For Incoming **Algebra 2 Honors and CP** Student's

Summer Prerequisite Math Guide

The following summer guide is to be used as a study tool to prepare you for the skills necessary for success in **Algebra 2 Honors and CP**. The following skills will be assessed as your first test grade.

The first test will be given within the first few weeks of school. If you are struggling on certain skills, you can use resources such as www.IXL.com/math, www.khanacademy.org/math/, www.coolmath.com. More can be found through an online search.

None of your work will be collected or graded at the beginning of the school year.

However, this is being provided to you in advance of the school year to help you recall the concepts previously taught in Algebra 1. The knowledge of these prerequisite skills will be critical to your success in Algebra 2 Honors and CP.

Algebra 2 - Honors and CP - Prerequisite Skills with Practice - Summer Activity

Prerequisite Skills of Factoring Strategies

Factoring Procedures

GCF

⬇

FOUR TERMS ⬇

Grouping

Split the problem into pairs
Find the **GCF of each pair**
The binomials MUST match
(binomial)(binomial)
(matches) (both GCF's)

THREE TERMS ⬇

Trinomial $1x^2$

$1x^2 + bx + c$

Find two numbers whose
Product = c and whose **sum = b**
Factors into
(binomial) (binomial)
Using the two numbers found

⬇

Trinomial ax^2

$1x^2 + bx + c$

Find **two** numbers whose
Product = ac and whose **sum = b**
Replace the middle term with
the **two** numbers
Factor by Grouping

⬇

Perfect Square Trinomial

$a^2 \mp 2ab + b^2$

Find **two** numbers whose
Product = ac and whose **sum = b**
and the two number that work REPEAT

$\left(\sqrt{FIRST}\ \ middle\ sign\ \sqrt{LAST}\right).^2$

$(a \mp b).^2$

TWO TERMS ⬇

Difference of Two Squares

$a^2 - b^2$

$(a + b)(a - b)$

Practice: **Factor**

1) $x^2 + 4x - 21$ **2)** $6x^2y + 2x$ **3)** $9a^2 - 49b^2$

4) $3y^2 + 13y + 4$ **5)** $12x^3 + 2x^2 - 30x$

Website:
https://www.khanacademy.org/search?page_search_query=Factoring%20polynomials

Prerequisite Skills for Chapter 1 - Expressions and Equations

(1.1) Simplifying Expressions

Order of Operations	**Step 1** Evaluate expressions inside grouping symbols. **Step 2** Evaluate all powers. **Step 3** Multiply and/or divide from left to right. **Step 4** Add and/or subtract from left to right.

Practice: **Evaluate**

1) $12 + 6 \div 3 - 2 \cdot 4$ **2)** $12 - [20 - 2(6^2 \div 3 \times 2^2)]$

Website:
https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-arithmetic-operations/cc-6th-order-of-operations/v/more-complicated-order-of-operations-example

(1.2) Properties of Real Numbers

Real Numbers All real numbers can be classified as either rational or irrational. The set of rational numbers includes several subsets: natural numbers, whole numbers, and integers.

R	real numbers	{all rationals and irrationals}
Q	rational numbers	{all numbers that can be represented in the form , where *m* and *n* are integers and *n* is not equal to 0}
I	irrational numbers	{all non terminating, non repeating decimals}
Z	integers	{…, –3, –2, –1, 0, 1, 2, 3, …}
W	whole numbers	{0, 1, 2, 3, 4, 5, 6, 7, 8, …}
N	natural numbers	{1, 2, 3, 4, 5, 6, 7, 8, 9, …}

Practice: **Classify** **1)** -4 **2)** 0 **3)** 2.345 **4)** $\sqrt{20}$ **5)** 14

Website:
https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-numbers-operations/cc-8th-irrational-numbers/v/categorizing-numbers

(1.3) Solving Equations

Properties of Equality To solve equations, we can use properties of equality.

Addition and Subtraction Properties of Equality	For any real numbers *a*, *b*, and *c*, if *a* = *b*, then *a* + *c* = *b* + *c* and *a* – *c* = *b* – *c*.
Multiplication and Division Properties of Equality	For any real numbers *a*, *b*, and *c*, if *a* = *b*, then *a* • *c* = *b* • *c* and, if *c* ≠ 0, $= .\frac{a}{c} = \frac{b}{c}$

Practice: **Solve**

1) $5(x + 3) + 2(1 - x) = 14$ **2)** $5w - 9 = 11w + 3$

3) $120 - \frac{3}{4}y = 60$ **4)** $\frac{3}{5}(15v + 20) - \frac{1}{6}(18v - 12) = 38$

Website:
https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:solve-equations-inequalities/x2f8bb11595b61c86:linear-equations-parentheses/a/multi-step-equations-review

(1.4) Solving Absolute Value Equations

Absolute Value Expressions The **absolute value** of a number is its distance from 0 on a number line. The symbol |*x*| is used to represent the absolute value of a number *x*.

Absolute Value	· **Words** For any real number *a*, if *a* is positive or zero, the absolute value of *a* is *a*. If *a* is negative, the absolute value of *a* is the opposite of *a*. · **Symbols** For any real number *a*, |*a*| = *a*, if *a* ≥ 0, and |*a*| = –*a*, if *a* < 0.

Practice: **Evaluate** **1)** $|8.3|$ **2)** $\left|-\frac{4}{5}\right|$ **3)** $|0|$

Website:
https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-negative-number-topic/cc-6th-absolute-value/v/absolute-value-of-integers

Absolute Value Equations Use the definition of absolute value to solve equations containing absolute value expressions.

For any real numbers *a* and *b*, where *b* ≥ 0, if |*a*| = *b* then *a* = *b* or *a* = –*b*.

Practice: **Solve** **1)** $|x + 12| = 9$ **2)** $|3x - 2| + 8 = 1$ **3)** $2|x + 1| - x = 3x - 4$

Website:
https://www.khanacademy.org/math/algebra-home/alg-absolute-value/alg-absolute-value-equations/v/absolute-value-equations

(1.5) Solving Inequalities

One-Step Inequalities The following properties can be used to solve inequalities.

Addition and Subtraction Properties for Inequalities	**Multiplication and Division Properties for Inequalities**
For any real numbers *a*, *b*, and *c*: If $a < b$, then $a + c < b + c$ and $a - c < b - c$. If $a > b$, then $a + c > b + c$ and $a - c > b - c$.	For any real numbers *a*, *b*, and *c*, with $c \neq 0$: If *c* is positive and $a < b$, then $ac < bc$ and $\quad <$. If *c* is positive and $a > b$, then $ac > bc$ and $\quad >$. If *c* is negative and $a < b$, then $ac > bc$ and $\quad >$. If *c* is negative and $a > b$, then $ac < bc$ and $\quad <$.

Multi–Step Inequalities An inequality is a statement that involves placing the inequality sign between two expressions. In order to solve the inequality, you need to find the set of all the values of the variable that makes the inequality true.

Practice: **Solve and Graph**

1) $5w + 3 > 4w + 9$

2) $-4x \geq -24$

3) $-3x \leq \frac{-4x + 22}{5}$

4) $\frac{9z - 4}{5} \leq \frac{7z + 2}{4}$

Website:
https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-variables-expressions/cc-7th-inequalities/v/one-step-inequalities-2

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:solve-equations-inequalities/x2f8bb11595b61c86:multistep-inequalities/v/multi-step-inequalities

(1.6) Solving Compound and Absolute Value Inequalities

Compound Inequalities A compound inequality consists of two inequalities joined by the word *and* or the word *or*. To solve a compound inequality, you must solve each part separately.

***And* Compound Inequalities**	The graph is the intersection of solution sets of two inequalities.	Example: $x > -4$ and $x < 3$ $-4 < x < 3$
***Or* Compound Inequalities**	The graph is the union of solution sets of two inequalities.	Example: $x \leq -3$ or $x > 1$

Practice: **Solve and Graph**

1) $8 < 3y - 7 \leq 23$

2) $x + 3 < 2 \text{ or } -x \leq -4$

3) $g - 6 > -11 \text{ or } 2g + 4 < -15$

4) $-12 \leq 4x + 8 \leq 32$

Website:
https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:solve-equations-inequalities/x2f8bb11595b61c86:compound-inequalities/v/compound-inequalities

Absolute Value Inequalities Use the definition of absolute value to rewrite an absolute value inequality as a compound inequality.

For all real numbers a and b, $b > 0$, the following statements are true.

1. If $|a| < b$, then $-b < a < b$.

2. If $|a| > b$, then $a > b$ or $a < -b$.

These statements are also true for ≤ and ≥, respectively.

Practice: **Solve and Graph**

1) $|4x - 7| > 13$

2) $|5z + 2| \leq 17$

Website:
https://www.khanacademy.org/math/algebra-home/alg-absolute-value/alg-absolute-value-inequalities/v/absolute-value-inequalities-example-1

https://www.khanacademy.org/math/algebra-home/alg-absolute-value/alg-absolute-value-inequalities/v/absolute-value-inequalities-example-2

Prerequisite Skills for Chapter 2 - Linear Relations and Functions

(2.1) Relations and Functions

Relations and Functions A **relation** can be represented as a set of ordered pairs or as an equation; the relation is then the set of all ordered pairs (*x*, *y*) that make the equation true. A **function** is a relation in which each element of the domain is paired with exactly one element of the range.

Practice: **Find each value if** $f(x) = 2x - 1$ **and** $g(x) = 2 - x^2$.

1) $f(-2)$ **2)** $g(-1)$ **3)** $f(d)$ **4)** $g(2a)$

Website:
https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:functions/x2f8bb11595b61c86:evaluating-functions/v/understanding-function-notation-example-1

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:functions/x2f8bb11595b61c86:evaluating-functions/e/functions_1

(2.2) Linear Relations and Functions

A **linear function** is a function with ordered pairs that satisfy a linear equation. Any linear function can be written in the form *f*(*x*) = *mx* + *b*, where *m* and *b* are real numbers.

Practice: **State whether each function is a linear function. Explain.**

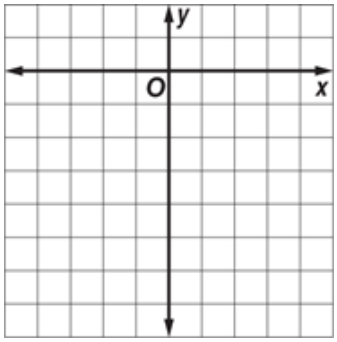
1) $y = -2 + 5x$ **2)** $-\frac{3}{x} + y = 15$ **3)** $x = y + 8$

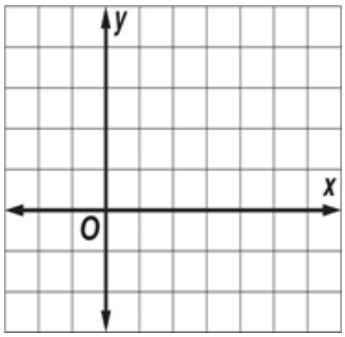
Practice: **Write each equation in standard form. Identify *A*, *B*, and *C*.**

1) $3x = -2y - 2$ **2)** $-6y + 14 = 8x$

Practice: **Find the x-intercept and the y-intercept of the graph of each equation. Then graph the equation using the intercepts.**

1) $y = 3x - 6$ **2)** $-6y + 14 = 8x$





Website:
https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:linear-equations-graphs/x2f8bb11595b61c86:slope/e/slope-from-two-points

(2.3) Rate of Change and Slope

Rate of Change Rate of change is a ratio that compares how much one quantity changes, on average, relative to the change in another quantity.

Slope

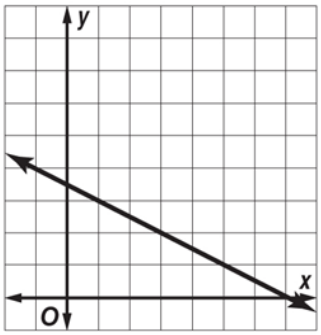
Slope *m* of a Line	For points (x_1, y_1) and (x_2, y_2), where $x_1 \neq x_2$ m $\neq 0$, $m = \frac{change\ in\ y}{change\ in\ x} = \frac{y_2 - y_1}{x_2 - x_1}$

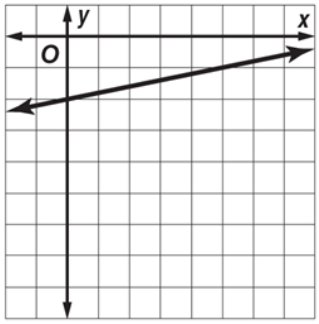
Practice: **Find the slope of the line that passes through each pair of points.**

1) $(8, -5), (4, -2)$ **2)** $(-3, 5), (-3, -1)$ **3)** $(-2, -2), (10, -2)$

Practice: **Determine the rate of change of each graph.**

1. **2.**





Website:
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(2.4) Writing Linear Equations

Forms of Equations

Slope–Intercept Form of a Linear Equation	$y = mx + b$, where m is the slope and b is the y-intercept
Point–Slope Form of a Linear Equation	$y - y_1 = m(x - x_1)$, where (x_1, y_1) are the coordinates of a point on the line and m is the slope of the line

Parallel and Perpendicular Lines Use the slope-intercept or point-slope form to find equations of lines that are parallel or perpendicular to a given line.

Remember that **parallel lines have equal (same) slopes** .

The slopes of two **perpendicular lines are opposite reciprocals, that is, their product is –1.**

Practice: **Write an equation in slope-intercept form for the line that satisfies each set of conditions.**

1) slope 3, passes through (1, –3)

2) passes through (–2, –4) and (1, 8)

3) passes through (3, –1), perpendicular to the graph of $y = -\frac{3}{2}x - 4$.

4) parallel to $y = \frac{1}{2}x + 6$, passes through (6, 7)

Website:

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(2.8) Graphing Linear and Absolute Value Inequalities

Graph Linear Inequalities A linear inequality, like $y \geq 2x - 1$, resembles a linear equation, but with an inequality sign instead of an equals sign. The graph of the related linear equation separates the coordinate plane into two half-planes. The line is the boundary of each half-plane.

To graph a linear inequality, follow these steps.

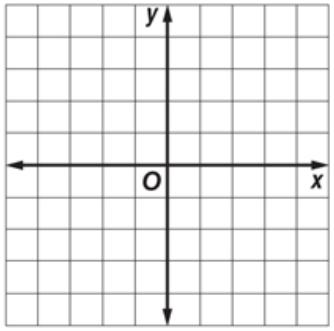
Step 1 Graph the boundary; that is, the related linear equation. If the inequality symbol is ≤ or ≥, the boundary is solid.
If the inequality symbol is < or >, the boundary is dashed.

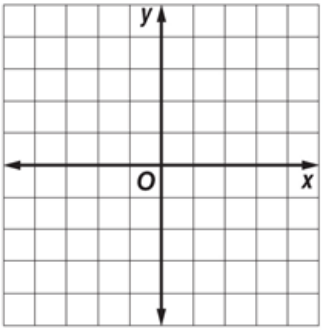
Step 2 Choose a point not on the boundary and test it in the inequality. (0, 0) is a good point to choose if the boundary does not pass through the origin.

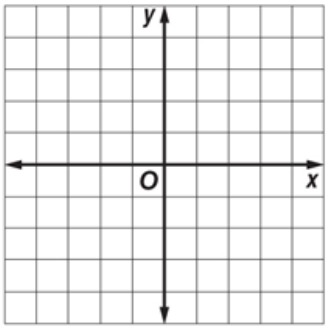
Step 3 If a true inequality results, shade the half–plane containing your test point. If a false inequality results, shade the other half-plane.

Practice: **Graph each inequality.**

1) $y \leq x + 2$ **2)** $x - y > -2$ **3)** $9x + 3y \leq 0$







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Prerequisite Skills for Chapter 3 - Systems of Equations and Inequalities

(3.1) Solving Systems

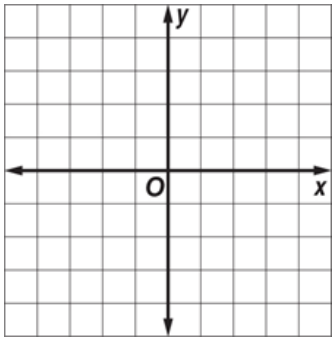
Graphically: A system of equations is two or more equations with the same variables. You can solve a system of linear equations by using a table or by graphing the equations on the same coordinate plane. If the lines intersect, the solution is that intersection point. The following chart summarizes the possibilities for graphs of two linear equations in two variables.

Graphs of Equations	Slopes of Lines	Classification of System	Number of Solutions
Lines intersect	Different slopes	Consistent and independent	One
Lines coincide (same line)	Same slope, same *y*-intercept	Consistent and dependent	Infinitely many
Lines are parallel	Same slope, different *y*-intercepts	Inconsistent	None

Practice: **Graph each system of equations and state the solution.**

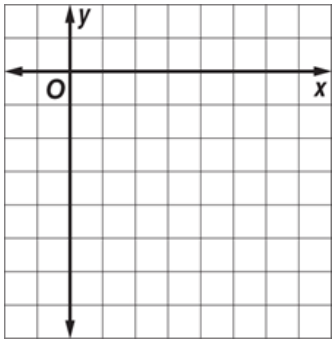
1) $y = -3x$

$y = -3x + 2$



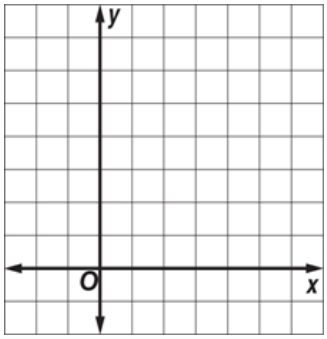
2) $y = x - 5$

$-2x + 2y = -10$



3) $2x - 5y + 10$

$3x + y = 15$



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Solving Systems Algebraically To solve a system of linear equations by substitution, first solve for one variable in terms of the other in one of the equations. Then substitute this expression into the other equation and simplify. To solve a system of linear equations by elimination, add or subtract the equations to eliminate one of the variables.

Practice: **Solve each system of equations.**

1) $2x - 3y = 6$

$-2x + 3y = -6$

2) $2x + 4y = -6$

$x + 2y = 3$

3) $x + 2y = -2$

$-2x - 5y = 3$

4) $3x - 2y = 1$

$2x - 3y = 9$

Website:

https://www.google.com/url?client=internal-element-cse&cx=004984196166817161901:gt3nscsxv5o&q=https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:systems-of-equations/x2f8bb11595b61c86:solving-systems-of-equations-with-substitution/v/practice-using-substitution-for-systems&sa=U&ved=2ahUKEwjS-6LX6q_3AhUDoHIEHc9nCjcQFnoECAQQAQ&usg=AOvVaw16U_1eSmt7KvE40lcFfLv3

(3-2) ***Solving Systems of Inequalities by Graphing***

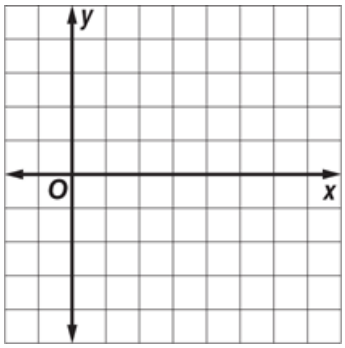
Systems of Inequalities To solve a system of inequalities, graph the inequalities in the same coordinate plane.

The solution of the system is the region shaded for all of the inequalities.

Practice: **Solve each system of inequalities by graphing.**

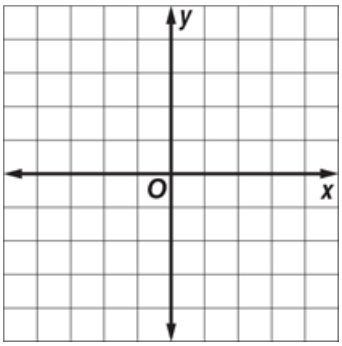
1) $y > 3$

$x + 2y \geq 12$



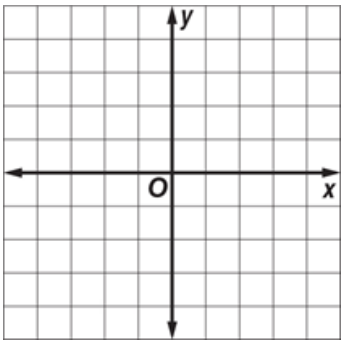
2) $y <- 2x + 3$

$y \leq x - 2$



3) $x - y \leq 4$

$2x + y > 4$



Website:

https://www.google.com/url?client=internal-element-cse&cx=004984196166817161901:gt3nscsxv5o&q=https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:inequalities-systems-graphs/x2f8bb11595b61c86:graphing-two-variable-inequalities/v/graphing-systems-of-inequalities-2&sa=U&ved=2ahUKEwizgN-F66_3AhVRI3IEHd6SARgQFnoECAMQAQ&usg=AOvVaw0L03PX66rjJVB2NxVip_E1