7th Grade Geometry Honnors

Dear Students,

The summer packet has six sections and Delta math assignments. Please take a break and don't think about math until July! Pace the work over several weeks during the summer.

Part. I.	Simplifying Expressions
Part II.	Solving linear equations and systems
Part III.	Linear Equations and graphing
Part IV.	Polynomials and Quadratics
Part V.	Radicals
Part VI.	Basic Geometry

Delta math will cover more challenging geometry concepts. (about 60 minutes in total)

Enjoy your summer.

Best,

Mr. Fallone

Part I. Simplifying Expressions and Combining Like Terms

Remember:
Always use order of operations when simplifying expressions. To help you, think of the PEMDAS rule-Parenthesis, Exponents, Multiply/Divide, Add/Subtract in order from left to right.

Problem Set 1

Evaluate each expression.

1. $1 + 4 \cdot 6 - 3$ 2. $2 + (10 - 1) \div 3$ 3. $\frac{15+3}{9} \cdot - 5 - (- 2)$ 4. $\frac{(-8+3)\cdot 2-(-2)}{-4}$

5. $(10 - 7)^2 - \frac{-18}{-3}$ 6. $\frac{-27-8}{5(10-9)}$ 7. $- 9 \cdot 5 - [10 - (- 7)]^2$ 8. $- 4\left(5 \cdot - \frac{30}{6} + 9\right)$

Evaluate each expression using the values given.

1. $z + y^2 - \frac{x}{3}$, *if* $x = - 9$, $y = - 3$, *and* $z = - 4$

2. $y - x + \frac{x^2}{4}$, *if* $x = 2$ *and* $y = - 9$

Problem Set 2

Simplify each of the following expressions.

1. $7m + 1 + 7m + 4$ 2. $10 - 7p + p - 5$ 3. $6(5x + 7) - 7$

4. $- 6(- 8 + 9) + 4a$ 5. $- 2(- 1 + 6m) + 8m$ 6. $- 3k - 3(5k + 7)$

7. $- 7k(1 - 8k) + 5k(- 3 - 2k)$ 8. $7a(1 + 8a) - 8a(a + 9)$ 9. $(6 + 5n) + (4n - 8)$

10. $\left(5x - 3x^2\right) - \left(7x + 8x^2\right)$ 11. $\left(k + 5k^2\right) + \left(k + 4 - 7k^2\right)$ 12. $\left(5v^2 + 7v^3\right) - \left(6v^3 - 2v^2 - 8\right)$

13. $(3n - 2 - 8n^2) + (7 - 8n - 7n^2)$ 14. $- 5(2u - h)$ 15. $(1 - 4a - 5a^3) - (6 + a^3 + 4a)$

Problem Set 3

Simplify each of the following expressions using the FOIL method.

Remember:

When multiplying two polynomials, you must distribute every term in the first expression to every term in the second expression. For binomials, it is helpful to remember the FOIL method, which reminds you to multiply the first terms together first, then the outer terms, then the inner terms, then the last terms. Finally, simplify by putting like terms together. When multiplying larger polynomials, you can follow the same pattern.

1. $(2x - 7)(x + 6)$
2. $(2x - 6)(8x - 1)$
3. $(x + 6)(8x - 3)$
4. $(b + 1)(3b - 8)$
5. $(7x + 8y)(8x + y)$
6. $(7x - 6y)(2x + 8y)$
7. $(5p + 6)((3p^2 + p + 6)$
8. $(7x + 5)(4x^2 + 8x + 5)$
9. $(3c - 5)(2c^2 - c + 8)$

Remember:

Rules for exponents

Product Rule ~ $a^x + a^y = a^{x+y}$

When terms with the same base are multiplied, you add the exponents.

Quotient Rule ~ $\frac{a^x}{a^y} = a^{x-y}$

When terms with the same base are divided, you subtract the exponents.

Power Rule ~ $\left(a^x\right)^y = a^{x \cdot y}$

When a term is raised to another exponent, you multiply the exponents.

Zero Exponent ~ $a^0 = 1$

Anything raised to the zero power is equal to one.

Negative exponents ~ $\left(\frac{a}{b}\right)^{-x} = \left(\frac{b}{a}\right)^x$

A negative exponent is equivalent to taking the reciprocal of the base number, and applying the absolute value to the exponent

Problem Set 4

Simplify each of the following expressions. Your answer should include only positive exponents.

1. $(4xy)^2$

2. $\frac{y^3}{4x^2y^{-1}}$

3. $4u^{-2}v^0 2u^{-2}$

4. $\left(y^4\right)^{-1}$

5. $\left(x^3\right) \cdot \left(2x^{-1}\right)^0$

6. $\left(\frac{2x^3}{2x^{-4}y^{-4}}\right)^2$

7. $\frac{\left(b^2\right)^3}{a^0 \cdot 2a^{-3}b^2}$

8. $\frac{(2ab)^3}{2a^2b^4 \cdot a^3b^3}$

9. $a^{-2}b^3 \cdot (2b)^4$

10. $\frac{4x^4}{3x^4y^{-3}}$

11. $\frac{\left(a^4b^{-3}\right)^0}{2ba^{-2}}$

12. $x^{-2}y^2 \cdot \left(x^0y^0\right)^{-3}$

Part II. Solving Linear Equations and Systems of Equations

Remember:

Rules for solving equations with one variable

1. Distribute if necessary
2. Combine all like terms
3. Isolate the variable

Problem Set 5

1. $-5 = 2 - 4n + 1$

2. $-x - 2x = -24$

3. $117 = -3(5r - 4)$

4. $-2(8m - 3) = 86$

5. $x + 16 = -8(5x - 2)$

6. $-9 + 4m = 3(m - 5)$

7. $2x + 6x = -10$

8. $\frac{2}{5} = -p + \frac{7}{5}p$

9. $-\frac{7}{2}n - 2n = -\frac{99}{4}$

Problem Set 6

Solve each of the following proportions.

1. $\frac{2}{6} = \frac{m}{4}$

2. $\frac{4}{5} = \frac{b}{4}$

3. $\frac{x-2}{5} = \frac{2}{6}$

4. $\frac{6}{5} = \frac{10}{k-1}$

5. $\frac{17d}{25} = \frac{51}{125}$

6. $\frac{x-4}{x} = \frac{7}{9}$

7. $\frac{3w}{10w+2} = \frac{2}{7}$

8. $\frac{8a-5}{5a-4} = \frac{13}{8}$

Problem Set 7

Solve each system of equations using the substitution method.

1. $3x + y = 5$
   $y = 2x$

2. $m - 3n = -4$
   $2m + 6n + 5$

Solve each system of equations using the addition-or-subtraction method.

3. $6r + 5y = -8$
   $2r - 5y = -16$

4. $12m + 3n = 51$
   $7m - 3n = 44$

Solve each system of equations using multiplication with the addition-or-subtraction method.

5. $3x - y = 3$
   $x + 3y = 11$

6. $3x + 4y = -25$
   $2x - 3y = 6$

Part III. Linear Equations and Graphing

Remember:

Slope-Intercept Form is $y = mx + b$, where m is the slope, and b is the y-interecept.

Slope can also be understood as $\frac{rise}{run}$.

The slope can be found from 2 points using the formula $\frac{y_2 - y_1}{x_2 - x_1}$.

Problem Set 8

Write an equation in slope-intercept form that satisfies each of the following requirements.

1. Slope = -2, y-intercept=1

2. slope=$\frac{2}{3}$, passes through the point $(-3, 2)$

Write the following equations in slope-intercept form.

3. $5x + y = 30$

4. $x - y = 7$

5. $-4x + 3y = 12$

Find the slope of the line that passes through each pair of points.

6. $(10, 10), (-4, 17)$

7. $(0, 9), (-2, -1)$

Remember:

Lines are parallel if the slopes are the same.

Lines are perpendicular if the slopes are the negative inverse of each other, such as $\frac{2}{3}$ and $-\frac{3}{2}$

Problem Set 9

State whether each pair of lines is parallel, perpendicular, or neither.

1. $y = 6x - 4$
   $y = 6x - 3$

2. $y = 2x + 1$
   $y = -\frac{1}{2}x - 4$

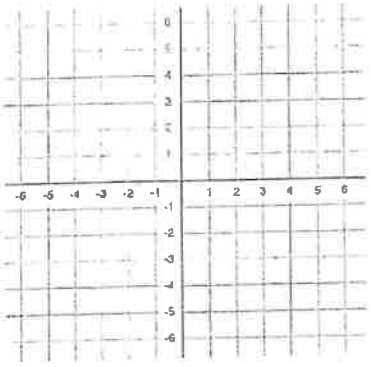
3. $2x - 3y = -6$
   $2x - y = 2$

Problem Set 10

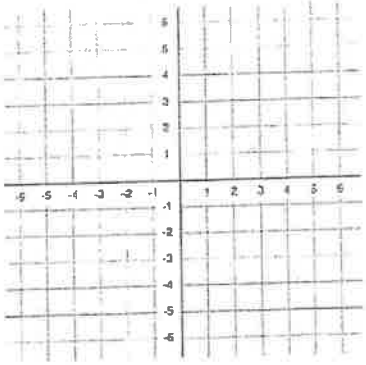
Remember:
When graphing a line from an equation, make sure it is in slope-intercept form, then plot the y-intercept and use the slope to find additional points.

Graph each of the following equations in the provided grid.

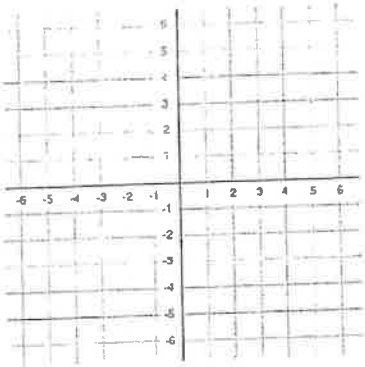
1. $y = 5$



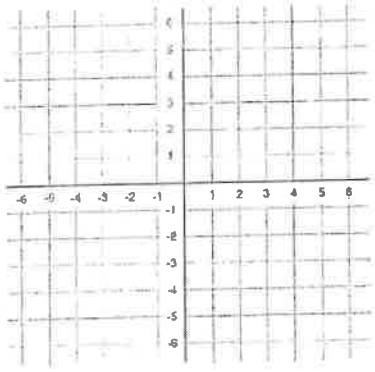
2. $y = -\frac{1}{4}x + 1$



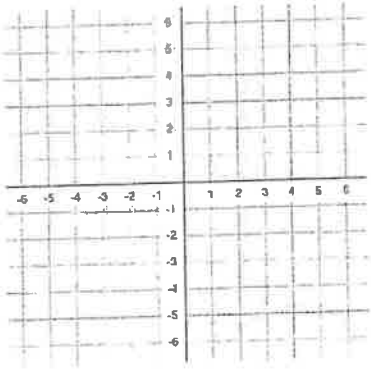
3. $y = \frac{1}{2}x + 5$



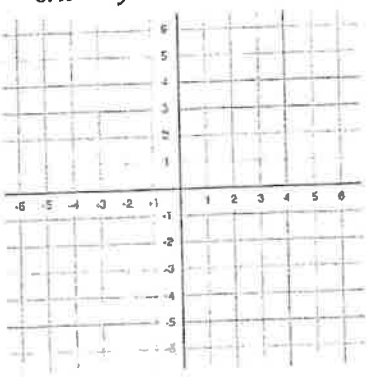
4. $15 - 3y = -x$



5. $-2x = -y + 1$



6. $x - y = 4$



Part IV. Polynomials and Quadratics

Remember:

1. Is there a GCF? Factor that out first.
2. Is this a difference of squares? Does it follow the pattern $a^2 - b^2$? If so, factor it as a difference of squares.
3. Is this a perfect square? Does it follow the pattern $a^2 +/- 2ab + b^2$? If so, factor it as a perfect square.
4. Does this polynomial have a 1 in the "a" spot? Use a product/sum chart to factor.
5. Does it have a number greater than 1 in the "a" spot? Use "busting the b".

*When you are finished, make sure it can't be factored again! Check your work with FOIL.

Problem Set 11

Completely factor each expression.

1. $3x^2 + 6x$

2. $x^2 - 25$

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

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

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

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

7. $4y^3 - 36y$

8. $5k^2 + 30k - 135$

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

Use the Zero Product Property to solve each equation. Check your answer.

10. $(x-4)(x-3)=0$	11. $x(x+13)=0$

Solve each quadratic equation by factoring. Check your answer.

12. $x^2+2x-15=0$	13. $x^2-5x-6=0$

Solve using square roots. Check your answer.

14. $x^2=64$	15. $x^2=900$
16. $9x^2+20=189$	17. $0=49x^2-16$

Solve by completing the square.

18. $x^2+10x=-21$	19. $-x^2+6x-3=0$

- For quadratic equations of the form $ax^2 + bx + c = 0$, where a, b, and c are real numbers, the **quadratic formula** is a formula for the solutions:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Solve using the Quadratic Formula.

20 $x^2+7x-6=0$	21. $2x^2-x-11=0$

Part V. Radicals

Simplifying & Multiplying Radicals

Simplify the following radicals:

1. $\sqrt{60}$

2. $-\sqrt{128}$

3. $5\sqrt{320}$

4. $2\sqrt{45}$

5. $\dfrac{20\sqrt{50}}{4\sqrt{2}}$

6. $\dfrac{\sqrt{21}}{7\sqrt{2}}$

Multiply and then simplify the following radicals:

1. $\sqrt{5} \cdot \sqrt{45}$

2. $(\sqrt{5})^2$

3. $\sqrt{6} \cdot \sqrt{30}$

4. $4(\sqrt{10})^2$

5. $\sqrt{6} \cdot \sqrt{2}$

6. $\sqrt{25} \cdot \sqrt{25}$

Part VI. Geometry

Remember:

Perimeter is defined as the distance around a 2D figure.

-Usually, the perimeter is found by adding the lengths of all the sides of the figure.

-The length around a circle is called the circumference and has a unique formula.

Area is defined as the space inside a 2D figure.

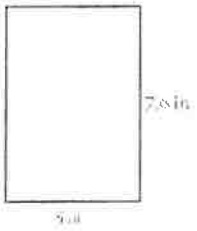
Formulas:

Rectangle/Square	Triangle	Circle
$P = 2l + 2w$ or $P = 4s$	$P = a + b + c$	$C = 2\pi r$
$A = l \times w$	$A = \frac{1}{2}bh$	$A = \pi r^2$

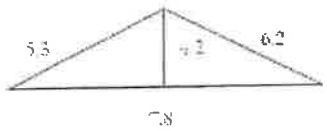
Problem Set 12

Find the area and perimeter/circumference of each of the following figures. Round your answers to the nearest hundredth.

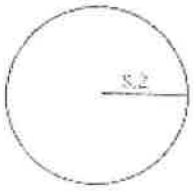
1.



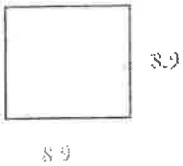
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3.



4.

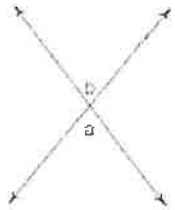


Name the relationship(s): complementary, supplementary, vertical, or adjacent.

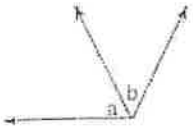
5.



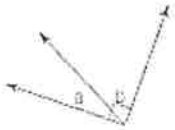
6.



7..



8..

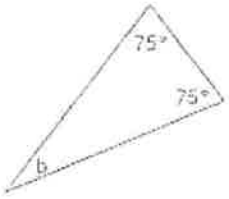


Find the measure of angle *b*.

9.

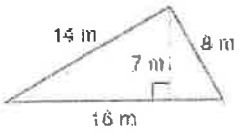


10.



Find the perimeter of each figure.

11.



12.

