Dear Accelerated Math 1 Student,

Congratulations for being a part of the Accelerated Math program at Wheeler High School!

In Accelerated Math 1 we will be learning many new concepts. In order to be successful in this program you must be prepared for class each day by completing all assignments and studying each night. You will be required to think, to apply what you know, and to use your problem-solving skills. By the end of the semester, it is our hope that you will not only learn some of the major concepts of Mathematics, but that you will also become more independent in your learning and will be able to tackle difficult problems with logical problem-solving skills. These are the skills that will be necessary for success in further accelerated level courses.

The attached worksheets represent topics from Math 8 that you will be using regularly in Accelerated Math 1. Because of the pace of our curriculum, we will not spend time in class reviewing these skills; rather you will be expected to know them thoroughly upon entering the class the first day of the semester. These review problems represent your first graded assignment for Accelerated Math 1. Your work will be graded for completeness and accuracy and you can expect to be tested on the material during the first few weeks of the semester.

All Accelerated Math I summer packets are due on the first day of school, August 5, and will be collected by your teacher when you come to class. This deadline is firm, and points will be deducted if the summer packets are turned in late.

Welcome to Wheeler, and we are looking forward to an exciting semester with you in Accelerated Math 1!

Mr. Ray Furstein
Accelerated Math 1 Teacher

Name: ____________________

Directions

Complete all problems neatly and completely on another sheet of paper in the order in which they appear in the packet. Number each problem and circle your solutions. Record all final answers on the answer sheet. Credit will only be given if ALL WORK IS SHOWN AND TURNED IN along with the answer sheet. Make note of any questions you may have as you work through the problems.

Part I: Simplifying Expressions

- Combine Like Terms
- Use Distributive Property
- If multiplying exponents, add the exponents
- If dividing exponents, subtract the exponents

===

Simplify each expression.

1) $x^2(2x + 5) - (x - 10)$ 2) $\frac{8x^2y^5z^2}{2xy^3z}$ 3) $15(3xy)$ 4) $-(3x-5) + 2(x-2) + 3x$

Part II: Solving Equations and Inequalities

Solve each equation. Show all steps. If there is no solution, write "no solution". If the problem involves an inequality, then graph your solution on a number line.

1) $4x - 7 = 13$ 2) $2y + 3 + 7y = 30$ 3) $\frac{2}{3}x = 6$

4) $\frac{3}{4}x = \frac{3}{2}$ 5) $-x + 5 > -4$ 6) $6m - 3 \le 2m + 5$

7) $\frac{x+5}{3} = -15$ 8) $\frac{1}{2}h + \frac{3}{4} = \frac{9}{4}$ 9) $3(6 - 9m) = -9(3m - 2)$

10) $2x^2 = 32$ 11) $.45(8) < 1.20 + .48(8 - x)$ 12) $8x - 5 + 2x \ge 5 + 5x - 12$

13) $\frac{5}{6}x - \frac{1}{3} = x - \frac{3}{2}$ 14) $9(x + 1) - 3x = 2(3x + 1) - 4$ 15) $2\{x-3(2x + 5)\} = 5x-(3x+6)$

16) $|6x - 3| = 15$ 17) $|2x + 7| = -11$ 18) $3|2 - 4x| + 2 > 32$

18) If $7x - 2(3 - 4x) = 12x - (x + 4)$, then what is the value of $5x$?

Part III: Evaluate Formulas

Find the value of each formula if $x = 2$, $y = 3$, $z = 4$ and $R = 5$.

1) $F = 3(R - y + 1)$ 2) $R^2 - y^2 - xz = A$ 3) $L = 3R - 2(y^2 - x)$

Part IV: Rearranging Functions

Solve each equation for the indicated variable.

1) $A = \frac{1}{2}bh$ for h 2) $P = 2\ell + 2w$ for w 3) $S = 4\Pi r^2$ for r

Part V: Scientific Notation

Rewrite each expression in standard from.

1) 7.35×10^{6}

2) 9.41×10^{-8}

Rewrite each expression in scientific notation.

3) 0.2984000

4) 49293000000

Simplify each expression. Leave answers in scientific notation.

5) $\left(4.3 \times 10^{7}\right) \times \left(1.7 \times 10^{-2}\right)$

6) $\dfrac{9.2 \times 10^{13}}{2.7 \times 10^{5}}$

Part VI: Radicals

Rules for Simplifying Radicals:

1) No perfect square factors under the radicand $\left(\sqrt{\ }\right)$
2) No fractions under the radicand
3) No radicals in the denominator of a fraction
   (if so, must RATIONALIZE – multiply radical in denominator by both the numerator and the denominator of the original fraction)
4) Product Property: $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$
5) Quotient Property: $\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$
6) When adding/subtracting radicals, may only combine like radicals

==

Simplify each expression

1) $\sqrt{169}$

2) $\sqrt{20}$

3) $\sqrt{405}$

4) $\sqrt{\dfrac{144}{225}}$

5) $5\sqrt{2} \times 3\sqrt{8}$

6) $2\sqrt{6} \times 3\sqrt{10}$

7) $3\sqrt{12} + 2\sqrt{3}$

8) $2\sqrt{98} + \sqrt{2} - 6\sqrt{72}$

9) $\sqrt{\dfrac{2}{3}}$

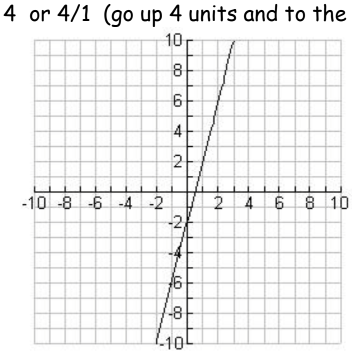
Part VII: *Graphing Linear Equations*

- To graph a linear equation, write the equation in the form y= mx + b (slope-intercept form)
  If given in *standard form Ax+By=C*, rather than slope-intercept form, then must "solve for y" first!

  (x, y) = points on the line   m = slope (rise/run)   b= y-intercept (where the line intersects the y-axis)

  Plot the y-intercept (b) and from this point use the slope to plot the second point to create a line.

  Example: Graph y = 4x - 2
  y-intercept (b) = -2
  Slope = 4 or 4/1 (go up 4 units and to the right 1 unit)



IMPORTANT: If there is not a "b", such as y = 2x, then the line intersects the y-axis at the origin (0, 0)
Horizontal lines are written in the form y = 2 and y = -5 (slope = 0)
Vertical lines are written in the form x = 2 and x = -5 (slope is undefined)

==

Graph each equation.

1) x = 2

2) y = -3

3) $y = \frac{3}{5}x$

4) y = 3x -1

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

6) 4x + 2y = -8

7) 3x – y = -2

8) 5x + 2y = 6

Part VIII: Slope and Writing Equations of Lines (y = mx + b)

A. Slope Formula $\frac{y_2 - y_1}{x_2 - x_1}$

Horizontal lines have a slope of zero; Vertical lines have no slope (undefined)

Example: Find the slope of a line containing point (10, 4) and (-5, 9)

$m = \frac{9-4}{-5-10} = \frac{5}{-15} = -\frac{1}{3}$

B. Write an equation given **slope** and **y-intercept**

Example: Write the equation of a line if the slope is 2 and the y-intercept is 3
y = 2x + 3 (m = slope and b = y-intercept)

C. Write an equation given **slope** and **a point** on the line

Example: Write the equation of a line that has a slope of ½ and contains point (-8, 1)

a) Use y= mx + b (Slope-Intercept form)
Substitute ½ for m and (-8, 1) for x & y
Solve for b and write the equation
1 = ½ (-8) + b
1 = -4 + b
5 = b
y = ½ x + 5

OR

b) Use $y - y_1 = m(x - x_1)$ (Point-Slope form)
Substitute ½ for m and (-8, 1) for x_1 & y_1
y - 1 = ½ (x - -8)
y – 1 = ½ x + 4
y = ½ x + 5

D. Write the equation of a line given **2 points**

Example: Write the equation of a line that passes through (3, 4) and (2, 6)

a) Find the slope of the line using slope formula m = -2
b) Choose one of the points and use either Slope-Intercept form or Point-Slope form to write the equation

Slope Intercept Form:
4 = (-2)(3) + b
4 = -6 + b
10 = b
y = -2x + 10

Point-Slope Form
y – 4 = -2 (x -3)
y – 4 = -2x + 6
y = -2x + 10

E. Write the equation of a line given the **x-intercept and a point** on the line.
The x-intercept is a "point" where the line intersects the x-axis
Rewrite the x-intercept as an ordered pair and then write the equation as you would if given 2 points

Example: Write the equation of a line with an x-intercept 2 and passes through (4, -5)

a) Rewrite the x-intercept as (2, 0) and then find the slope of the line
b) Write the equation using slope-intercept or point-slope form. Use the slope and the coordinates of 1 point.

Slope-intercept Form:
0 = - 5/2 (2) + b
0 = -5 + b
5 = b
y = -5/2 x + 5

Point-Slope Form
y – 0 = -5/2 (x -2)
y = -5/2x + 5

F. Write the equation of a line that is **parallel or perpendicular to the line**

• Parallel lines have the same slope
$y = 3x + 2$, $y = 3x - 6$, $y = 3x - 2$ (all slopes equal 3)

• Perpendicular lines have slopes that are the negative reciprocals of each other
$y = -2x + 5$ and $y = \frac{1}{2}x + 10$ (-2 and $\frac{1}{2}$ are negative reciprocals of each other)

Example: Write the equation of a line parallel to $y = -2x + 6$ and passes through the point (2, 3).
If parallel, the slopes are the same, so m = -2. Next, use the point (2, 3) and slope -2 to write an equation using either point-slope or slope-intercept form.

Slope-Intercept Form	Point-Slope Form
$3 = -2(2) + b$	$Y - 3 = -2(x - 2)$
$7 = b$	$y - 3 = -2x + 4$
$Y = -2x + 7$	$y = -2x + 7$

** To write the equation of a line perpendicular to $y = -2x + 6$ and passes through point (2, 3), find the negative reciprocal of the slope and do the same as above. The slope is -2, so the negative reciprocal is $\frac{1}{2}$. Use $\frac{1}{2}$ as the slope and (2,3) as x and y. The equation would be $y = \frac{1}{2}x + 2$.

==

Find the slope of the line containing each pair of points

1) (6,-4) to (3, -8) 2) (-5, 3) and (-5, 6) 3) (-5, 12) and (3, -12)

Use the given information to write a linear equation.

4) slope = - 2 y-intercept is 7

5) slope = 3 y-intercept is 0

6) slope= -5/6 contains the point (6, -9)

7) slope = -4 contains the point (1, -3)

8) A horizontal line that contains the point (4, 7)

9) Contains points (4, -4) and (-7, -4)

10) Contains points (6, -5) and (-2, 7)

11) Contains the point (3, -8) and the x-intercept is -1

12) x -intercept is -2 y-intercept is 5

13) A line parallel to $y = -\frac{1}{2}x$ and passes through (-4, -3)

14) A line parallel to $y = 3x - 2$ & contains point (-4, 10)

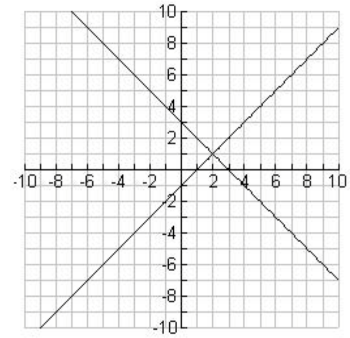
15) A line perpendicular to $y = -1/3\,x + 2$ & passes through (-2, -4)

16) A line perpendicular to $y = \frac{1}{8}x + 6$ and contains point (6, -9)

Part IX: Systems of Equations

- Solving for 2 variables (x and y)
- Intersecting lines have 1 solution
- Same lines have many solutions (infinite solutions)
- Parallel lines have no solutions
- To solve a system, you may use graphing, substitution or elimination (linear combination)

Examples:
a) Solve by graphing:
$y = -x + 3$



Solution: (2, 1)

b) Substitution: $y = x - 1$
$4x - y = 19$

First: Substitute (x-1) for y in the second equation and solve for x
$4x - (x - 1) = 19$
$4x - x + 1 = 19$
$3x = 18$
$x = 6$

Second: Substitute the x value to find y.
$y = x - 1$
$y = 6 - 1$
$y = 5$

c) Elimination using Addition

$$\begin{array}{r} 2m - n = 4 \\ + \quad m + n = 2 \\ \hline 3m \quad = 6 \\ m = 2 \end{array} \qquad \begin{array}{l} m + n = 2 \\ 2 + n = 2 \\ n = 0 \end{array}$$

d) Elimination using Multiplication

$$\begin{array}{r} 3x - 4y = 7 \\ + \quad \underline{2x + y = 1} \end{array} \text{ (x by 4)} \qquad \begin{array}{r} 3x - 4y = 7 \\ \underline{8x + 4y = 4} \\ 11x = 11 \\ x = 1 \end{array} \qquad \text{Then, } \begin{array}{l} 2x + y = 1 \\ 2 + y = 1 \\ y = -1 \end{array}$$

==

Solve each system of equations.

1) By Graphing: $y = 2x$, $y = -3x + 5$

2) By Graphing: $x + y = 3$, $x - y = 1$

3) $y = 3x$
$x + y = 12$

4) $x = 4$
$y = 3x - 5$

5) $x + y = 7$
$x - y = 9$

6) $y - 2x = 1$
$y + 2x = 7$

7) $x + y = 3$
$3x - 5y = 17$

8) $3x + 2y = 10$
$6x - 3y = 6$

9) $3y = 2 - x$
$2x = 7 - 3y$

Part X: Solve Word Problems Using Substitution and Elimination

- Define variables and set up 2 equations
- Use substitution or elimination to solve

Example: Two different numbers added together equal 5. The same 2 numbers subtracted from each other equal 1. Find the two numbers.

Let x and y represent the two numbers.

Set up 2 equations since we have 2 variables $x + y = 5$, $x - y = 1$

Solve using the elimination method

$$\begin{array}{r} x + y = 5 \\ \underline{+ \; x - y = 1} \\ 2x = 6 \\ x = 3 \end{array} \qquad \begin{array}{r} 3 + y = 5 \\ y = 2 \end{array}$$

==

Write a system of equations and solve in order to answer each question.

1) The sum of two different numbers is 27. Their difference is 5. Find the two numbers.

2) The sum of two numbers is twenty. The number "y" is three times the value of x. Find x and y.

3) Tom bought 4 drinks and 5 hotdogs at a Wheeler basketball game and spent twenty dollars. Lynn bought 2 drinks and 4 hotdogs and spent \$14.50. How much did each drink and hot dog cost?

Part XI: Congruence

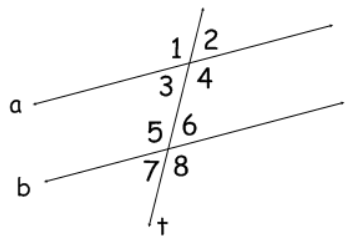
In Geometry, two figures are said to be CONGRUENT if all of their corresponding parts have the same measure.

---

1) Given that $\square ABCD \cong \square WXYZ$, list the 4 pairs of corresponding angles and the four pairs of corresponding sides.

Part XII: Special Angle Pairs

In the following diagram, lines *a* and *b* are intersected by a TRANSVERSAL, *t*.



<u>Special Angle Pairs</u>

Corresponding Angles: $\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 7$, $\angle 4$ and $\angle 8$

Alternate Interior Angles: $\angle 3$ and $\angle 6$, $\angle 4$ and $\angle 5$

Alternate Exterior Angles: $\angle 1$ and $\angle 8$, $\angle 2$ and $\angle 7$

Consecutive Interior Angles: $\angle 3$ and $\angle 5$, $\angle 4$ and $\angle 6$

Consecutive Exterior Angles: $\angle 1$ and $\angle 7$, $\angle 2$ and $\angle 8$

Rule: If lines *a* and *b* are PARALLEL, then the following are true:

- *Corresponding Angles are Congruent*
- *Alternate Interior Angles are Congruent*
- *Alternate Exterior Angles are Congruent*
- *Consecutive Interior Angles are Supplementary*
- *Consecutive Exterior Angles are Supplementary*

Using the figure above, solve for each variable

1) $m\angle 3 = 2x + 26$, $m\angle 5 = 118$

2) $m\angle 4 = 72$, $m\angle 8 = x + 30$

3) $m\angle 2 = x + 11$, $m\angle 7 = 3x - 5$

4) $m\angle 4 = 7x - 22$, $m\angle 5 = 4x + 29$

5) $m\angle 1 = x + 47$, $m\angle 7 = 3x + 12$

6) If $t \perp a$ and $m\angle 2 = \frac{3}{2}x + 11$, then what is the value of x?

Part XIII: The Pythagorean Theorem

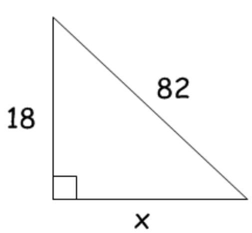
In a right triangle, where a and b are the legs and c is the hypotenuse $\Rightarrow$ $a^2 + b^2 = c^2$

Note: If $c^2 > a^2 + b^2$, then the triangle is obtuse

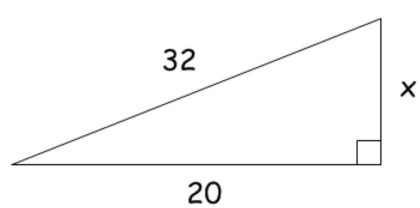
If $c^2 < a^2 + b^2$, then the triangle is acute

Find the missing side length

1)



2)



3) $a = 5,\ b = 12,\ c = ?$

4) $a = 7,\ b = ?,\ c = 25$

Determine if the triangle with the given sides is acute, obtuse, or right (must use longest side for c!)

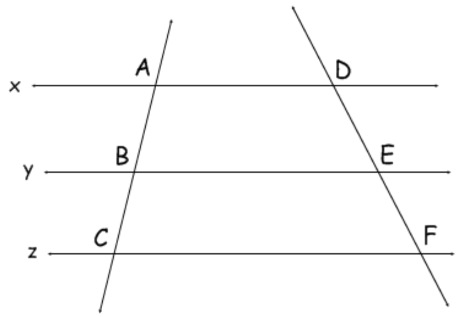
5) 3, 9, 7

6) 17.1, 12.3, 13.8

Part XIV: Ratios of Segments formed by Transversals

Theorem: If three or more parallel lines are intersected by two transversals, then the lengths of the segments of the transversals formed are divided proportionally.

Ex:



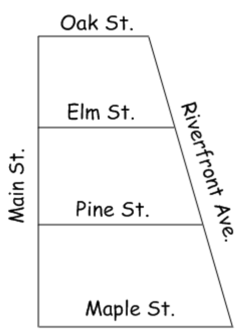
If line x // line y // line z, then,

$$\frac{AB}{BC} = \frac{DE}{EF}$$

==

1) In the figure above, AB = 9, DE = 4, BC = x+3, and EF = x-2. Find x.

2)



The figure to the left shows a quickly growing area of Mathtown. To attract tourists, the mayor has decided to build a "riverwalk" along Riverfront Avenue, where people will be able to shop, eat, and enjoy the scenery. It is known that the entire length of Riverfront Avenue is 7800 feet, but before they can begin working, the construction workers need to know exactly how long each block of the riverwalk will be. Use the following lengths along Main Street to find this information for the construction workers:

Oak to Elm – 1400 feet   Elm to Pine – 1800 feet   Pine to Maple – 2000 feet

Part XV: Probability and Counting Principles

Probability of Simple and Compound Events

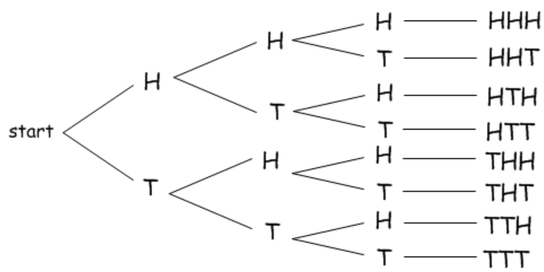
- A **simple** event involves the use of one item (a card being drawn, a person being chosen, a die being rolled, etc)
- A **compound** event involves the use of two or more items (two cards being drawn, four people being chosen, a die being rolled and a coin being tossed, etc)
- The **sample space** of an event is the list of all possible outcomes for that event
- The **probability** of an event occurring is represented as a ratio: $\frac{\text{number of times it can occur}}{\text{total possible number of outcomes}}$

Counting Principles

To determine the number of outcomes in a sample space, we use counting principles:

- The **addition principle of counting** is used for single events. Simply add up the possible outcomes.
- The **multiplication principle of counting** is used for compound events. Use the addition principle for each event separately. Then multiply all the possible outcomes together to determine the total number of possible outcomes.
- **Tree diagrams** are useful to help determine the total possible outcomes for a compound event.

Example: Draw a tree diagram of all possible outcomes of tossing 3 coins at the same time.



Example: Find the number of possible outcomes if you had a choice of 7 cars and 10 colors.

Since there are 7 total car choices and 10 total color choices, the total number of car/color combinations is $7 \times 10 = 70$

==

Answer each question

1) Lynnwood High School requires all staff members to have a 6-character computer password that contains 2 letters followed by 4 numbers. Find the number of possible passwords.

2) Sarah rolls two 5-sided numbered cubes. What is the probability that the two numbers added together will equal 4?

3) The eighth grade graduation party is being catered. The caterers offer 4 appetizers, 3 salads, and 2 main courses for each eighth grade student to choose for dinner. If the caterers would like 48 different combinations of dinners, how many desserts should they offer?

Part XVI: Set Notation

- A **set** is a collection of objects. In mathematics, we use sets to represent a collection of numbers, events, etc. We represent the members of a set by using braces, { }. Members in the set are separated by commas.
- When two sets have some members in common, this is called an **intersection** of the two sets, represented by $A \cap B$
- When we combine all members of two sets together, we create the **union** of the two sets, represented by $A \cup B$

Example: Suppose $A = \{1, 4, 9, 16\}$ and $B = \{1, 2, 4, 8, 16, 32\}$

a) What is the set that represents $A \cap B$?

The common members of both sets are 1, 4, and 16. Using set notation, we write: $A \cap B = \{1, 4, 16\}$

b) What set represents $A \cup B$?

When we combine the members of both sets, we get a bigger set which contains all the members of A and B, with no repeats. Using set notation, we write: $A \cup B = \{1, 2, 4, 8, 9, 16, 32\}$

==

A survey was taken of ninth and tenth grade students to determine student preference of ice cream flavors. The most common preferences were recorded for both groups.

Let A be the set of preferences for ninth graders and B be the set of preferences for tenth graders.

A = {chocolate, strawberry, rainbow, vanilla}

B = {chocolate, moose tracks, vanilla, neopolitan}

Use set notation to answer the following questions

1) What is $A \cup B$?

2) What is $A \cap B$?

Part XVII: Events and Venn Diagrams

Complementary Events

- The **complement** of an event A consists of all outcomes in the sample space that are not in A
- A^c represents the complement
- $P(A^c) = 1 - P(A)$
- Example: Let A be rolling a 5 on a single die. Then A^c is NOT rolling a 5 on a single die.

  $P(A) = \frac{1}{6}$; therefore, $P(A^c) = 1 - \frac{1}{6} = \frac{5}{6}$

Independent Events

- Two events are **independent** if knowing that one event happens does not change the probability of the other event happening
- When two events are independent, we can find the probability of both events happening using the **multiplication rule for independent events**: $P(A \cap B) = P(A) \times P(B)$.

  We read this as, "The probability that both A **and** B occur equals the probability of A times the probability of B."

Disjoint Events

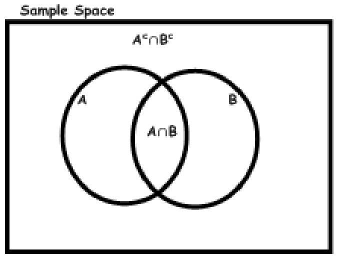
- Two events are **disjoint** when they have no outcomes in common. These events cannot occur at the same time.

  Disjoint events are not independent.
- When two events are disjoint, we can find the probability that either event occurs by using the **addition rule for disjoint events**: $P(A \cup B) = P(A) + P(B)$

Venn Diagrams

- A **venn diagram** is a useful tool to help visualize how events occur
- Example: Consider a typical subdivision of houses. Let A = {houses that have garages} and B = {houses that have pools}.

  We can use a venn diagram to visualize the set of all houses in this subdivision.



$A \cap B$ = {houses that have both garages and pools}

$A^c \cap B^c$ = {houses that have neither garages nor pools}

Use the following information to answer questions 1-4:

In a recent survey of 100 10-year olds, the following information was obtained:

53 liked McDonalds

24 liked Burger King

42 liked Wendy's

6 liked all three

12 liked both McDonalds and Burger King

23 liked both McDonalds and Wendy's

4 liked only Burger King

1) Draw a Venn diagram illustrating this information.

2) How many 10-year olds don't like any of these three?

3) What percentage of these 10-year olds like Burger King and Wendy's?

4) If one of these 10-year olds likes Wendy's, what is the probability that he likes Burger King?

Answer each question

5) Florida has 23 members in the United States House of Representatives. Eight members are Democrats, and 15 are Republicans. Of the 17 men in the house, 4 are Democrats. The Speaker of the House wants to choose a representative from Florida at random to serve on the agriculture committee. What is the probability that the representative will be a woman or a Democrat?

6) In the United States, 3/5 of all households have some kind of pet, and 1/3 of all households have at least one child. What is the probability that a household picked at random will have a pet and one or more children?

ANSWER SHEET

Name: ____________________

Part I - Simplifying Expressions	
1.	2.
3.	4.

Part II – Solving Equations and Inequalities		
1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.
13.	14.	15.
16.	17.	18.

Part III – Evaluate Formulas		
1.	2.	3.

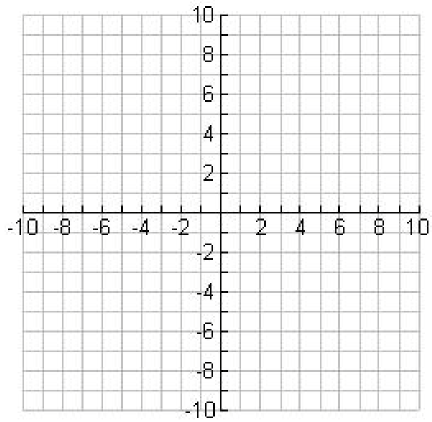
Part IV – Rearranging Functions		
1.	2.	3.

Part V – Scientific Notation		
1.	2.	3.
4.	5.	6.

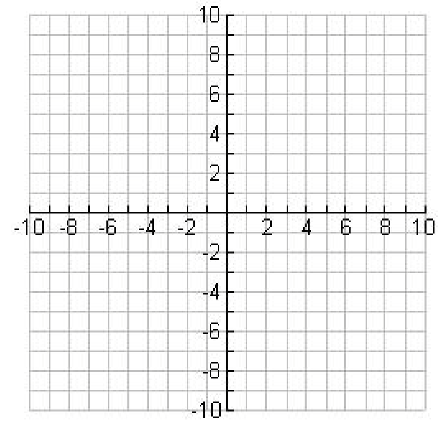
Part VI – Radicals		
1.	2.	3.
4.	5.	6.
7.	8.	9.

Part VII – Graphing Linear Equations

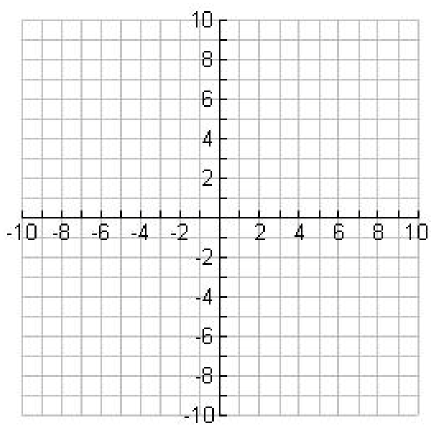
1.



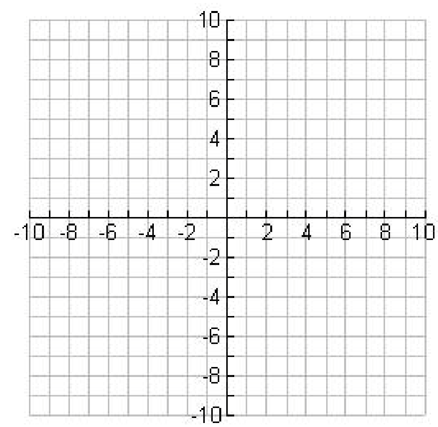
2.



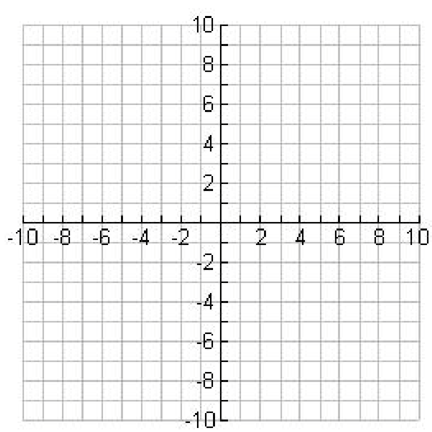
3.



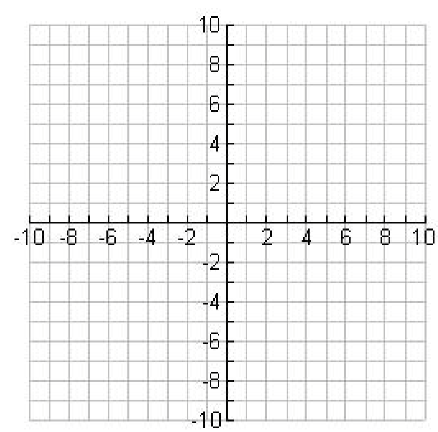
4.

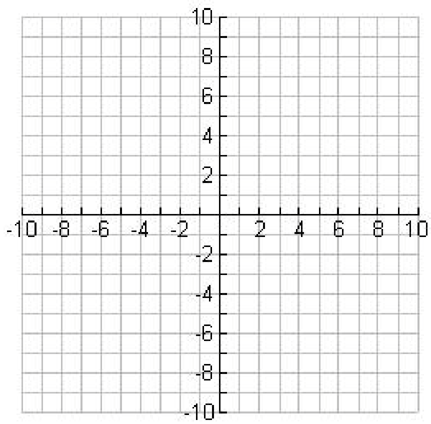
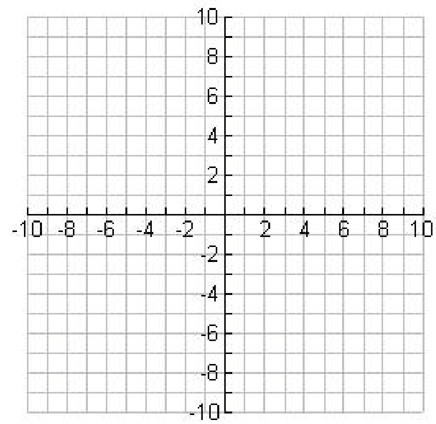


5.



6.

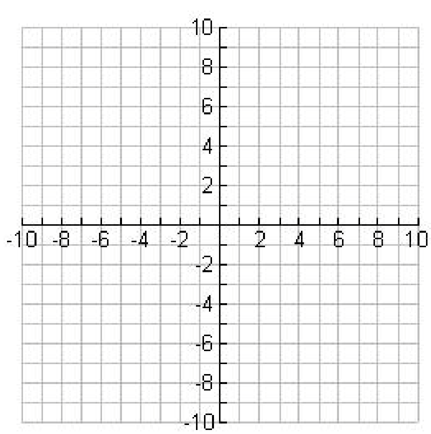
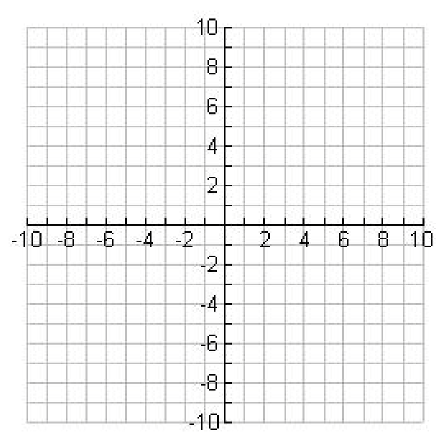


7. 	8. 

Part VIII - Slope and Writing Equations of Lines (y = mx + b)

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.
13.	14.	15.
16.		

Part IX – Systems of Equations

1. 	2. 

3.	4.	5.
6.	7.	8.
9.		

Part X – Solve Word Problems Using Substitution and Elimination		
1.	2.	3.

Part XI – Congruence
1.

Part XII – Special Angle Pairs		
1.	2.	3.
4.	5.	6.

Part XIII – Pythagorean Theorem		
1.	2.	3.
4.	5.	6.

Part XIV – Ratios of Segments formed by Transversals	
1.	2.

Part XV – Probability and Counting Principles		
1.	2.	3.

Part XVI – Set Notation	
1.	2.

Part XVII – Events and Venn Diagrams		
1.		
2.	3.	4.
5.	6.	