

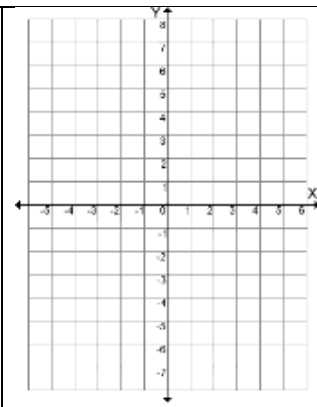
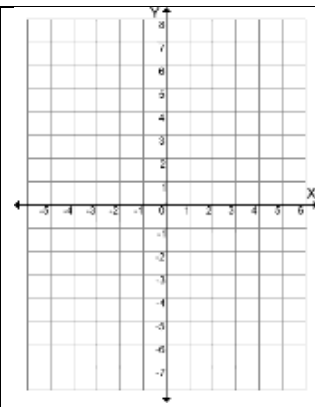
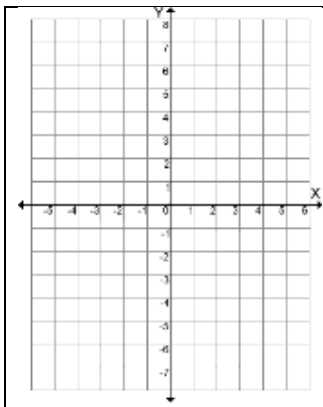
Summer Work for Students Taking Honors Geometry

Complete the summer work two times - once from June 10-July 10 and once from July 11-August 11. Complete the work on loose-leaf or graph paper the first time around (or on an extra copy of this packet), then on the packet the second time. Your parents must verify that each set of problems was completed (two signatures with applicable dates). Be neat and complete and show your work. Feel free to call a classmate for help with content. You will be assessed on this information in the fall. **Because of the unusual end of this year, you are not responsible for doing #6, 22-24, and 28.**

Part I: Functions, Linear Functions, Absolute Values, and Inequalities

1. Graph the following lines. You may choose to use a table of values, $y = mx + b$ or a combination of the slope and any point.

a. $y = \frac{1}{2}x - 3$	c. $y = -\frac{3}{2}x + 2$	e. $y = -5x$
b. $y = 3$	d. $x + 2 = 5$	f. $2x - 3y = 6$

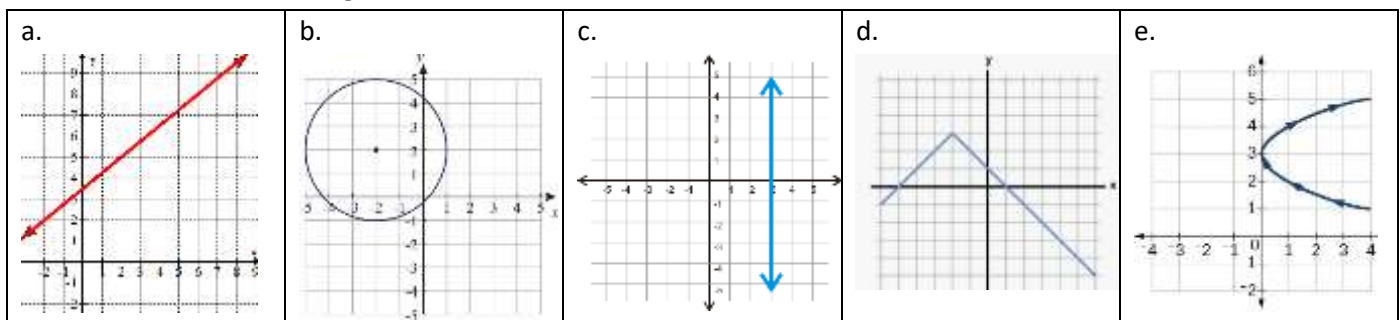


2. Determine the domain and range of each relation. Determine if each relation is a function.

a. $\{(4,3), (-3,6), (2,1), (4,5)\}$	b. $\{(7,8), (8,7), (3,8), (-4,1)\}$
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The vertical line test is used to determine if a graph illustrates a function. To be a function a vertical line passed across the graph will intersect the graph at one point at most.

3. Determine if the following are functions.



4. Evaluate the following functions. Replace x with the number inside the parentheses. If functions are expressed such as $g(f(2))$, compute the inside, $f(2)$, first, then use the new result to plug into the outside function.

$$f(x) = 3x - 4, \quad g(x) = 5x + 2, \quad h(x) = x^2, \quad k(x) = x^3, \quad j(x) = \frac{1}{x}$$

a. $f(4)$	b. $k(-5) + 2h(3)$	c. $g(w)$	d. $j\left(\frac{2}{3}\right)$	e. $h(f(g(-1)))$
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To solve *absolute value equalities* and *inequalities*: Begin by writing what is inside the absolute value bars with the original symbol and writing what is inside the absolute value bars with the symbol reversed. (Inequalities- greater become "or" problems...less than are "and" problems) Answers to equalities can be written as inequalities like this $x < 3$ or $x > 5$ or like this $-2 \leq x \leq 6$. Answers can also be written in interval notation, which might look like: $(-\infty, 3) \cup (5, \infty)$ or $[-2, 6]$.

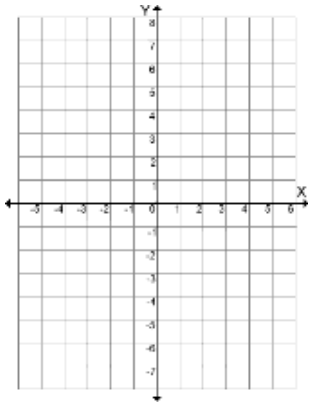
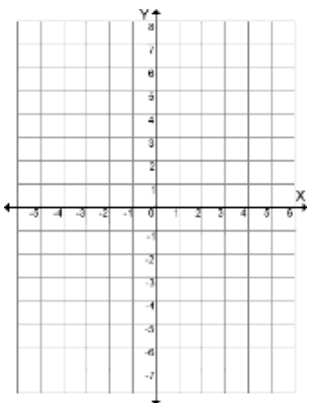
5. Solve each absolute value equality/inequality algebraically.

a. $ x + 3 + 2 = 6$	b. $ 4 - x < 3$	c. $ 2x - 3 \geq 7$
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The graph of a **direct variation** is a line through the origin. An example of a direct variations is $y/x = 4$ which can also be written as $y = 4x$.

The graph of an **inverse variation** is a hyperbola. An example of a direct variation is $xy = 4$ which can also be written as $y = 4/x$

6. Graph the following. (You can skip #6 this year.)





<p>a. Graph the direct variation $y = 4x$</p> 	<p>b. Graph the inverse variation $y = 4/x$</p> 
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7. Solve each system using substitution or elimination.

<p>a. $3x + 1 = y$ $2x + 3y = 25$</p>	<p>b. $x - 2y = -6$ $x = 2y + 2$</p>	<p>c. $6x + 4y = 2$ $3x + 2y = 1$</p>
<p>d. Two new markers and one ream of paper cost \$7.75. Three new markers and two reams of paper cost \$14.75. Use a system of equations to find the cost of one marker and one ream of paper.</p>		

Remember, when working with inequalities, if you divide or multiply by a negative, reverse the inequality.

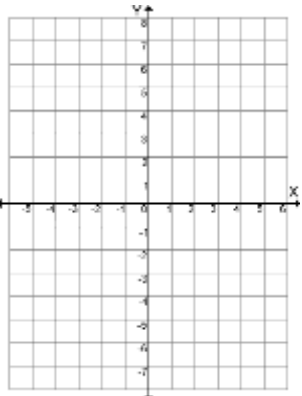
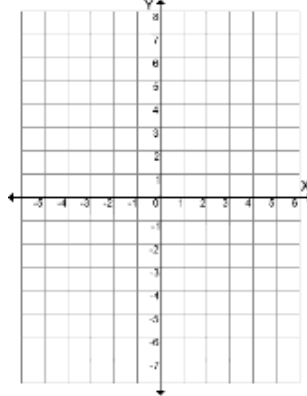
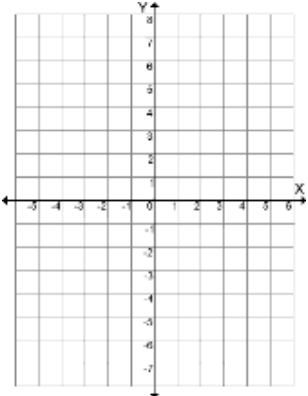
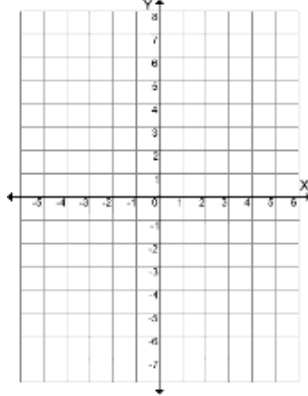
8. Graph each inequality on a number line.

<p>a. $x < 2$</p> 	<p>b. $y \geq -3$</p> 	<p>c. $x \leq 1$ or $x \geq 5$</p> 	<p>d. $-5 < x < -3$</p> 
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9. Solve each inequality. Write the result in interval notation. (Remember that ∞ use parentheses.)

<p>a. $3x - 5 > 4x + 7$</p>	<p>b. $-3 < 2x + 1 < 11$</p>	<p>c. $3x + 5 > 8$ or $3x + 4 < -11$</p>
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10. Graph the following inequalities.

<p>a. $y \geq \frac{1}{3}x - 4$</p> 	<p>b. $y \leq 2x$</p> 	<p>c. $y \geq 3$; $x \leq -1$</p> 	<p>d. $-2y > 3x$; $x - y < 4$</p> 
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11. Solve each linear equation.

a. $(x + 3) - (3x - 4) = 10$	b. $2(x - 3) - 4(5 - x) = 10x + 4$	c. $-\frac{4}{5}x + 1 = -11$
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12. Find the slope of each line.

a. Passing through $(-3,6)$ and $(4,-7)$	b. $2y = 3x - 6$	c. $3x - 7y = 10$	d. $x = 6$	e. $2y = 9$
f. With x-intercept $(4,0)$ and y-intercept $(0,-3)$	g. $x = 0$	h. $y = 0$	i. $\frac{x}{3} - \frac{y}{2} = 2$	j. $\frac{y}{x} = 3$

A **line** has three basic forms:

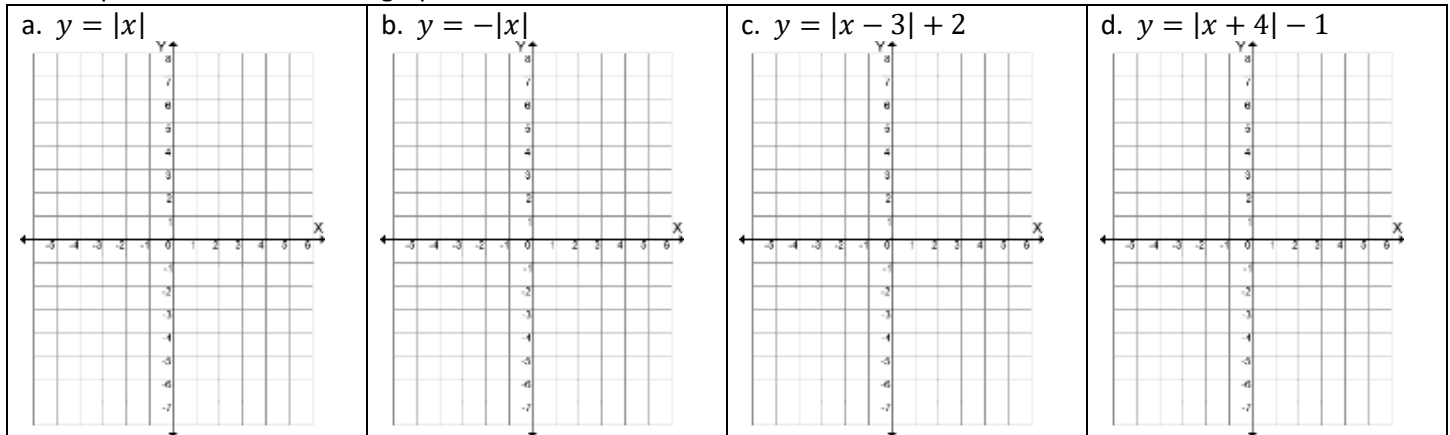
- slope- intercept form $y = mx + b$,
- standard form $Ax + By = C$
- point-slope form $y - y_1 = m(x - x_1)$

13. Find the equation of the line using the given information. (Any of the 3 forms is fine.) Show all work.

a. $m = 4, b = -5$	b. slope is $-.25$, line passes through the point $(0,3)$	c. slope is -1 , line passes through the point $(2,3)$	d. passes through $(3,-1)$ and $(5,7)$
d. slope is 0, line passes through $(6,9)$	e. parallel to $y = 4x - 1$ and passing through $(0,11)$	f. perpendicular to $3x + y = 1$ and passing through $(3,-6)$	g. perpendicular to $y = 3$ and passes through $(-4,-2)$

In the absolute value function $y = |x - h| + k$, the vertex is (h, k) .

14. Graph each absolute value graph.



Part II: Quadratics and Factoring

15. Factor each expression completely.

a. $4x^2 - 12x$	b. $4(x - w) + p(x - w)$	c. $x^2 - 25$	d. $16x^2 + 24x + 9$
e. $x^2 + 15x + 56$	f. $x^2 - 2x - 63$	g. $8y^2 - 9y + 1$	h. $6x^2 + 11x + 3$
i. $a^2 - 49b^2$	j. $3x + 3y + wx + wy$	k. $y^4 - 16$	l. $(x + 3)^2 - 2(x + 3) - 15$
m. $2xy^2 - 4xy$	n. $x^2 - 5xy - 14y^2$	o. $81x^2 - 25y^2$	p. $7x^2 - 19x + 10$
q. $36x^2 + 84x + 49$	u. $30x^3y^3 - 18x^2y^4$	v. $a^2 + 8a - 33$	w. $x^4 - 3x^2 - 28$

16. Solve each equation by factoring. (First get the function equal to 0.)

a. $4y^2 = 2y$	b. $x^2 = 20x - 100$	c. $25m^2 - 16 = 0$	d. $6h^2 + 17h = -12$
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17. Solve each equation by completing the square and by using the quadratic formula. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

a. $x^2 - 2x - 5 = 0$	b. $y^2 + 8y + 4 = 0$	c. $x^2 - 3x - 5 = 0$
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18. Solve $2x^2 + 5x = 12$ by factoring, completing the square, **and** the quadratic formula

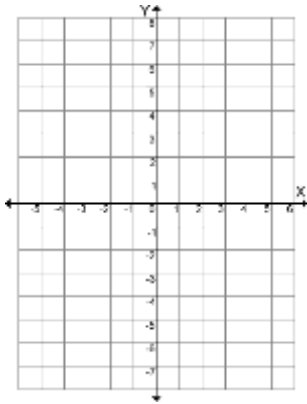
19. Expand/Multiply each of the following.

a. $(x + 4)(x + 7)$	b. $(x + 10)(x - 5)$	c. $(3x + 5)^2$	d. $x(x - 1)(x - 6)$	e. $(x - 2)(x^2 + x - 3)$
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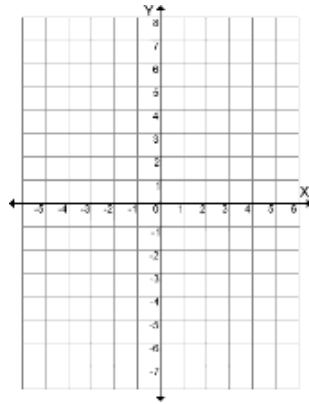
The *vertex form* for a parabola is $y = (x - h)^2 + k$ which has vertex (h, k) .

20. Graph each parabola. Label the graph.

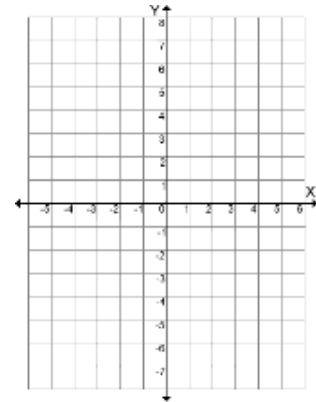
a. $y = x^2$
b. $y = -x^2$



c. $y = -x^2 + 4$
d. $y = x^2 + 2$

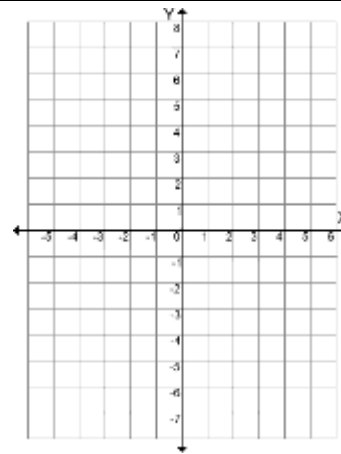


e. $y = (x - 2)^2 + 1$
f. $y = -(x + 1)^2 - 2$



g. Graph the parabola $y = -x^2 + 4x + 1$.

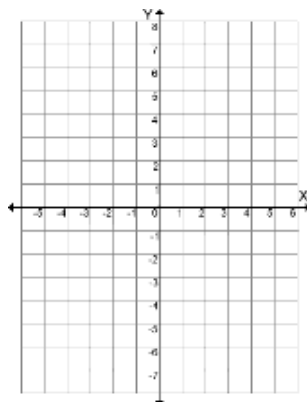
Compute $x = -\frac{b}{2a}$. This is the equation of the vertical line of symmetry and is the x portion of the vertex. Denote the line of symmetry with a broken line. Find the y -coordinate of the vertex. Plot a minimum of 5 points, including the vertex.



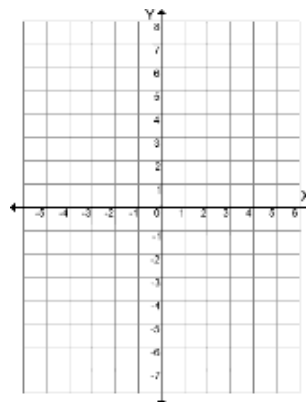
In the radical function $y = \sqrt{x - h} + k$, the vertex is (h, k) .

21. Graph each radical function.

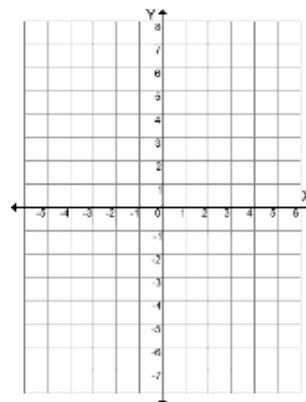
a. $y = \sqrt{x}$



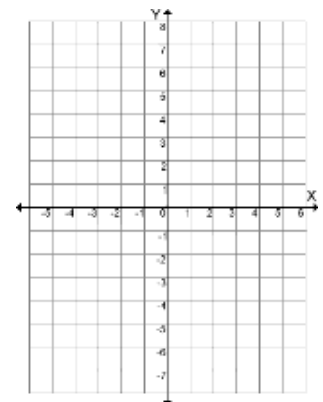
b. $y = -\sqrt{x}$



c. $y = \sqrt{x - 1} + 3$



d. $y = \sqrt{x} - 5$



Part III: Exponentials and Polynomials

Rational Expressions (Fractions) When multiplying or dividing rational expressions, begin by factoring the expressions. (You can skip #22-24 this year.)

22. Simplify each of these rational expressions. (Factor each first, then cancel factors to simplify.)

a. $\frac{x^2-x-2}{x^2+x}$	b. $\frac{x^3-4x}{x^2-4x+4}$	c. $\frac{4x^2-1}{x^2-1} \cdot \frac{x-2}{2x-1}$	d. $\frac{x^2}{x-1} \cdot \frac{x+1}{x+2} \div \frac{x}{x^2+x-2}$
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23. Add or subtract. Remember, you must have common denominators first!

a. $\frac{x-4}{2} - \frac{5x}{2}$	b. $\frac{6}{x-5} - \frac{x+2}{x-5}$	c. $\frac{2x+3}{x+5} - \frac{x-3}{x+5}$	d. $\frac{x+3}{5} - \frac{2x+1}{10}$
e. $\frac{x+2}{x^2} + \frac{x-2}{2x}$	f. $\frac{1}{x+4} - \frac{x-1}{x-4}$	g. $\frac{3x-4}{2x-1} + \frac{x+3}{1-2x}$	h. $\frac{d+2}{d^2-1} - \frac{3}{2d+2}$

24. Solve the equations. (It helps to multiply each side by the least common multiple.)

a. $\frac{2x-1}{6} = \frac{x+2}{4} + \frac{1}{3}$	b. $\frac{x-3}{x} = \frac{x-4}{x-2}$	c. $\frac{x}{x+1} + \frac{x}{x-2} = 2$
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25. Simplify. Write all answers using positive exponents.

a. $\frac{7a^{-2}}{b^{-5}}$	b. $\frac{-3a^{-3}}{6a^4b^{-2}}$	c. $5 \cdot 4^0$	d. 3^{-2}
e. $\left(\frac{2}{3}\right)^4$	f. $16^{\frac{3}{2}}$	g. $\left(\frac{27}{125}\right)^{-\frac{2}{3}}$	h. $16^{-0.75}$ (Change the decimal to a fraction.)

26. Rewrite each expression without the root sign and with no denominators. (To remove denominators, use negative exponents.) Remember: $\frac{\text{power}}{\text{root}}$

a. $\sqrt[3]{x^2}$	b. $\sqrt[4]{x-2}$	c. $\frac{\sqrt{x+3}}{\sqrt[5]{(a-5)^3}}$	d. $\sqrt{\frac{x^3}{y^7}}$
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Exponents: **DAMP/ SNAM** is a memory tool used to remember the laws of exponents with respect to monomials.

When **D**ividing monomials, keep the base and **S**ubtract the exponents.

When **A**dding monomials, make sure the variable parts are the same and do **N**othing to the exponents.

When **M**ultiplying monomials, keep the base and **A**dd the exponents.

When a monomial has an exponent and is raised to a **P**ower, keep the base and **M**ultiply the powers/exponents.

27. Simplify.

a. $y^2 \cdot y^3$	b. $(-2w^4)^5$	c. $2xy^2 - 10xy^2 + 3x^2y$	d. $\frac{x^{10}}{x^5}$
e. $-3xy^2 \cdot 4x^5y^7$	f. $\frac{-12a^3b^6}{18a^9b^2c}$	g. $4^x \cdot 4^y$	h. $2^{x+3} \cdot 2^{4-2x} \cdot 8$

28. Solve each equation. (When the variable is under a radical, isolate the term with the radical, undo the root, and solve. Check your answer by plugging it in to the original equation.) (You can skip #28 this year.)

<p>a. $\sqrt{x-2} = 9$</p>	<p>b. $\sqrt{4x+1} - 2 = 3$</p>	<p>c. $\sqrt{\frac{x}{3}} = 6$</p>
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29. Simplify each complex expression.

<p>a. $\frac{\frac{1}{6} + \frac{1}{3}}{\frac{1}{2} + \frac{1}{5}}$</p>	<p>b. $\frac{\frac{2}{x+1} - \frac{4}{x}}{\frac{3}{2x} + \frac{1}{x+1}}$</p>
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Part IV: Word Problems \$ Misc.

30. Use the order of operations to simplify each. (PEMDAS)

<p>a. $10 \div 5 \cdot 2$</p>	<p>b. $3 + 5^2 \cdot 3$</p>	<p>c. $2(1 - 5)^2$</p>
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31. Use a Venn diagram to illustrate the relationships between the sets of numbers. (Use the symbols: I = integer, Ir. = irrational, N = natural, R = real, Q = rational, and W = whole) Provide an example for each set of numbers.

Given a right triangle with legs a and b and hypotenuse c , the **Pythagorean Theorem** is $a^2 + b^2 = c^2$

Recall what happens when you square a radical: $(\sqrt{5})^2 = \sqrt{5} \cdot \sqrt{5} = \sqrt{25} = 5$, so $(\sqrt{5})^2 = 5$

32. Determine whether the following are side lengths of a right triangle.

a. 3,4,5	b. 5, 13, 12	c. 4,7,8
d. $\sqrt{6}, \sqrt{8}, \sqrt{10}$	e. $4, 4\sqrt{3}, 8$	f. $2\sqrt{2}, 2\sqrt{2}, 6$

Simplifying Square Roots Recall $\sqrt{100}$ is read: the *square root* of 100.200000000000

Simplifying: $\sqrt{12} = \sqrt{4} \cdot \sqrt{3} = 2\sqrt{3}$

Multiplying: $\sqrt{2} \cdot \sqrt{3} = \sqrt{6}$

$2\sqrt{3} \cdot 4\sqrt{5} = 8\sqrt{15}$

$\sqrt{3} \cdot \sqrt{3} = 3$

Adding/Subtracting: $2\sqrt{3} + 5\sqrt{3} = 7\sqrt{3}$

Removing a square root from the denominator of a fraction is called *rationalizing* (making rational) the denominator.

33. Simplify each of the following.

a. $\sqrt{196}$	b. $3\sqrt{225}$	c. $\sqrt{98}$	d. $-3\sqrt{72}$
e. $\sqrt{12} - \sqrt{27}$	f. $4\sqrt{8} + \sqrt{50} - \sqrt{32}$	g. $(2 + \sqrt{3})(2 - \sqrt{3})$	h. $(2 + \sqrt{5})(3 + \sqrt{5})$
i. $(3 - \sqrt{5})^2$	j. $\sqrt{\frac{144}{441}}$	k. $\sqrt[3]{\frac{27}{64}}$	l. $\sqrt[4]{\frac{16}{81}}$
m. $\sqrt{0.0289}$ (no calculator)	n. $\frac{2}{\sqrt{5}}$	o. $\frac{5}{\sqrt{12}}$	p. $\frac{2}{3+\sqrt{7}}$

Scientific notation is a way to write all numbers uniformly. We write these in the form $a \times 10^b$, where $1 \leq a < 10$.

Tiny numbers (between zero and one) are written with *negative* exponents. Numbers greater than 1 and less than ten are written with a zero exponent. Numbers greater than 10 (considered *large* numbers) are written with a *positive* exponent.

34. Write each number in scientific notation.

a. 4500	b. 0.0003	c. 5.6
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35. Write each number in decimal notation.

a. 3×10^2	b. 6.17×10^{-5}	c. 1.2×10^0
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To calculate the percent change, you can use $\frac{\text{change}}{\text{original}}$. Recall, change = large value - small value.

36. Find the percent change.

a. The computer originally priced at \$580 was on sale for \$377.
b. In 2010 the enrollment at St. Mary's was 910 students. In 2011, the enrollment was 1019 students.

37. Given the sets, answer the following. $A = \{1, 2, 3, 4, 9\}$, $B = \{3, 4, 5, 6, 9\}$, $C = \{2, 5, 7, 8, 9\}$

a. Using a Venn diagram, illustrate the relationship between the sets.	b. Find $A \cap B$	c. Find $A \cup B$	d. Find $(A \cap B) \cap C$
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38. Write out the following.

a. Write out and know the perfect squares from 1^2 to 15^2
b. Write out and know the perfect cubes from 1^3 to 5^3
c. Write out and know the perfect fourth powers from 1^4 to 5^4

39. Answer the following.

<p>To find a unit rate, write the fraction with the money amount in the numerator. Then divide.</p> <p>a. Find the unit rate of 6 lb. of potatoes for \$2.99</p>	<p>b. Convert 20 days to seconds. Include the dimensional analysis steps.</p>
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Arithmetic Sequence: $a_n = a_1 + d(n - 1)$ where d is the common difference.

40. Answer the following.

<p>a. Given the explicit formula for the arithmetic sequence, find the 20th term.</p> $a_n = 3 + 10(n - 1)$	<p>b. Given the first term and the common difference of an arithmetic sequence, find the explicit formula.</p> $a_1 = 12, d = -3$	<p>c. Find the common difference and write the explicit formula of the arithmetic sequence</p> $-3, 6, 15, \dots$
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Geometric Sequence: $a_n = a_1 \cdot r^{n-1}$ where r is the common ratio.

41. Answer the following.

<p>a. Given the explicit formula for the geometric sequence, find the 7th term.</p> $a_n = 4 \cdot 2^{n-1}$	<p>b. Find the seventh term of the geometric sequence</p> $2, 6, 18, 54, \dots$	<p>c. Find the explicit formula for the geometric sequence</p> $2, 6, 18, 54, \dots$
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When creating a proportion with percentages, remember that the number after the word "of" is in the denominator. A useful memory tool: *Is over of equal the %.*

42. Solve each problem. Work must be shown.

<p>a. What percent of 987 is 227.01?</p>	<p>b. 25.335 is 56.3% of what number?</p>	<p>c. 15% of what number is 52.5?</p>	<p>d. $2 + 0.08x = 0.2x + 8$</p>
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43. Answer the following.

<p>a. Write 78% as a decimal.</p>	<p>b. Write 0.008 as a percent.</p>	<p>c. Write 22% as a fraction in lowest terms.</p>	<p>d. Write $\frac{5}{8}$ as a percent.</p>
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Consecutive integers are represented by $x, x + 1, x + 2, \dots$

Consecutive odd and consecutive even numbers are represented by $x, x + 2, x + 4, \dots$

44. Write an equation and solve the following.

a. Find three consecutive odd integers whose sum is 45.	b. Find four consecutive integers whose sum is 134.
c. Two decreased by three times a numbers is 8. What is the number?	d. Alyssa has one and a half times as much as Steven. Together they have \$225. How much does Alyssa have?
e. The sum of 8 and x subtracted from 7 is -3 . Find x .	f. Find a number that is 12 greater than its opposite.
g. A state legislature has 45 people. The number of men is six less than twice the number of women. How many men and how many women serve in the legislature?	h. The perimeter of a certain basketball court is 266 feet, and its length is 35 feet more than its width. Find the dimensions of the court.

i. An apple sells for 25 cents and a peach sells for 15 cents. A total of 10 pieces of fruit were sold for a total cost of \$2.10. How many apples were sold?

j. Joe has 8 more quarters than dimes. If the coins are worth \$6.20, how many dimes are there?

k. Amy bought 12 apples, ate two of them, and sold the rest at 20 cents more per apple than she paid. Her total profit was \$1.00. How much did she sell each apple for?

l. A rectangle is three times as long as it is wide. If its length and width are both decreased by 2 cm, its area is decreased by 36 cm^2 . Find its original dimensions.

m. A poster is 25 cm taller than it is wide. It is mounted on a piece of card board so that there is a 5 cm border on all sides. If the area of the border alone is 1350 cm^2 , what are the dimensions of the poster?

n. The length of a rectangle is 8 cm greater than its width. Find the dimensions if its area is 105 cm^2 .

o. A truck uses 8 L of gasoline to go 120 km. How much gasoline will it use to go 300 km?

p. The ratio of the number of girls to the number of boys in math class is 4:5. There are 36 people in the class. Find the number of girls.

Signature Form for Those Taking Honors Geometry

Over the summer, your son/daughter is required to accurately complete the summer work two times- once from June 10-July 10 and once from July 11-August 11. Please sign indicating that you reviewed the work. Your son/daughter will have an assessment over this material in the fall.

Please let me know if you have any questions.

Mrs. Nancy Dever ndeaver@cjeagles.org

June 10 - July 10

Signature _____ Date _____

July 11 - August 11

Signature _____ Date _____

