Algebra 2 Honors Summer Packet | 2023

Welcome to Algebra 2 Honors!

This summer packet is for all students enrolled in Algebra 2 Honors at Herndon High School for Fall 2023.
This summer assignment is not *required*, but it is *strongly recommended.* The exercises will give you the opportunity to self-assess how prepared you are for Algebra 2 Honors this year. Success in our first unit will depend how well you understand the topics included, so put your best effort into it! Feel free to use old notes and online resources as needed to ensure that you understand the content.

Complete the work for this packet in the spaces provided or on a separate piece of paper. Students should complete this assignment WITHOUT the use of a calculator. It is important to spend time keeping these skills and concepts fresh in your mind – especially your mental math! We will provide you with a key at the start of next year for you to check your work. Be sure to keep track of sticky spots and ask questions when we return. You are also welcome to reach out to us over the summer; our contact information is below.

FCPS recommend activities for each level of mathematics are also posted on the Herndon High School website. Both resources will help you prepare for next year.

Have a great summer – we are looking forward to meeting you in August!

Mr. Mada
rlmada@fcps.edu

Mrs. Comesanas
ocomesanas@fcps.edu

As you work through the packet, keep track of the following:

"Things I learned, but forget how to do:"	**"Things I never learned:"**

Simplify expressions

1. $8-(5-x)$

$8-5+x$

$3+x$

$\boxed{x+3}$

2. $3(2x-3(x-1))$

$3(2x-3x+3)$

$3(-x+3)$

$\boxed{-3x+9}$

3. $-(-(-(-(-(x)))))$

$\boxed{-x}$

4. $7[x-9(x-1)]+3[2x+3(2x-5)]$

$7[x-9x+9]+3[2x+6x-15]$

$7[-8x+9]+3[8x-15]$

$-56x+63+24x-45$

$\boxed{-32x+18}$

Evaluate expressions.

5. $10(t^2+t)$ for $t=-5$

$10((-5)^2+(-5))$

$10(25-5)$

$10(20)$

$=200$ $\boxed{200}$

6. $-5|k+1|$ for $k=-10$

$-5|-10+1|$

$-5|-9|$

$-5(9)$

$\boxed{-45}$

7. $\dfrac{(x+y)^2}{-y}$ for $x=-12,\ y=4$

$\dfrac{(-12+4)^2}{-(4)} = \dfrac{(-8)^2}{-4} = \dfrac{64}{-4} = \boxed{-16}$

Solve equations

Solve for x. Show all work and circle your answer.

8. $-(x-1)+10=-3(x-3)$

$-x+1+10=-3x+9$

$-x+11=-3x+9$

$2x+11=9$

$2x=2$

$\boxed{x=1}$

9. $2.5(x-3)+1.7x=10.8(x+1.5)$

$2.5x-7.5+1.7x=10.8x+16.2$

$4.2x-7.5=10.8x+16.2$

$-23.7=6.6x$

$\boxed{-3.59=x}$

10. $a+bx=dx$

$a+bx=dx$

$a=dx-bx$

$a=x(d-b)$

$\boxed{\frac{a}{d-b}=x}$

Solve inequalities

Solve each inequality and **graph on a number line.** Show all work.

11. $5-5x\geq 4(3-x)$

$5-5x\geq 12-4x$

$5-x\geq 12$

$-x\geq 7$

$x\leq -7$

12. $13<4-3x<52$

$-4\quad -4\quad -4$

$9<-3x<48$

$\frac{9}{-3}<\frac{-3x}{-3}<\frac{48}{-3}$

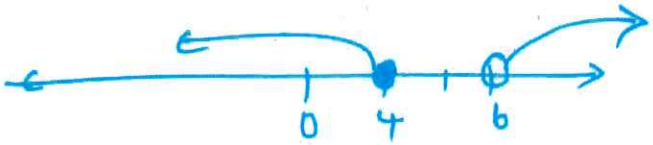
$-3>x>-16$

$-16<x<-3$

13. $7-3x\geq -5$ or $3x+3>21$

$-3x\geq -12$ OR $3x>18$

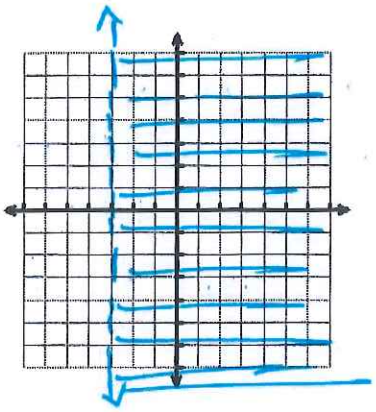
$\boxed{x\leq 4 \text{ OR } x>6}$



Graph inequalities

Graph each inequality on a separate coordinate plane. Show all work.

14. $x > -3$

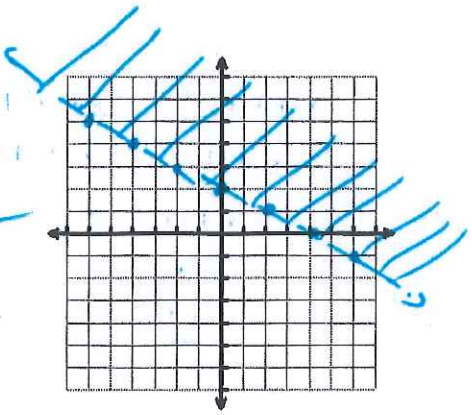


15. $x+2y>4$

$x+2y>4$

$2y>-x+4$

$y>-\frac{1}{2}x+2$



Identify slope.

$x_1\ y_1 \quad x_2\ y_2$

16. through (8, 5) and (11, 14)

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

$m=\frac{14-5}{11-8}=\frac{9}{3}=3$

$\boxed{m=3}$

17. $x=-4$

Undefined.

18. parallel to $3x-y=-2$

$-y=-3x-2$

$y=3x+2$

$\boxed{m=3}$

19. perpendicular to $4x-5y=5$

$-5y=-4x+5$

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

$\boxed{m=-5/4}$

Determine x- and y- intercepts.

Find the x and y intercepts of the line. Intercepts must be given as ordered pairs. Show all work.

20. $10x-6y=-30$

x-Int $(-3,0)$

y-Int $(0,5)$

21. $y=5x-3$

x-Int $(3/5,0)$

y-Int $(0,-3)$

22. $x=-2$

x-Int $(-2,0)$

y-Int —

23. $y=6$

x Int — —

y-Int $(0,6)$

Graph linear equations.

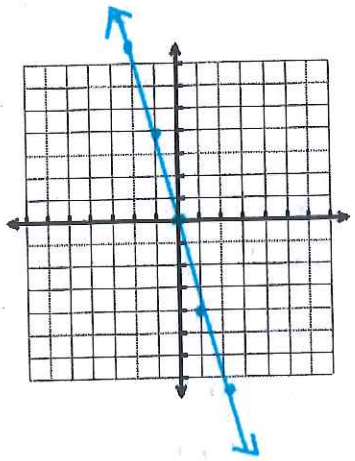
Graph each line on the coordinate plane provided. Show all work necessary to graph the line.

24. $y = -4x$

$y = -4x + 0$

$m = -4$

y Int (0,0)



25. $4x - 6y + 24 = 0$

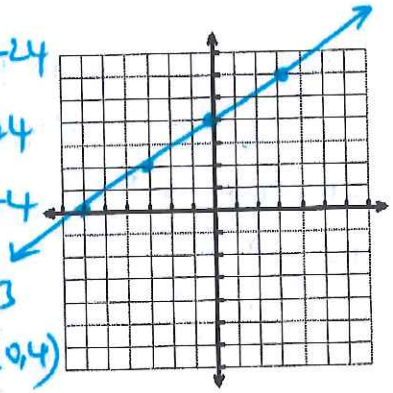
$-6y = -4x - 24$

$6y = 4x + 24$

$y = \frac{2}{3}x + 4$

$m = 2/3$

y Int (0,4)



Write the equation of a line.

Write the equation of the line in slope-intercept form. Show all work and circle your answer.

26. slope = -3, y-intercept $(0, -8)$

$y = mx + b$

$y = -3x - 8$

27. Passing through (8, -5) and (-4, 7)

$m = \frac{7 - -5}{-4 - 8} = \frac{12}{-12} = -1$

$y = mx + b$

$-5 = -1(8) + b$

$-5 = -8 + b$

$3 = b$

$y = -x + 3$

28. Parallel to $3x + 2y = 6$ and passing through (-2, 5)

$3x + 2y = 6$

$2y = -3x + 6$

$y = -\frac{3}{2}x + 3$

Parallel slope $-\frac{3}{2}$

$y = mx + b$

$5 = (-\frac{3}{2})(-2) + b$

$5 = 3 + b$

$2 = b$

$y = -\frac{3}{2}x + 2$

29. Perpendicular to $y = -4x + 2$ and passing through (-4, 2)

Perpendicular slope $\frac{1}{4}$

$y = mx + b$

$2 = \frac{1}{4}(-4) + b$

$2 = -1 + b$

$3 = b$

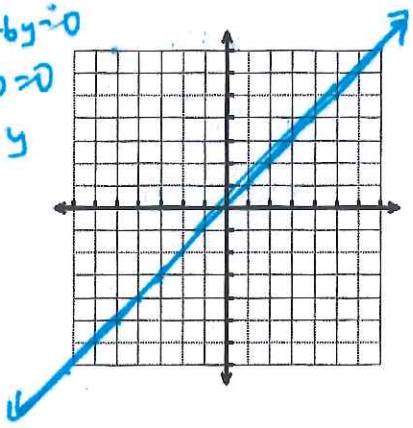
$y = \frac{1}{4}x + 3$

Solve systems of equations.

Solve by graphing on the coordinate plane provided. Show all work. Answers should be in the form of an ordered pair where appropriate. If the lines are coincident write all points on the line and name the line. Write no solution for parallel lines. Put your answer in the blank.

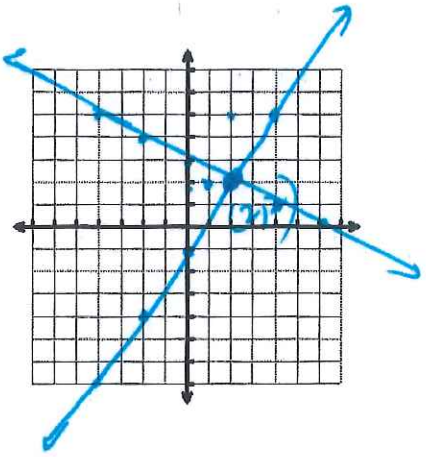
30. $\begin{cases} 2x-2y=0 \\ 6x-6y=0 \end{cases}$ All points on the line $y=x$

$2x-2y=0$ $6x-6y=0$
$x-y=0$ $x-y=0$
$x=y$ $x=y$



31. $\begin{cases} 3x-2y=2 \\ x+2y=6 \end{cases}$ $(2,2)$

$3x-2=2y$
$\frac{3}{2}x-1=y$
$x+2y=6$
$2y=-x+6$
$y=-\frac{1}{2}x+3$



Solve by substitution. Answers should be in the form of an ordered pair where appropriate. Show all work

32. $\begin{cases} 2x+3y=28 \\ 4x-y=4 \end{cases}$

$4x-y=4$
$y=4x-4$
$2x+3y=28$
$2x+3(4x-4)=28$
$2x+12x-12=28$
$14x=40$
$x=20/7$

$4(\frac{20}{7})-4=y$
$\frac{80}{7}-4=y$
$\frac{52}{7}=y$

$(20/7, 52/7)$

Solve by elimination (linear combination). Answers should be in the form of an ordered pair where appropriate. Show all work.

33. $\begin{cases} 2x-3y=15 \\ 9x+5y=0 \end{cases}$

$5(2x-3y=15)$
$3(9x+5y=0)$
$10x-15y=75$
$27x+15y=0$
$37x=75$
$x=\frac{75}{37}$

$9(\frac{75}{37})+5y=0$
$5y=\frac{-675}{37}$
$y=\frac{-675}{185}$
$y=\frac{-135}{37}$

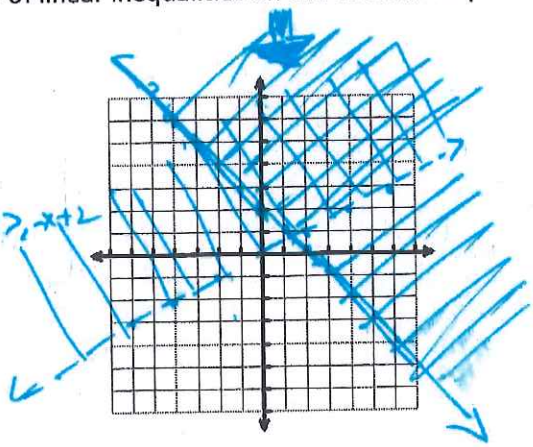
$(\frac{75}{37}, \frac{-135}{37})$

Graph systems of linear inequalities.

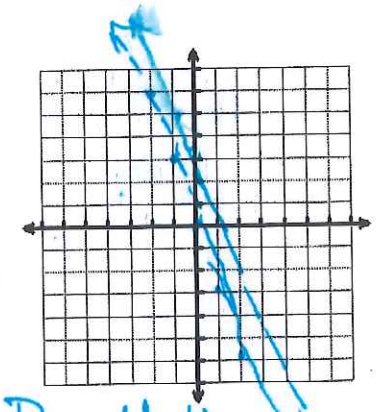
Graph the system of linear inequalities on the coordinate plane. Shade only the solution area. Show all work.

34. $x-2y<0$
$y\geq -x+2$

$-2y < -x$
$y > \frac{1}{2}x$



35. $y<-3x$
$y>-3x+2$

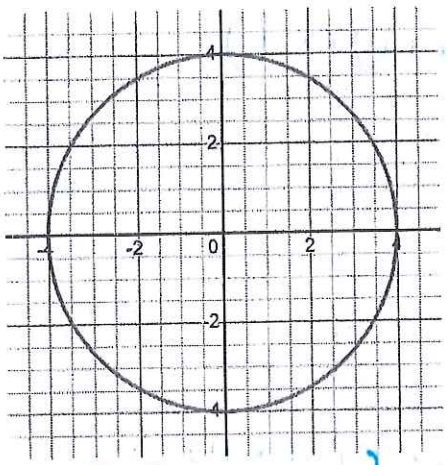


Parallel lines
No solution

Graph Properties.

Find the properties of each graph.

36.



Domain: $\{x / -4 \leq x \leq 4\}$

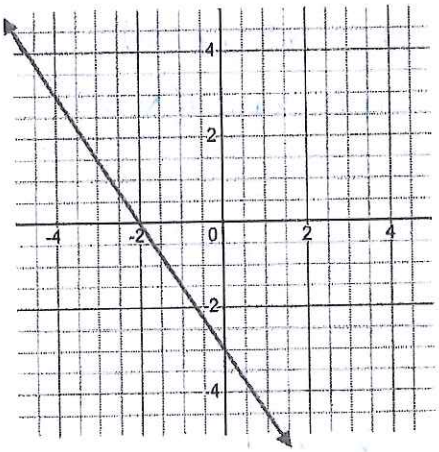
Range: $\{y / -4 \leq y \leq 4\}$

Is it a function? No.

X-Intercept(s): $(-4,0)$ $(4,0)$

Y- Intercept(s): $(0,-4)$ $(0,4)$

37.



Domain: $\{x / x$ is a Real Number$\}$ All Real Numbers.

Range: $\{y / y$ is a Real Number$\}$ All Real Numbers

Is it a function? Yes

X-Intercept(s): $(-2,0)$

Y- Intercept(s): $(0,-3)$

Simplify exponents.

Simplify. Show all work.

38. $(10y^{-3})^4$

$10^4 \cdot y^{-12}$

$\frac{10000}{y^{12}}$

39. $\left(-\frac{ab^5}{c^4}\right)^{-3}$

$\frac{-c^{12}}{a^3b^{15}}$

40. $\frac{(m^3n^4)^2}{(-mn^5)^2(m^4n^2)}$

$\frac{1}{n^4}$

Factor quadratic expressions.

Factor completely. Show all work.

41. $x^2 - x - 42$

$(x-7)(x+6)$

42. $7x^2 - 9x + 2$

$(x-1)(7x-2)$

43. $12x^2 - 28x - 24$

$4(3x^2-7x-6)$

$4(3x+2)(x-3)$

44. $x^2 - 36$

$(x+6)(x-6)$

Solve quadratic equations.

Solve by factoring. Show all work.

46. $3x^2 - 12x = 0$

$3x(x-4)=0$

$3x=0$ $\quad x-4=0$

$x=0$ $\quad x=4$

46. $2x^2 + 11x + 9 = 0$

$(2x+9)(x+1)=0$

$2x+9=0$ $\quad x+1=0$

$x=-\frac{9}{2}$ $\quad x=-1$