Weekly Writing Assignment

Name ___________________________ Date __________

One thing I still don't understand is:

A basic concept that we studied last week is:
One thing I still don't understand is:

The problem in this section is which one thing, so I will take the thing I don't understand most. It is to find the $y$ intercept of an equation $y = ax^2 + bx + c$. Let $x = 0$.

So, $y = a(0)^2 + b(0) + c \rightarrow y = c$, hence $(0, c)$.

So far, so good. Now with the equation be the vertex $\rightarrow y = a(x-h)^2 + k$, why isn't $k$ to the $y$ intercept? Because when you expand $a(x-h)^2$, it will have a number $(ah^2)$ which is combined with $k$ to make the $c$ of the other form.

A concept we studied last week.
A basic concept that we studied last week is:

**Variation** - I had been using this in my work for years without knowing what it is called! We used the formula \( E = \frac{F}{E \cdot A} \) to find the strain (\( \varepsilon \)) of a compressed structure by dividing the force (\( F \)) by the modulus of elasticity (\( E \)) of the material times the area (\( A \)) at its cross-section. We would use a constant force \( F = k \) and vary the area or, looking for the strain or sometimes use the strain (\( \varepsilon \)) as constant:

\[ F = E \cdot \varepsilon \cdot A \]

I imagine there are probably thousands of different applications where I have used variation without really knowing the text book names & formula's! I think you're right.
Basic Math Writing Assignment 1

Fractions

1. Explain how to add fractions. Use \( \frac{15}{16} + \frac{3}{10} \) as an example.

2. Explain how to subtract fractions. Use \( \frac{11}{12} - \frac{2}{5} \) as an example.

3. Explain how to multiply fractions. Use \( \frac{18}{35} \cdot \frac{49}{54} \) as an example.

4. Explain how to divide fractions. Use \( \frac{15}{32} \div \frac{27}{10} \) as an example.
Basic Math Writing Assignment 2

Decimals

1. Explain how to add decimals. Use $23.79 + 5.068 + 0.4$ as an example.

2. Explain how to subtract decimals. Use $7.002 - 4.58$ as an example.

3. Explain how to multiply decimals. Use $(3.61)(0.042)$ as an example.

4. Explain how to divide decimals. Use $0.795 \div 0.24$ as an example.

5. Explain how to change a number from fraction form to decimal form. Use $\frac{24}{111}$ as an example.
1. What is a percent? What does the symbol % mean? What does it mean to have more than 100%?

2. Explain how to change a decimal number to a percent. Use 3.678 as an example.

3. Explain how to change a percent into a decimal. Use 15.5% as an example.

4. Explain how to change a fraction into an exact percent. Use 5/6 as an example.

5. Explain how to change a percent into a fraction. Use 125% as an example.
# Basic Math Writing Assignment 4

**Measurements**

1. Give 2 examples in each system.

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2. Explain how to convert 3.4 cg into kg and do it.

3. Explain how to convert 512 mi into inches and do it.
1. What is an algebraic expression? What is an algebraic equation? Give an example of each. What is the difference between an expression and an equation?

2. Explain how to simplify $3(4x - 9) - 10(2x + 7)$ and do it. (Use complete sentences and show algebra.)

3. Explain how to solve $5x - 8 = 12 - 3x$ and do it. (Use complete sentences and show algebra.)

4. Explain how to solve $2x + \frac{8}{5} = \frac{2x}{3}$ and do it. (Use complete sentences and show algebra.)
2. (13 pts) Explain how to simplify $3(4x - 9) - 10(2x + 7)$ and do it. (Use complete sentences and show algebra.)

To simplify this expression, start by using the distributive property of multiplication to combine the coefficients of the like terms:

\[3(4x - 9) - 10(2x + 7)\]

\[12x - 27 - 20x - 70\]

Because subtraction can be written in terms of addition, rewrite the expression in addition so you can use the commutative property of addition to combine the like terms:

\[12x + (-27) + (-20x) + (-70)\]

Now, combine the like terms to simplify the expression:

\[-8x + (-97)\]

The expression can be rewritten as:

\[-8x - 97\]

It is considered simplified because there are no like terms left to combine.
1. Explain how to find the x-intercept and y-intercept of a line from its equation. Use $2x + 3y = 9$ as an example.

2. Explain how to graph a line using the slope and the y-intercept. Use $y = \frac{-3}{5}x + 4$ as an example.
3. How can you tell from a graph if the slope of a line is positive or negative? Explain how to calculate the slope of a line from a graph. Use the graph below as an example.

4. Explain how to find the equation of a line given two points. Use the points (3, 16) and (5, 28) as an example.
Beginning Algebra Writing Assignment 4
Systems of Equations

1. What are you looking for when solving a system of linear equations? What are the three possibilities for the solution to a system of linear equations? Draw a graph of each possibility.

2. Explain how to solve the system graphically and do it.
   \[
   \begin{align*}
   y &= 2x - 7 \\
   y &= -\frac{1}{3}x + 14
   \end{align*}
   \]

3. Explain how to solve the system by substitution and do it.
   \[
   \begin{align*}
   2x - 6y &= 4 \\
   -4x + 2y &= -18
   \end{align*}
   \]

4. Explain how to solve the system by addition and do it.
   \[
   \begin{align*}
   2x - 6y &= 4 \\
   -4x + 2y &= -18
   \end{align*}
   \]
Beginning Algebra Writing Assignment 5

Polynomials

1. Explain how to subtract polynomials.
   Use \((x^2 - 4x + 9) - (3x^2 - 7x + 4)\) as an example.

2. Explain how to multiply monomials.
   Use \((6xy^4)(3x^5y^2)^2\) as an example.

3. Explain how to multiply binomials.
   Use \((3x + 8)(2x - 5)\) as an example.

4. Explain how to divide a monomial into a polynomial.
   Use \((24x^6 - 10x^4 - 15x^2) ÷ 3x^2\) as an example.

5. Explain how to simplify negative exponents.
   Use \((3a^4b^{-3})^{-2}\) as an example.
Beginning Algebra Writing Assignment 6
Factoring

1. Explain how to factor and do it.  $10x^6y^2 - 20x^3y^4 + 5x^4y^6$

2. Explain how to factor and do it.  $3x^2 + xy - 15x - 5y$

3. Explain how to factor and do it.  $x^2 - 2xy - 48y^2$

4. Explain how to factor and do it.  $12x^2 - 31x + 20$

5. Explain how to factor completely and do it.  $3x^5 + 9x^3 - 12x$
1. Explain how to solve a quadratic equation using the Zero Product Principle. Use \( 2x^2 = 15 - x \) as an example.

2. Explain how to solve a quadratic equation using the Square Root Property. Use \( 5x^2 - 30 = 0 \) as an example.

3. Explain how to solve a quadratic equation using the Quadratic Formula. Use \( 2x^2 = 15 - x \) as an example.

4. Which of the three methods of solving quadratic equations is the easiest, and why? Which one always works?

5. How many \( x \)-intercepts can a parabola have? Draw an example of each possibility. How can you tell from the equation that a parabola does not have any \( x \)-intercepts?

6. Explain how to find the \( x \)-intercepts of a parabola. Use \( y = -3x^2 - 8x \) as an example.
Intermediate Algebra Writing Assignment 1
Rational Expressions and Equations

1. Explain how to divide rational expressions. Use \( \frac{x^3 + 4x}{x^2 - 16} \div \frac{x^2 + 8x + 15}{x^2 + x - 20} \) as an example.

2. Explain how to add and subtract rational expressions. Use \( 2 + \frac{t}{t - 3} - \frac{18}{t^2 - 9} \) as an example.

3. Explain how to simplify complex fractions. Use \( \frac{x}{x + 2} + \frac{5}{x} + \frac{x}{2x + 4} + \frac{1}{3x} \) as an example.

4. Explain how to solve rational equations. Use \( \frac{3}{x^2 - 6x + 9} + \frac{x - 2}{3x - 9} = \frac{x}{2x - 6} \) as an example.
1. Explain how to divide rational expressions. Use \( \frac{x^3 + 4x}{x^2 - 16} \div \frac{x^2 + 8x + 15}{x^2 + x - 20} \) as an example.

The first step is to change the problem to multiplication by flipping the 2nd term: factor

\[
\frac{x^3 + 4x}{x^2 - 16} \cdot \frac{x^2 + x - 20}{x^2 + 8x + 15}
\]

The second step is to factor all of the terms:

\[
\frac{x(x^2 + 4)}{(x+4)(x-4)} \cdot \frac{(x+5)(x-4)}{(x+3)(x+5)}
\]

The cancel like terms from the top’s bottom multiply existing terms to get final result:

\[
\frac{x(x^2 + 4)}{(x+4)(x+3)}
\]

Check to see if anything else can be factored and canceled.
2. Explain how to add and subtract rational expressions. Use \( 2 + \frac{t}{t-3} - \frac{18}{t^2-9} \) as an example.

When adding or subtracting expressions, the first step is to have a common denominator, just as in any adding/subtracting of fractions. The common denominator of the given example would be \((t-3)(t+3)\). This includes the denominator of 1, underneath the 2, and \(t-3\) under \(t\), and using the difference of squares rule for \(t^2-9\). The expression then becomes:

\[
\frac{2(t-3)(t+3) + t - 18}{(t-3)(t+3)(t-3)(t+3)} \text{ no - if you change the denominators then you also have to change the numerators}
\]

At this point, follow the given operations and add/sub like terms, in this case the 2 and 18 are like terms, and they cannot be combined with the \(t\).

\[
\frac{t - 18}{(t-3)(t+3)} \text{ does then the simplified expression.}
\]
4. Explain how to solve rational equations. Use \( \frac{3}{x^2-6x+9} + \frac{x-2}{3x-9} = \frac{x}{2x-6} \) as an example.

Factor all the denominators and find the lowest common. You'll get \((x-3)(x-3)(6)\). Multiply the whole equation by this, to get rid of the denominator. Cancell out what you can to be left with:

\[ 18 + 2x^2 - 10x + 12 = 3x^2 - 9x. \]

Get all x's on one side:

\[ 30 = x^2 + x \quad \text{factor to get} \quad 30 = x(x+1). \]

Divide by x, subtract 1 and multiply by x. You'll get\n
\[ x^2 = 29. \]

So, \( x = \sqrt{29} \).
Intermediate Algebra  Writing Assignment 2

Radicals

1. Explain how to simplify the product of radicals.
   Use $\sqrt{20x^3y^2} \sqrt{15x^4z^5}$ as an example.

2. Explain how to simplify the quotient of radicals.
   Use $\frac{\sqrt[3]{24a^7}}{\sqrt[3]{5b^2}}$ as an example.

3. Explain how to solve radical equations.
   Use $x + 3 = \sqrt{7x + 29}$ as an example.

4. State the Pythagorean Theorem in words. Explain how to use it to find the length of one side of a right triangle when the lengths of the other two sides are known. Give an example.
2. Explain how to simplify the quotient of radicals. Use $\frac{\sqrt[3]{24a^7}}{\sqrt[3]{5b^2}}$ as an example.

In order to simplify the quotient of radicals, we have to think about the 3 rules that determine when a radical is simplified.

1. No factor of the radicand has an exponent that is $\geq$ the index.
2. No fractions in the radicand.
3. No radicals in the denominator.

In $\frac{\sqrt[3]{24a^7}}{\sqrt[3]{5b^2}}$ there is a radical in the denominator, so in order to simplify we must rationalize the denominator. This means multiply the expression by a radical (in the form of 1) to make the radicand of a perfect power of the index.

$\frac{\sqrt[3]{24a^7}}{\sqrt[3]{5b^2}} \cdot \frac{\sqrt[3]{125b^3}}{\sqrt[3]{125b^3}} = \frac{\sqrt[3]{\frac{1500a^7b}{125b^3}}}{\sqrt[3]{125b^3}}$

Using rule #1 we simplify:

$\frac{\sqrt[3]8 \cdot \sqrt[3]{75} \cdot \sqrt[3]{a^6} \cdot \sqrt[3]{9} \cdot \sqrt[3]{b}}{\sqrt[3]{5b} \cdot \sqrt[3]{5b} \cdot \sqrt[3]{5b} \cdot \sqrt[3]{5b}} = \frac{2a^2 \sqrt[3]{75ab}}{5b}$

Compare the final answer to the 3 rules to determine if it is in simplest form.
3. Explain how to solve radical equations. Use \( x + 3 = \sqrt{7x + 29} \) as an example.

To solve a radical equation we must first isolate the radical term.

\( x + 3 = \sqrt{7x + 29} \)

Then we use the principle of Powers rule, which states if \( a = b \) then \( a^n = b^n \) for any exponent \( n \). This eliminates the radical, since we now have a quadratic equation (indicated by the \( x^2 \) term) we set the equation to zero.

This equation is factorable so we can solve for \( x \).

Solve each product for \( x \).

Check the solutions by placing the \( x \) values into the original equation.

In this case \( x = -4 \), but \( x = 5 \) is a solution.
1. Explain how to solve a quadratic equation using the Zero Products Property. Use $12x^2 = 17x + 5$ as an example.

2. Explain how to solve a quadratic equation using the quadratic formula. Use $x^2 + 53 = 4x$ as an example.

3. How many solutions are possible for a quadratic equation? Explain how to use the discriminant to find out their type. Give an example of each type.

4. The graphing form of a parabola is $f(x) = a(x-h)^2 + k$. Explain how different values of $a$, $h$, and $k$ affect the graph. Give examples for positive and negative values of each.
1. What is a function? What is the domain and range of a function? Give a real world example (i.e. use words to describe it) of a function you have encountered in your life. Specify the domain and range of your function.

2. Explain how to apply the vertical line test and what it tells you. Give a graphical example which passes the vertical line test and a graphical example which fails the test and explain why in each case.

3. Explain how to combine functions by adding them and by dividing them. Use $f(x) = 10 - 5x$ and $g(x) = x^3$ as examples.

4. Explain how to compose functions. Use $f(x) = 10 - 5x$ and $g(x) = x^3$ as examples.
2. Explain how to apply the vertical line test and what it tells you. Give a graphical example which passes the vertical line test and a graphical example which fails the test and explain why in each case.

For any graphed expression a vertical line must be able to move all the way across the graph \((-\infty, \infty)\) and never cross our graph more than once to be a function. If it does, it is not a function.

This fails our vertical line test because there is a vertical line that crosses the graph more than once.

This passes our vertical line test because our vertical line never crosses the graph more than once.