MATH SUMMER
ASSIGNMENT HIGH HONORS
ALGEBRA 2

Mathematics is foundational and it is crucial that students maintain certain skills and conceptual understandings to be able to succeed in future mathematics courses. It is for this reason that we have developed numerous summer assignments that are designed to help students review, refresh, and improve upon **prerequisite skills** to prepare for future courses.

This year, we are requiring students to complete summer assignments to ensure that they are prepared for the year. The assignments were designed by content teachers to help students be better prepared for math work in the fall. Students will be given time in class to clarify questions, practice concepts and will be assessed during the first week of school.

For High Honors Algebra 2, the summer assignment will be due the first week of class, counted as two homework assignments and used to review for a formative assessment.

High Honors Algebra 2 Expectations and Summer Assignment

Expectations for Students

Students expecting to take High Honors Algebra 2 at Lowell High School should demonstrate the ability to:

General

- Keep an organized notebook
- Be good note takers
- Complete homework every night
- Be active learners
- Ask questions and participate in class/seek help outside of class if needed
- Work with others
- Work with and without a calculator
- Consistently earn Algebra 1 grades in the and 90's

Math Specific

A. Solve various types of equations (one step, two step, multi-step)
B. Solve and graph inequalities
C. Identify functions using multiple representations (table, equations, graphically)
D. Graph equations in various forms (slope-intercept, standard, point-slope)
E. Solve systems of equations and systems of inequalities
F. Perform operations with exponents and radicals
G. Perform operations with polynomials (add, subtract, multiply, etc)
H. Factor polynomials including quadratics

Students planning on taking High Honors Algebra 2 will need a graphing calculator for fourth quarter (fourth quarter begins in April). A Texas Instruments TI-83 or TI-84 graphing calculator is recommended. These calculators are available at Walmart and Staples and usually cost about $100. If there is some hardship that will prevent you from purchasing a graphing calculator, discuss this hardship with your teacher.

Review Problems

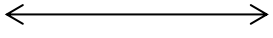
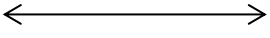
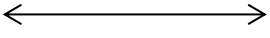
This packet includes the type of problems that are commonly part of an Algebra 1 course. Your solutions to these problems are **due the first week of school**. Please show your work on a separate page. **NOTE:** We provide an example from each section at the end of the packet. If you need a more specific example to help you complete a problem, then follow the corresponding link, which will bring you to a video explanation.

A. Solve various types of equations.

1. $2w + 1 = -9$ 2. $6(y + 3) = 24$ 3. $4v - 9 = 6v + 7$ 4. $4p - 5 + 2p = 7 + 5p + 2$

B. Solve and graph inequalities.

5. $4z + 7 \geq 15$ 6. $-\frac{7}{2}m < 14$ 7. $4 + 3n \geq 1$ or $-5n < 25$

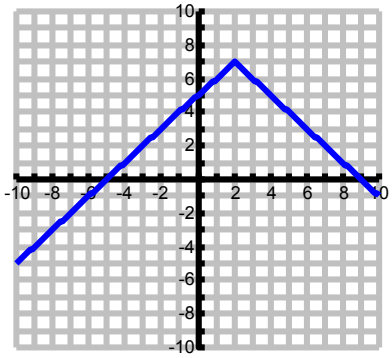
  

C. Identify functions using multiple representations: Determine whether each of the following is a function or not. EXPLAIN the reason for your answer.

8.

x	f(x)
0	10
1	8
2	-5
3	1
4	10

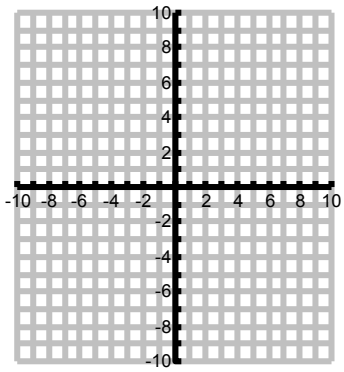
9.



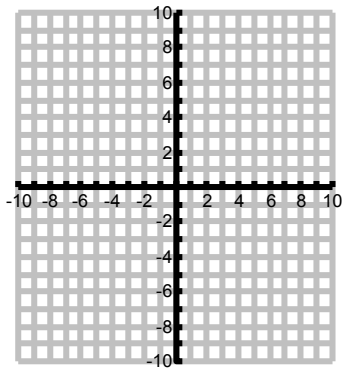
10. (1, 2) (- 4, 5) (1, 6) (2, -1)

D. Graph equations in various forms.

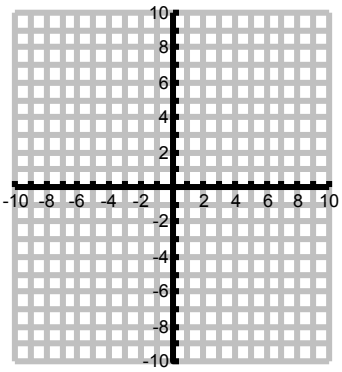
11. y = 2x – 4



12. 3x + 4y = -12



13. y – 3 = ½ (x + 1)



Write a linear equation for the line that:

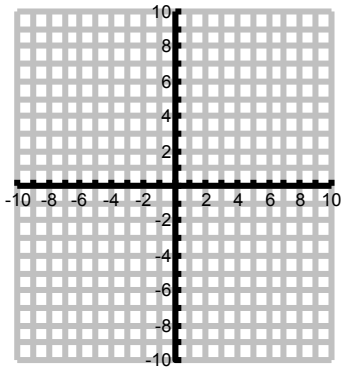
14. has m = $-\frac{2}{3}$ and b = –5

15. passes through (0, 4) and (2, 1)

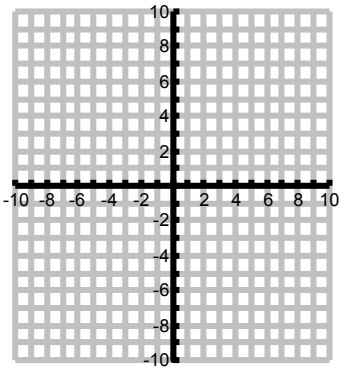
16. passes through (5, –8) and (–9, –8)

E. Solve systems of equations and systems of inequalities.

17. Solve by graphing: $\begin{cases} y = 3x - 7 \\ y = -x + 1 \end{cases}$



18. Solve by graphing: $\begin{cases} y \geq -x + 4 \\ 2x + 3y < -6 \end{cases}$



19. Solve using substitution: $\begin{cases} 8x + 2y = -2 \\ y = -x + 1 \end{cases}$

20. Solve using elimination: $\begin{cases} 3x + 2y = 14 \\ x - 12y = -8 \end{cases}$

F. Perform operations with exponents and radicals.

Simplify completely – no negative exponents

21. $(w^2k^0p^{-5})^2$

22. $(-3x^5)(2xy^4)$

23. $\left(\frac{a^3}{m}\right)^{-4}$

24. $\frac{r^3t^{-7}}{t^5}$

Put into simplified radical form – no decimals!!

25. $\sqrt{24}$

26. $3\sqrt{50}$

27. $\sqrt{17}$

28. $\sqrt{5} + 3\sqrt{5}$

29. $7\sqrt{2} - 3\sqrt{18}$

30. $2\sqrt{3} - 3\sqrt{15}$

31. $\frac{\sqrt{20}}{\sqrt{5}}$

G. Perform operations with polynomials.

Simplify each of the following.

32. $(4x^2 + 2x + 5) + (7x^2 - 5x + 2)$

33. $(9a^2 - 5a - 4) - (-6a^2 + 12a + 3)$

34. $8b(b^2 + 3b + 7)$

35. $(p + 2)(2p^2 - 5p + 4)$

H. Factor polynomials including quadratics.

36. $w^2 - 5w - 14$

37. $2y^2 + 9y + 4$

38. $4p^2 + 164p + 81$

39. $4x^2 - 49$

40. $9m^3 - 7m^4 + 8m^2$

Part A: Solving various types of equations

Example:

Solve $-2(b - 4) = 12$.

$-2b + 8 = 12$	Use the Distributive Property.
$-2b + 8 - 8 = 12 - 8$	Subtract 8 from each side.
$-2b = 4$	Simplify.
$\frac{-2b}{-2} = \frac{4}{-2}$	Divide each side by -2.
$b = -2$	Simplify.

Solving Equations with Variables on Both Sides

Part B: Solving and graphing inequalities

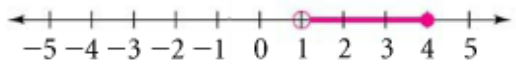
Example:

Solve $-4 < r - 5 \leq -1$. Graph your solution.

Write the compound inequality as two inequalities joined by *and*.

$-4 < r - 5$	and	$r - 5 \leq -1$	
$-4 + 5 < r - 5 + 5$	|	$r - 5 + 5 \leq -1 + 5$	Solve each inequality.
$1 < r$	and	$r \leq 4$	Simplify.

$1 < r \leq 4$



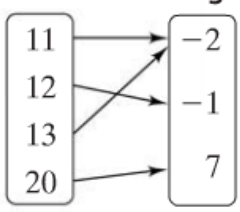
Solving Compound Inequalities

Part C: Identify functions using multiple representations

Example:

Determine whether each relation is a function.

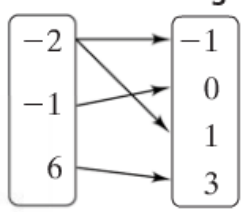
a. $\{(11, -2), (12, -1), (13, -2), (20, 7)\}$



There is no value in the domain that corresponds to more than one value of the range.

The relation is a function.

b. $\{(-2, -1), (-1, 0), (6, 3), (-2, 1)\}$



The domain value -2 corresponds to two range values, -1 and 1.

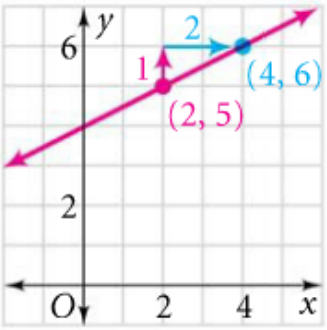
The relation is not a function.

Is a Relation a Function?

Part D: Graph equations in various forms

Example:

Graph the equation $y - 5 = \frac{1}{2}(x - 2)$.

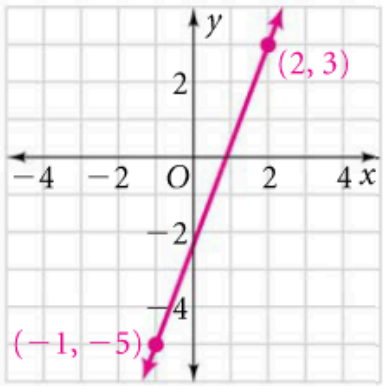


The equation shows that the line passes through (2, 5) and has a slope $\frac{1}{2}$.

Start at (2, 5). Using the slope, go up 1 unit and right 2 units to (4, 6). Draw a line through the two points.

Example:

Write equations for the line in point-slope form and in slope-intercept form.



Step 1 Find the slope.

$$\frac{y_2 - y_1}{x_2 - x_1} = m$$

$$\frac{-5 - 3}{-1 - 2} = \frac{8}{3}$$

The slope is $\frac{8}{3}$.

Step 2 Use either point to write the equation in point-slope form. Use (2, 3).

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{8}{3}(x - 2)$$

Step 3 Rewrite the equation from Step 2 in slope-intercept form.

$$y - 3 = \frac{8}{3}(x - 2)$$

$$y - 3 = \frac{8}{3}x - 5\frac{1}{3}$$

$$y = \frac{8}{3}x - 2\frac{1}{3}$$

Graphing with Intercepts

Point-Slope Equation of a Line

Write an equation given two points

Part E: Systems of Equations & Inequalities

$$\begin{cases} 3x + 2y = 9 \\ 2x + 6y = 6 \end{cases}$$

$$\begin{matrix} -2 & (3x + 2y = 9) \\ 3 & (2x + 6y = 6) \end{matrix}$$

$$\begin{aligned} -6x - 4y &= -18 \\ +\ 6x - 18y &= 18 \\ \hline -22y &= 0 \\ y &= 0 \end{aligned}$$

if $y = 0$, then $3x + 2(0) = 9$ and $x = 3$

$(3,0)$

Solve a system by Graphing

Solve a system of Inequalities

Part F: Perform operations with exponents and radicals

Example:

Simplify $(x^{-2})^2(3xy^2)^4$.

$(x^{-2})^2(3xy^2)^4 = (x^{-2})^2 \cdot 3^4x^4(y^2)^4$	Raise the three factors to the 4th power.
$= x^{-4} \cdot 3^4x^4y^8$	Multiply the exponents of a power raised to a power.
$= 3^4 \cdot x^{-4} \cdot x^4 \cdot y^8$	Use the Commutative Property of Multiplication.
$= 3^4x^0y^8$	Add exponents of powers with the same base.
$= 81y^8$	Simplify.

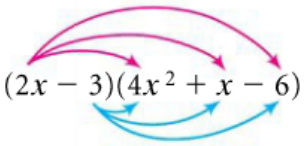
Rationalize the Denominator

Radical Operations

Part G: Perform operations with polynomials

Example:

Multiply using the horizontal method.



$$= 2x(4x^2) + 2x(x) + 2x(-6) - 3(4x^2) - 3(x) - 3(-6)$$
$$= 8x^3 + 2x^2 - 12x - 12x^2 - 3x + 18$$
$$= 8x^3 - 10x^2 - 15x + 18 \qquad \text{Add like terms.}$$

Subtracting Polynomials

Part H: Factor polynomials including quadratics

Example:

Factor $7x^2 - 26x - 8$.

$7x^2$	$-26x$	-8
$1 \cdot 7$	$(1)(-8) + (1)(7) = -1$	$(1)(-8)$
	$(1)(1) + (-8)(7) = -55$	$(-8)(1)$
	$(1)(-4) + (2)(7) = 10$	$(2)(-4)$
	$(1)(2) + (-4)(7) = -26$ ✓	$(-4)(2)$

$$7x^2 - 26x - 8 = (1x + -4)(7x + 2)$$

Factor a Trinomial

Factor the Difference of Two Squares

Factor Completely