Example A Find c and factor the perfect square $x^2 + 10x + c$	Example B Find c and factor the perfect square $x^2 - 7x + c$
Example C Find c and factor the perfect square $x^2 - \frac{3}{7}x + c$	Example D Find c and factor the perfect square $x^2 + \frac{6}{5}x + c$
Practice A	Practice B
Practice C	Practice D

Complete the Square – Rational Solutions

To complete the square: $ax^2 + bx + c = 0$

1. Separate _____________ and _______________
2. Divide by ______ (everything!)
3. Find ______ and ______ to __________________

Example A	Example B
$3x^2 - 15x + 18 = 0$	$8x + 32 = 4x^2$

Practice A	Practice B

Complete the Square – Irrational and Complex Solutions

If we can't simplify the ______________ we __________________ what we can.	
Example A $2x^2 - 8x - 3 = 0$	Example B $5x^2 - 3x + 2 = 0$
Practice A	Practice B

Solve by completing the square:

$$ax^2 + bx + c = 0$$

Quadratic Formula – Using the Formula

If $ax^2 + bx + c = 0$ then $x =$	
Example A $6x^2 + 7x - 3 = 0$	Example B $5x^2 - x + 2 = 0$
Practice A	Practice B

Quadratic Formula – Make Equal to Zero

Before using the quadratic formula, the equation must equal _______	
Example A $2x^2 = 15 - 7x$	Example B $3x^2 + 5x + 2 = 7$
Practice A	Practice B

Quadratic Formula – $b = 0$

If a term is missing, we use ______ in the quadratic formula.	
Example A $$7x^2 - 49 = 0$$	Example B $$3x^2 + 54 = 0$$
Practice A	Practice B

Rectangles - Area

Area of a rectangle: To help visualize the rectangle, ______________________________	
Example A The length of a rectangle is 2 ft longer than the width. The area of the rectangle is 48 ft^2. What are the dimensions of the rectangle?	Example B The area of a rectangle is 72 cm^2. If the length is 6 cm more than the width, what are the dimensions of the rectangle?
Practice A	Practice B

Rectangles - Perimeter

Perimeter of a Rectangle: Tip: Solve the _______________ equation for a variable.	
Example A The area of a rectangle is 54 m^2. If the perimeter is 30 meters, what are the dimensions of the rectangle?	Example B The perimeter of a rectangle is 22 inches. If the area of the same rectangle is 24 in^2, what are the dimensions?
Practice A	Practice B

Rectangles - Bigger

We may have to draw ________ rectangles. Multiply/Add to the _____________ to get the big rectangle. Divide/Subtract to the _______________ to get the small rectangle.

Example A	Example B
Each side of a square is increased 6 inches. When this happens, the area is multiplied by 16. How many inches in the side of the original square?	The length of a rectangle is 9 feet longer than it is wide. If each side is increased 9 feet, then the area is multiplied by 3. What are the dimensions of the original rectangle?
Practice A	**Practice B**

Compound Fractions - Numbers

Compound/Complex Fractions: Clear _____________ by multiplying each __________ by the __________ of everything!	
Example A $$\frac{\frac{3}{4}+\frac{5}{6}}{\frac{1}{2}-\frac{4}{3}}$$	Example B $$\frac{\frac{1}{2}+2}{1+\frac{9}{4}}$$
Practice A	Practice B

Compound Fractions - Monomials

<table>
<tr><td colspan="2">Recall: To find the LCD with variables, use the ________________ exponents

Be sure to check for ____________________!!!!</td></tr>
<tr><td>Example A

$$\frac{1-\frac{9}{x^2}}{\frac{1}{x}+\frac{3}{x^2}}$$</td><td>Example B

$$\frac{\frac{1}{y^3}-\frac{1}{x^3}}{\frac{1}{x^2y^3}-\frac{1}{x^3y^2}}$$</td></tr>
<tr><td>Practice A</td><td>Practice B</td></tr>
</table>

Compound Fractions - Binomials

The LCD could have one or more _________________ in it!

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

Compound Fractions – Negative Exponents

Recall: $5x^{-3} =$

If there is any _______ or ___________ we can't just ________________. Instead make ___________________

Example A	Example B
$$\frac{1 + 10x^{-1} + 25x^{-2}}{1 - 25x^{-2}}$$	$$\frac{8b^{-3} + 27a^{-3}}{4a^{-1}b^{-3} - 6a^{-2}b^{-2} + 9a^{-3}b^{-1}}$$
Practice A	**Practice B**

MPC 099 Module D:
Rational Equations

Rational Equations – Clear Denominator

Recall: $\frac{3}{4}x - \frac{1}{2} = \frac{5}{6}$

Clear fractions by multiplying ______________________ by ___________

Example A

$$\frac{5}{x} = \frac{3}{7x} - 4$$

Example B

$$\frac{4}{x+5} + x = \frac{-2}{x+5}$$

Practice A

Practice B

Rational Equations – Factoring Denominator

To identify all the factors in the ____________ we may have to _______________ the _________________	
Example A $$\frac{x}{x-6}+\frac{1}{x-7}=\frac{-3x-8}{x^2-13x+42}$$	Example B $$\frac{-9x}{x^2-9}+\frac{2}{x+3}=\frac{1}{x-3}$$
Practice A	Practice B

Rational Equations – Extraneous Solutions

Because we are working with fractions, the _______________ cannot be __________	
Example A $$\frac{x}{x-8}-\frac{2}{x-4}=\frac{-3x+56}{x^2-12x+32}$$	Example B $$\frac{x}{x-2}+\frac{2}{x-4}=\frac{4x-12}{x^2-6x+8}$$
Practice A	Practice B

Work Problems – One Unknown Time

Adam does a job in 4 hours. Each hour he does _________ of the job.

Betty does a job in 12 hours. Each hour he does ___________ of the job.

Together, each hour they do ____________________ of the job.

This means it takes them, working together, ________ hours to do the entire job.

Work Equation: Use ___________________!

Example A	Example B
Catherine can paint a house in 15 hours. Dan can paint it in 30 hours. How long will it take them working together?	Even can clean a room in 3 hours. If his sister Faith helps, it takes them $2\frac{2}{5}$ hours. How long will it take Faith working alone?
Practice A	Practice B

Work Problems – Two Unknown Times

Be sure to clearly identify who is the ________________________!	
Example A Tony does a job in 16 hours less time than Marissa, and they can do it together in 15 hours. How long will it take each to do the job alone?	Example B Alex can complete his project in 21 hours less than Hillary. If they work together it can get done in 10 hours. How long does it take each working alone?
Practice A	Practice B

Simultaneous Products

Simultaneous Product: _______ equations with ________ variables that are _________________

To solve: _________________ both by the same _______________. Then _____________________

Example A

$$xy = 72$$
$$(x-5)(y+2) = 56$$

Practice A

Revenue Table:

To solve: Divide by ________________________

Example A	Example B
A group of college students bought a couch for $80. However, five of them failed to pay their share so the others had to each pay $8 more. How many students were in the original group?	A merchant bought several pieces of silk for $70. He sold all but two of them at a profit of $4 per piece. His total profit was $18. How many pieces did he originally purchase?

(practice problems on the next page)

Practice A	Practice B

Distance/Revenue – Distance Problems

Distance Table: To solve: Divide by ________________________	
Example A A man rode his bike to a park 60 miles away. On the return trip he went 2 mph slower which made the trip take 1 hour longer. How fast did he ride to the park? (practice problems on the next page)	Example B After driving through a construction zone for 45 miles, a woman realized that if she had driven just 6 mph faster she would have arrived 2 hours sooner. How fast did she drive?

Practice A	Practice B

Distance/Revenue – Steams and Wind

Downwind/stream: Upwind/stream:	
Example A Zoe rows a boat downstream for 80 miles. The return trip upstream took 12 hours longer. If the current flows at 3 mph, how fast does Zoe row in still water? (practice problems on the next page)	Example B Darius flies a plane against a headwind for 5084 miles. The return trip with the wind took 20 hours less time. If the wind speed is 10mph, how fast does Darius fly the plane when there is no wind?

Practice A	Practice B

Frames – Picture Frames

To help visualize the frame _______________________________ Remember the frame is on the ____________ and _______________, also the ______ and __________	
Example A A picture measures 10 inches by 7 inches is placed in a frame of uniform width. If the area of the frame and picture together is 208 square inches, what is the width of the frame?	Example B An 8 inch by 12 inch drawing has a frame of uniform width around it. The area of the frame is equal to the area of the picture. What is the width of the frame?
Practice A	Practice B

Frames – Percent of a Field

Clearly identify the area of the __________ and _____________ rectangles! Be careful with ___________________, is it talking about the ____________ or _______________?	
Example A A man mows his 40 ft by 50 ft rectangular lawn in a spiral pattern starting from the outside edge. By noon he is 90% done. How wide of a strip has he cut around the outside edge?	Example B A farmer has a 50 ft by 25 ft rectangular field that he wants to increase by 68% by cultivating a strip of uniform width around the current field. How wide of a strip should he cultivate?
Practice A	Practice B

MPC 099 Module E:
Functions

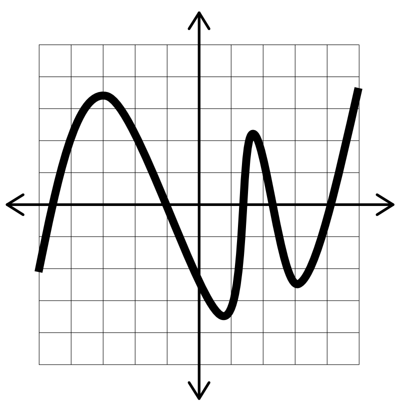
Functions – Definition and Vertical Line Test

Function:

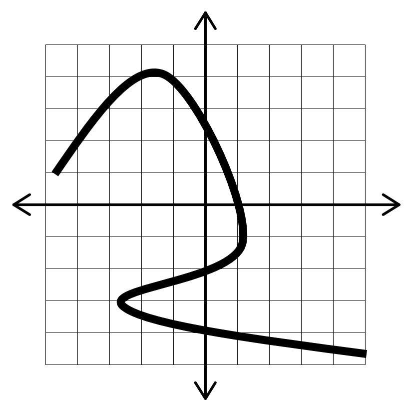
If it is a function we often write _____ which is read _______________________

A graph is a function if it passes the ________________________, or each ___ has at most one _____.

Example A



Example B



Practice A

Practice B

Functions - Domain

Domain: Fractions: Even Radicals:	
Example A $f(x) = 3\sqrt[4]{2x - 6} + 4$	Example B $g(x) = 3\lvert 2x + 7\rvert^2 - 4$
Practice C $h(x) = \dfrac{x - 1}{x^2 - x + 2}$	Practice A
Practice B	Practice C

Functions – Function Notation

Function notation: What is inside of the function notation goes ______________________________	
Example A $f(x) = -x^2 + 2x - 5$ Find $f(3)$	Example B $g(x) = \sqrt{2x+5}$ Find $g(20)$
Practice A	Practice B

Functions – Evaluate at Expressions

When replacing a variable we always use ______________________________

We can replace the variable with _____________________

Example A	Example B
$p(n) = n^2 - 2n + 5$ Find $p(n-3)$	$f(x) = \sqrt{2x} + 3x$ Find $f(8x^2)$
Practice A	Practice B

Algebra of Functions – Add/Subtract/Multiply/Divide

Four basic function operations:

1. $(f+g)(x)$
2. $(f-g)(x)$
3. $(f \cdot g)(x)$
4. $\left(\frac{f}{g}\right)(x)$

Example A	Example B
$f(x) = x - 4$ $g(x) = x^2 - 6x + 8$	$f(x) = x^2 - 5x$ $g(x) = x - 5$
$(f+g)(-2)$	$(f+g)(x)$
$(f-g)(3)$	$(f-g)(x)$
$(f \cdot g)(1)$	$(f \cdot g)(x)$
$\left(\frac{f}{g}\right)(0)$	$\left(\frac{f}{g}\right)(x)$

Practice A	Practice B

Algebra of Functions - Composition

Composition of Functions:

$(f \circ g)(x) = f(g(x))$

Example A	Example B
$f(x) = \sqrt{x+6}$ $g(x) = x + 3$ $(f \circ g)(7) =$ $(g \circ f)(7) =$	$p(x) = x^2 + 2x$ $r(x) = x + 3$ $(p \circ r)(x) =$ $(r \circ p)(x) =$
Practice A	Practice B

Inverse Functions – Showing Functions are Inverses

Inverse Function: To test if functions are inverses calculate ____________ and __________ and the answer should be ___	
Example A Are they inverses? $f(x) = 3x - 8$ $g(x) = \frac{x}{3} + 8$	Example B Are they inverses? $f(x) = \frac{5}{x-3} + 6$ $g(x) = \frac{5}{x-6} + 3$
Practice A	Practice B

Inverse Functions – Find the Inverse

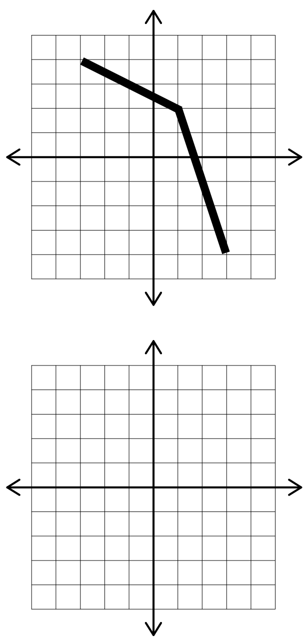
To find an inverse function ____________ the ___ and ___, then solve for ___. (the _____ is the y!)	
Example A $$g(x) = 5\sqrt[3]{x-6} + 4$$	Example B $$h(x) = \frac{-3}{x-1} - 2$$
Practice A	Practice B

Inverse Functions – Graph the Inverse

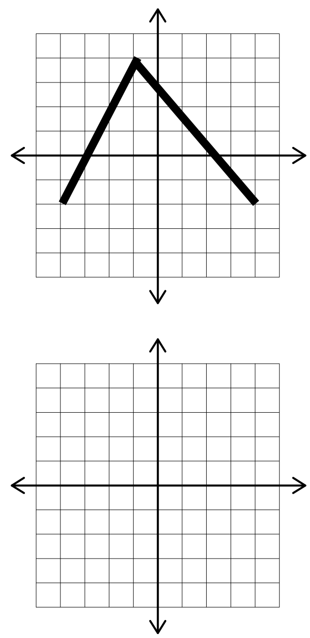
Inverse functions ____________ the ____ and ____

Identify key __________ and ____________ the ________________

Example A



Example B



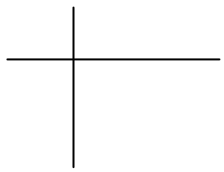
Practice A

Practice B

Graph Quadratic Functions – Key Points

Quadratic Equations are of the form:

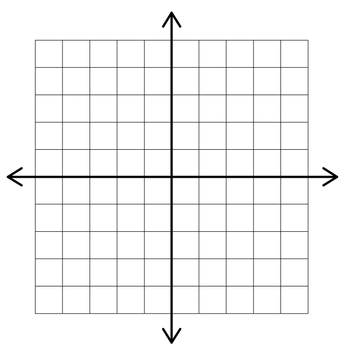
Quadratic Graph:



Key Points:

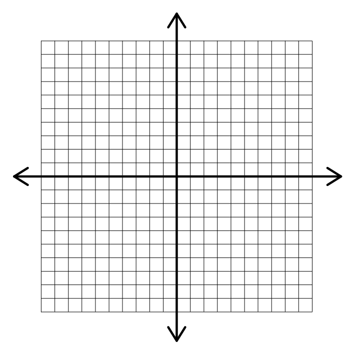
Example A

$f(x) = x^2 - 2x - 3$



Example B

$f(x) = -3x^2 + 12x - 9$



Practice A

Practice B

Exponential Equations – Common Base

Exponential Functions:

Solving Exponential Functions: If the __________ are equal then the _______________ are equal.

Recall Exponent Property: $(a^m)^n =$

Example A	Example B
$$7^{3x-6} = 7^{5x+2}$$	$$\left(\frac{1}{3}\right)^x = 81^{4x}$$
Practice A	Practice B

Exponential Functions – Binomial Exponents

When multiplying exponents we may have to ________________________	
Example A $8^{2x-4} = 16^{x+3}$	Example B $\left(\frac{1}{25}\right)^{3x-1} = 125^{4x+2}$
Practice A	Practice B

Compound Interest – N Compounds

Compound Interest:

n compounds per year: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

$A =$

$P =$

$r =$

$n =$

$t =$

Example A	Example B
Suppose you invest $13000 in an account that pays 8% interest compounded monthly. How much would be in the account after 9 years?	You loan out $800 to you friend at 3% interest compounded quarterly. Your friend pays you back after five years. What does he owe you?
Practice A	Practice B

Compound Interest – Find Principle

Evaluate______________________________ first	
Example A How much money would have to be invested at 6% interest compounded weekly to be worth $1500 at the end of 15 years?	Example B What principle would amount to $800 if invested for 10 years at 12% interest compounded semi-annually?
Practice A	Practice B

Compound Interest – Continuous Compounds

Continuous Interest:

$A = Pe^{rt}$

$A =$

$P =$

$e =$

$r =$

$t =$

Example A	Example B
An investment of $25000 is at an interest rate of 11.5% compounded continuously. What is the balance after 20 years?	What is the balance at the end of 10 years on an investment of $13000 at 4% compounded continuously?
Practice A	Practice B

Compound Interest – Finding Principle with Continuous Interest

Evaluate______________________________ first	
Example A To pay an $1100 vacation in 10 years, how much money should the Franklins invest at 9% interest compounded continuously?	Example B How much should you invest at 12% continuous interest for 100 years in order to have $1,000,000?
Practice A	Practice B

Logs - Convert

Logarithm: $b^x = a$ can be written as ____________	
Example A Write each as a logarithm: $m^2 = 25$ $5^x = 125$	Example B Write each as an exponent: $\log_x 64 = 2$ $\log_5 x = m$
Practice A	Practice B

Logs - Evaluate

To evaluate a log: make the equation ________________ and convert to an __________________	
Example A $\log_4 64$	Example B $\log_3 \frac{1}{81}$
Practice A	Practice B

Logs - Solving

To solve a logarithmic equation:	
Example A $\log_x 8 = 3$	Example B $\log_5(2x - 6) = 2$
Practice A	Practice B