MCSM Manhattan Center for Science and Mathematics

Scientia Potentia est-
Knowledge Itself is Power

David Jimenez, High School Principal

2017 Summer Break Assignment for Students Entering Algebra II

Name: _____

Due Date: September 7th 2017

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Please be advised that you need to have the following tools for their math class in September.

Required Math equipment and supplies for all students

1. Graph paper
2. Loose leaf paper with binder
3. Ruler / straight edge
4. Colored Pens
5. Pencil
6. Graphing Calculator: TI 84+ Family
7. Folders

For Geometry class, students need the following additional equipment:

8. Compass
9. Protractor
10. Colored Pencils

Sincerely,

Mathematics Department

A. Simplifying Polynomial Expressions

I. Combining Like Terms	II. Distributive Property
Add/Subtract terms that are considered "like terms" – have the same variable(s) with same exponent(s)	Every term inside the parentheses is multiplied by the term outside of the parentheses.

Ex. 1

$5x - 7y + 10x + 3y$

$\underline{5x} \; \underline{-7y} + \underline{10x} + \underline{3y}$

$15x - 4y$

Ex. 2

$-8h^2 + 10h^3 - 12h^2 - 15h^3$

$\underline{-8h^2} + \underline{10h^3} \; \underline{-12h^2} \; \underline{-15h^3}$

$-20h^2 - 5h^3$

Ex. 1: $3(9x-4)$

$3 \cdot 9x - 3 \cdot 4$

$27x - 12$

Ex. 2: $4x^2(5x^3 + 6x)$

$4x^2 \cdot 5x^3 + 4x^2 \cdot 6x$

$20x^5 + 24x^3$

Practice Set A: Simplify the following. Box your final answer

1. $8x - 9y + 16x + 12y$

2. $14y + 22 - 15y^2 + 23y$

3. $5n - (3 - 4n)$

4. $-2(11b - 3)$

5. $10q(16x + 11)$

6. $-(5x - 6)$

7. $3(18z - 4w) + 2(10z - 6w)$

8. $(8c + 3) + 12(4c - 10)$

9. $9(6x - 2) - 3(9x^2 - 3)$

10. $-(y - x) + 6(5x + 7)$

B. Solving Equations

Recall: To solve an equation, UNDO the order of operations. REMEMBER, addition is "undone" by subtraction and vice versa. Multiplication is "undone" by division, and vice versa.

I. When solving equations with variables on both sides of the equal sign, be sure to get all terms with variables on one side and all the terms without variables on the other side.	II. In some equations, you will need to combine like terms and/or use the distributive property to simplify each side of the equation, and then begin to solve it.
$8x + 4 = 4x + 28$ $-4 \quad -4$ $8x = 4x + 24$ $-4x \quad -4x$ $4x = 24$ $\div 4 \quad \div 4$ $x = 6$	$5(4x - 7) = 8x + 45 + 2x$ $20x - 35 = 10x + 45$ $-10x \quad -10x$ $10x - 35 = 45$ $+35 \quad +35$ $10x = 80$ $\div 10 \quad \div 10$ $x = 8$

Practice Set B. Solve each equation. Show all steps. Box your final answer

1. $5x - 2 = 33$

2. $140 = 4x + 36$

3. $8(3x - 4) = 196$

4. $45x - 720 + 15x = 60$

5. $132 = 4(12x - 9)$

6. $198 = 154 + 7x - 68$

Practice Set B continued. Solve each equation. Show all steps. Box your final answer.

7. $-131 = -5(3x - 8) + 6x$

8. $-7x - 10 = 18 + 3x$

9. $12x + 8 - 15 = -2(3x - 82)$

10. $-(12x - 6) = 12x + 6$

Practice Set B continued. Solve each equation for the specified variable. Box your final answer.

1. $Y + V = W$, for V

2. $9wr = 81$, for w

3. $2d - 3f = 9$, for f

4. $dx + t = 10$, for x

5. $P = (g - 9)180$, for g

6. $4x + y - 5h = 10y + u$, for x

C. Rules of Exponents

Multiplication: Recall $(x^m)(x^n)=x^{(m+n)}$ Ex: $(3x^4y^2)(4xy^5)=(3\cdot 4)(x^4\cdot x^1)(y^2\cdot y^5)=12x^5y^7$

Division: Recall $\frac{x^m}{x^n}=x^{(m-n)}$ Ex: $\frac{42m^5j^2}{-3m^3j}=\left(\frac{42}{-3}\right)\left(\frac{m^5}{m^3}\right)\left(\frac{j^2}{j^1}\right)=-14m^2j$

Powers: Recall $(x^m)^n=x^{(m\cdot n)}$ Ex: $(-2a^3bc^4)^3=(-2)^3(a^3)^3(b^1)^3(c^4)^3=-8a^9b^3c^{12}$

Power of Zero: Recall $x^0=1,\ x\neq 0$ Ex: $5x^0y^4=(5)(1)(y^4)=5y^4$

Practice Set C. Simplify each expression. Box your final answer

1. $(c^5)(c)(c^2)$
2. $\frac{m^{15}}{m^3}$
3. $(k^4)^5$
4. d^0
5. $(p^4q^2)(p^7q^5)$
6. $\frac{45y^3z^{10}}{5y^3z}$
7. $(-t^7)^3$
8. $3f^3g^0$
9. $(4h^5k^3)(15k^2h^3)$
10. $\frac{12a^4b^6}{36ab^2c}$
11. $(3m^2n)^4$
12. $(12x^2y)^0$
13. $(-5a^2b)(2ab^2c)(-3b)$
14. $4x(2x^2y)^0$
15. $(3x^4y)(2y^2)^3$

D. Multiplying

The distributive property is used when you want to multiply a single term by an expression.

Ex 1: $8(5x^2 - 9x)$

$8 \cdot 5x^2 + 8 \cdot (-9x)$

$40x^2 - 72x$

Recall: $4^2 = 4 \cdot 4$

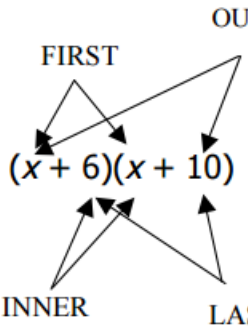
$x^2 = x \cdot x$

Ex. $(x + 5)^2$

$(x + 5)^2 = (x + 5)(x+5)$

FOIL

Ex. 1: $(x + 6)(x + 10)$



First $x \cdot x$ ------> x^2

Outer $x \cdot 10$ -----> $10x$

Inner $6 \cdot x$ ------> $6x$

Last $6 \cdot 10$ -----> 60

$x^2 + 10x + 6x + 60$

$x^2 + 16x + 60$

(After combining like terms)

Practice Set D. Multiply each expression

1. $(x + 10)(x - 9)$

2. $(x + 7)(x - 12)$

3. $(x - 10)(x - 2)$

4. $(x - 8)(x + 81)$

5. $(2x - 1)(4x + 3)$

6. $(-2x + 10)(-9x + 5)$

7. $(-3x - 4)(2x + 4)$

8. $(x + 10)^2$

9. $(-x + 5)^2$

10. $(2x - 3)^2$

E. Factoring. (GCF, Trinomial Factoring, Difference of Two Squares.)

Ex. 1 $3x^4 - 33x^3 + 90x^2$

- In this example the GCF is $3x^2$.
- So when we factor, we have $3x^2(x^2 - 11x + 30)$.
- Now we need to look at the polynomial remaining in the parentheses. Can this trinomial be factored into two binomials? In order to determine this make a list of all of the factors of 30.
  Since -5 + -6 = -11 and (-5)(-6) = 30 we should choose -5 and -6 in order to factor the expression.
- The expression factors into $3x^2(x-5)(x-6)$

Note: Not all expressions will have a GCF. If a trinomial expression does not have a GCF, proceed by trying to factor the trinomial into two binomials.

Practice Set E. Factor each expressions

1. $3x^2 + 6x$

2. $4a^2b^2 - 16ab^3 + 8ab^2c$

3. $x^2 - 25$

4. $n^2 + 8n + 15$

5. $g^2 - 9g + 20$

6. $d^2 + 3d - 28$

7. $z^2 - 7z - 30$

8. $m^2 + 18m + 81$

9. $4y^3 - 36y$

10. $5k^2 + 30k - 135$

F. Radicals

To simplify a radical, we need to find the greatest perfect factor of the number under the radical sign (radicand) and then take the square root of that number.

Ex. 1: $\sqrt{72}$ $\sqrt{36}\cdot\sqrt{2}$ $6\sqrt{2}$	*Ex.* 2: $4\sqrt{90}$ $4\cdot\sqrt{9}\cdot\sqrt{10}$ $4\cdot 3\cdot\sqrt{10}$ $12\sqrt{10}$	*Ex.* 3: $\sqrt{48}$ $\sqrt{16}\sqrt{3}$ $4\sqrt{3}$ OR	*Ex.* 3: $\sqrt{48}$ $\sqrt{4}\sqrt{12}$ $2\sqrt{12}$ ← This is not simplified completely because 12 is divisible by 4 (another perfect square) $2\sqrt{4}\sqrt{3}$ $2\cdot 2\cdot\sqrt{3}$ $4\sqrt{3}$

Practice Set F. Simplify the following radicals. Box your final answer.

1. $\sqrt{100}$ 2. $\sqrt{36}$ 3. $-\sqrt{121}$ 4. $\sqrt{49}$ 5. $\sqrt{8}$

6. $\sqrt{50}$ 7. $\sqrt{45}$ 8. $\sqrt{28}$ 9. $-\sqrt{80}$ 10. $\sqrt{450}$

11. $\sqrt{400}$ 12. $3\sqrt{98}$ 13. $\sqrt{36x^2}$ 14. $\sqrt{7x^2}$ 15. $\sqrt{18a^2}$

16. $\sqrt{20x^2y}$ 17. $\sqrt{100a^2}$ 18. $\sqrt{72a^2}$ 19. $\sqrt{20x^6y^{10}z}$ 20. $\sqrt{75x^{12}y^{20}z^6}$

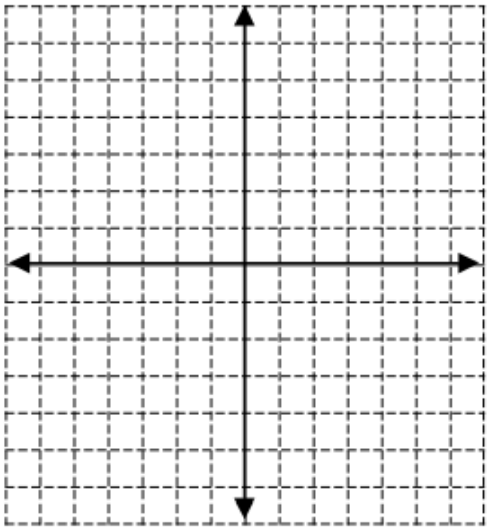
21. $\sqrt{(x+5)^{12}}$ 22. $\sqrt{x^5}$ 23. $5\sqrt{x^3}$

G. Graphing Linear Equations

Practice Set G. Graph the following linear equations.

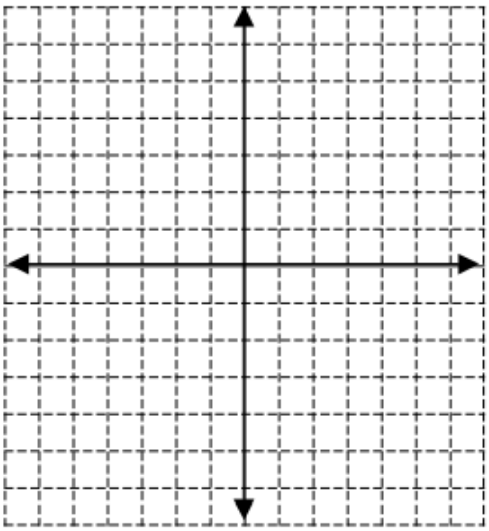
1. $y = 2x + 5$

Slope: _____ y-intercept: _____

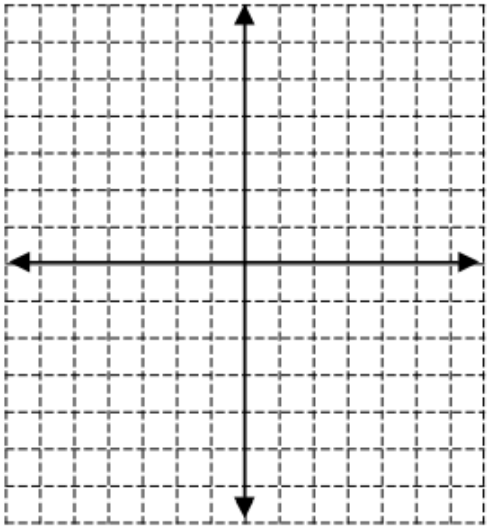


2. $y = \frac{1}{2}x - 3$

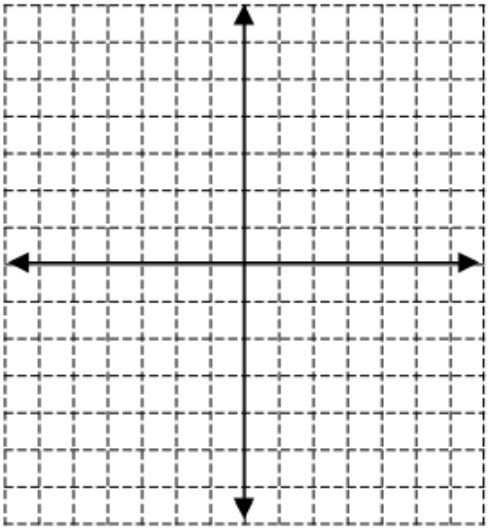
Slope: _____ y-intercept: _____



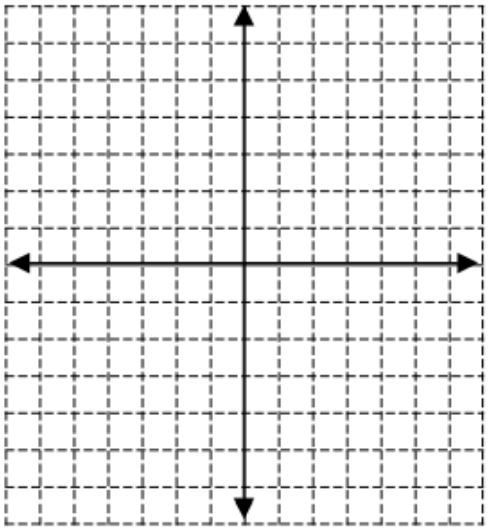
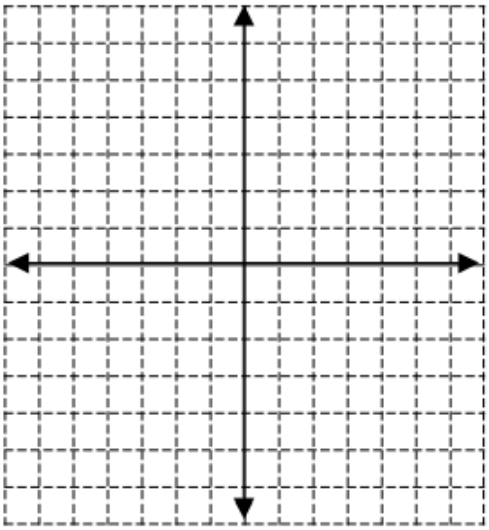
3. $y = 4$



4. $4x - 3y = 9$



Practice Set G continued. Graph the following linear equations.

5. $-2x+6y=12$ 	6. $x=-3$ 

H. Fractions. Simplify the following fractions.

1) $\frac{2}{3}+\frac{4}{9}$	2) $\frac{7}{4}-\frac{4}{5}$	3) $\frac{3}{4}+\frac{1}{6}$
4) $\frac{2}{3}\bullet\frac{4}{9}$	5) $\frac{7}{4}\bullet\frac{4}{5}$	6) $\frac{3}{4}\bullet\frac{1}{6}$
7) $\frac{2}{3}\div\frac{4}{9}$	8) $\frac{7}{4}\div\frac{4}{5}$	9) $\frac{3}{4}\div\frac{1}{6}$