Name Answers Key Date _____ Period _____

Accelerated Geometry
End of Year Algebra Review #3

Solving Inequalities and graphing results

- When dividing or multiplying by a negative number, be sure to switch the inequality sign!

Recall: No Solution (untrue statement) so no graph and All Real Numbers (True statement) so shade entire line.

Solve each inequality, then graph the solutions on a number line.

1. $4-(2x-6)<3x-7-2x+8$

$4-2x+6<x+1$
$10-2x<x+1$
$-1 \quad +2x \quad +2x-1$
$\frac{9}{3}<\frac{3x}{3}$

$x>3$

2. $-5(x+3)<-5x+1$

$-5x-15<-5x+1$
$-15<1$ True

All $\mathbb{R}$

3. $7a<3+7(a-1)$

$7a<3+7a-7$
$0<-4$ False

$\varnothing$

no graph

4. $2(4x-3)\geq 18$

$8x-6\geq 18$
$+6 \quad +6$
$\frac{8x}{8}\geq\frac{24}{8}$

$x\geq 3$

Solving Combined Inequalities ("and"/"or" statements) and graphing results

- *"And" statements are intersections (overlapping) of graphs*
- *"Or" statements are unions (everything on same number line) of graphs*

Recall: No Solution (untrue statement) so no graph and All Real Numbers (True statement) so shade entire line.

Solve each inequality, then graph the solutions on a number line.

5. $-7\leq 4x-11<9$

$+11 \quad +11 \quad +11$
$\frac{4}{4}\leq\frac{4x}{4}<\frac{20}{4}$

$1\leq x<5$

6. $-4x+3>11$ or $\frac{1}{2}x>5$

$\frac{-4x}{-4}>\frac{8}{-4}$

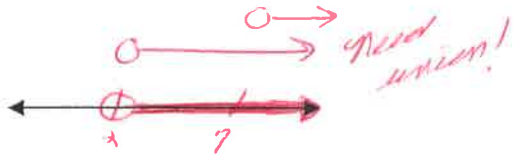
$x<-2$ or $x>10$

Solve each inequality, then graph the solutions on a number line.

7. $2x+3>11$ or $3x+2>8-2x$

$2x>14$ $\quad 5x>10$

$x>7$ or $\boxed{x>2}$



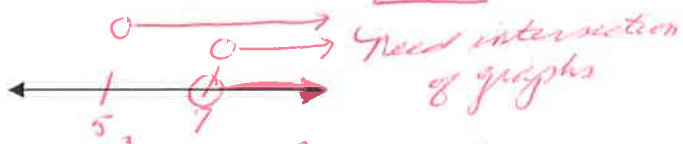
8. $13<3x+2$ and $5(3x+2)<18x-11$

$15<3x$ and $15x+10<18x-11$

$5<x$ $\quad 21<3x$

$x>5$ $\quad 7<x$

and $\boxed{x>7}$



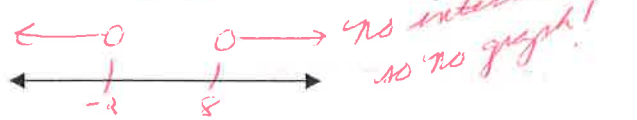
9. $2-5x>12$ and $\frac{3}{4}x+2>8$

$-5x>10$ $\quad \frac{4}{3}\cdot\frac{3}{4}x>6\cdot\frac{4}{3}$

Sign flips!

$x<-2$ and $x>8$

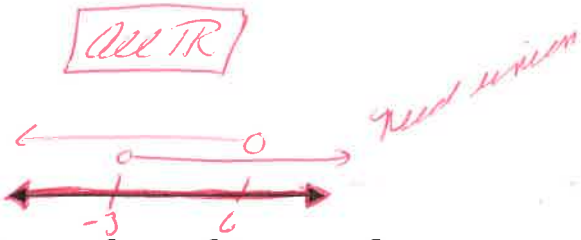
$\boxed{\varnothing}$



10. $-3<x$ or $-\frac{x}{3}>-2$ $\quad \cdot(-3)$ Sign flips!

$x>-3$ or $x<6$

$\boxed{\text{All } \mathbb{R}}$



Solving Absolute Value Equalities and Inequalities and graphing results

- *Isolate the absolute value part of the equality/inequality first!*
- *Rewrite abs. value equality as an "OR" statement*
- *Rewrite abs. value inequality as combined inequality: Great"OR" Less"AND"*
  - *"And" statements are intersections (overlapping) of graphs*
  - *Or" statements are unions (everything on same number line) of graphs*

Solve each inequality, then graph the solutions on a number line.

11. $2|3-2x|+1=11$

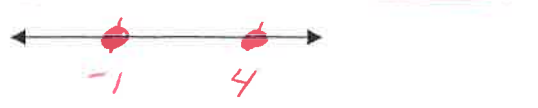
$2|3-2x|=10$

$|3-2x|=5$

$3-2x=5$ $\quad -3+2x=5$

$-2x=2$ $\quad 2x=8$

$\boxed{x=-1 \text{ or } x=4}$



12. $3+\left|\frac{1}{4}x+1\right|\geq 6$

$\left|\frac{1}{4}x+1\right|\geq 3$

$\frac{1}{4}x+1\geq 3$ or $-\frac{1}{4}x-1\geq 3$

$4\cdot\frac{1}{4}\geq 2\cdot 4$ $\quad -\frac{1}{4}x\geq 4$ Sign flips!

$\boxed{x\geq 8 \text{ or } x\leq -16}$

Solve each inequality, then graph the solutions on a number line.

13. $2|x-3|+5<7$

$-5 \quad -5$

$\frac{2}{2}|x-3| < \frac{2}{2}$

$|x-3|<1$

$x-3<1$ and $-x+3<1$ sign flips!

$x<4$ $\quad -x<-2$

and $\quad x>2$

$2<x<4$

14. $|8x-4|-2>10$

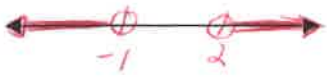
$+2 \quad +2$

$|8x-4|>12$

$8x-4>12$ or $-8x+4>12$

$8x>16$ $\quad -8x>8$ sign flips!

$x>2$ or $x<-1$



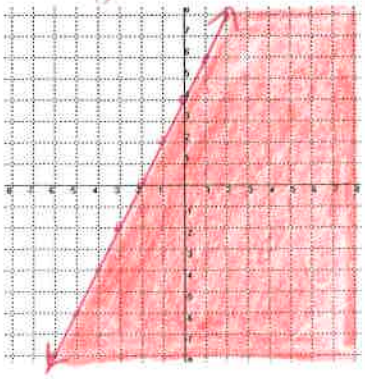
Steps to graph a linear inequality:

1. Isolate y $\quad y=mx+b$
2. Use the y-intercept and slope to plot points
3. Graph the equation of the boundary
   - solid line: $\geq$, $\leq$
   - dashed line: $>$, $<$
4. Shade the appropriate region
   - use a test point to check shading

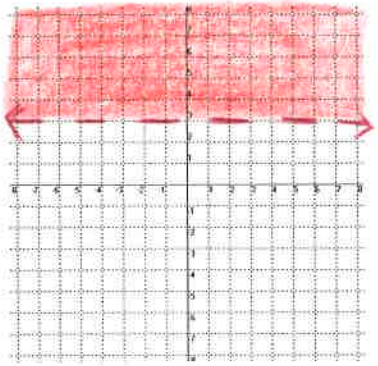
Graph.

15. $2x-y\geq -4$ (solid)

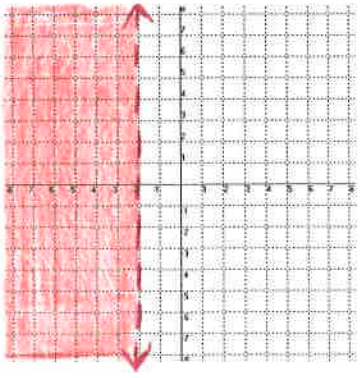
$y \leq 2x+4$



16. $y>3$ (dashed) horizontal line



17. $x<-2$ (dashed) vertical line



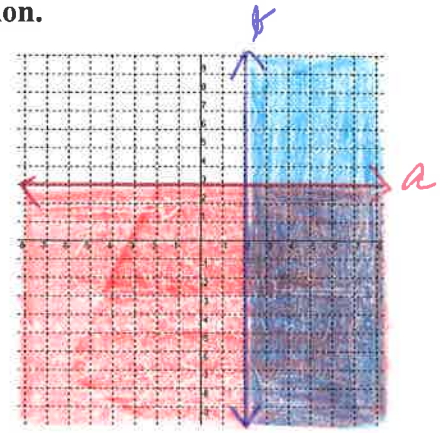
Steps to graphing the solution set of a system of two linear equalities:

1. Isolate y in each inequality
2. Draw the boundary line for one graph
   a. $\geq$, $\leq$ solid
   b. $>$, $<$ dashed

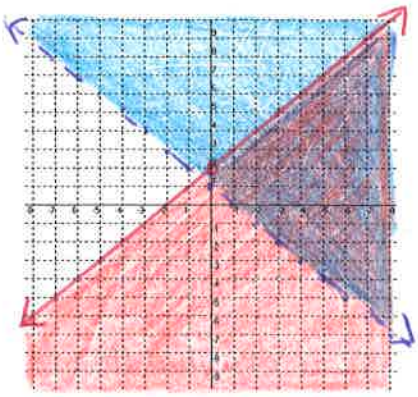
3. Shade the appropriate region
4. Draw a boundary line for the 2nd graph
5. Shade the appropriate region
6. Darken the overlapping shaded region (solution)

Graph the solution.

18. a $y \le 3$
b $x \ge 2$

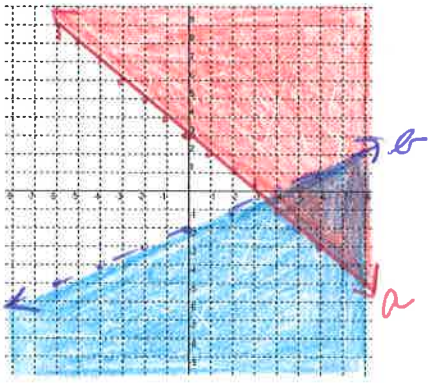


19. a $y \le x + 2$
b $y > 1 - x$



20. $x + y \ge 3$
$x - 2y > 4$

a $y \ge -x + 3$
b $y < \frac{1}{2}x - 2$



21. $x - y < 5$
$x - 2y > 6$

a $y > x - 5$
b $y < \frac{1}{2}x - 3$