Name Key
8A; Algebra 1

Date _____
Period _____

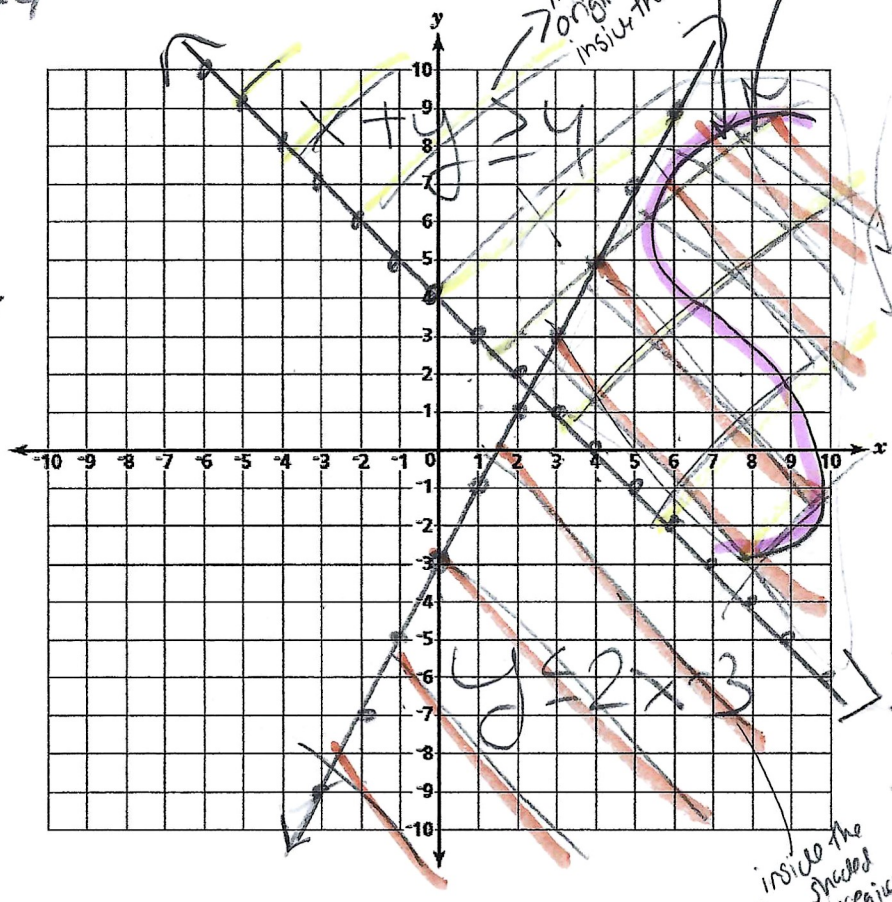
How do we solve a System of Inequalities Graphically?

In order to find the solution set of a system of inequalities, we must find the ordered pairs that satisfy the open sentences of the system. We do this by a graphic method that is similar to the method used in finding the solution set of a system of equations.

Example 1:

(a) Graph the following system of inequalities and label the solution set S.

$x + y \geq 4$
$y \leq 2x - 3$



answers (where the shadings intersect)

Solution set: ☆ Any point in the solution set satisfies BOTH inequalities

$x + y \geq 4$
$-x \quad -x$
$y \geq -x + 4$
$m = -\frac{1}{1}$ ↓ →
$B = 4$
• solid
• shade above

Test Point (7,7)
$x + y \geq 4$
$7 + 7 \geq 4$
$14 \geq 4$ ✓

$y \leq 2x - 3$
$m = \frac{2}{1}$ ↑ →
$B = -3$
• solid
• shade below

T.P (4, -4)
$y \leq 2x - 3$
$-4 \leq 2(4) - 3$
$-4 \leq 8 - 3$
$-4 \leq 5$ ✓

(b) Name a point in the solution set of $x + y \geq 4$ and $y \leq 2x - 3$. (6,5)

(c) Name a point in the solution set of $x + y \geq 4$ but not in the solution set of $y \leq 2x - 3$. (2,4)

(d) Name a point in the solution set of $y \leq 2x - 3$ but not in the solution set of $x + y \geq 4$. (3,-8)

(e) Name a point that is not in the solution set of $x + y \geq 4$ nor in the solution set of $y \leq 2x - 3$. (0,0)

Example 2:

Graph the solution set of the system:

$x > 2$

$y < -2$

*Start graphing on the x-axis b/c it's $x >$

$x > 2$

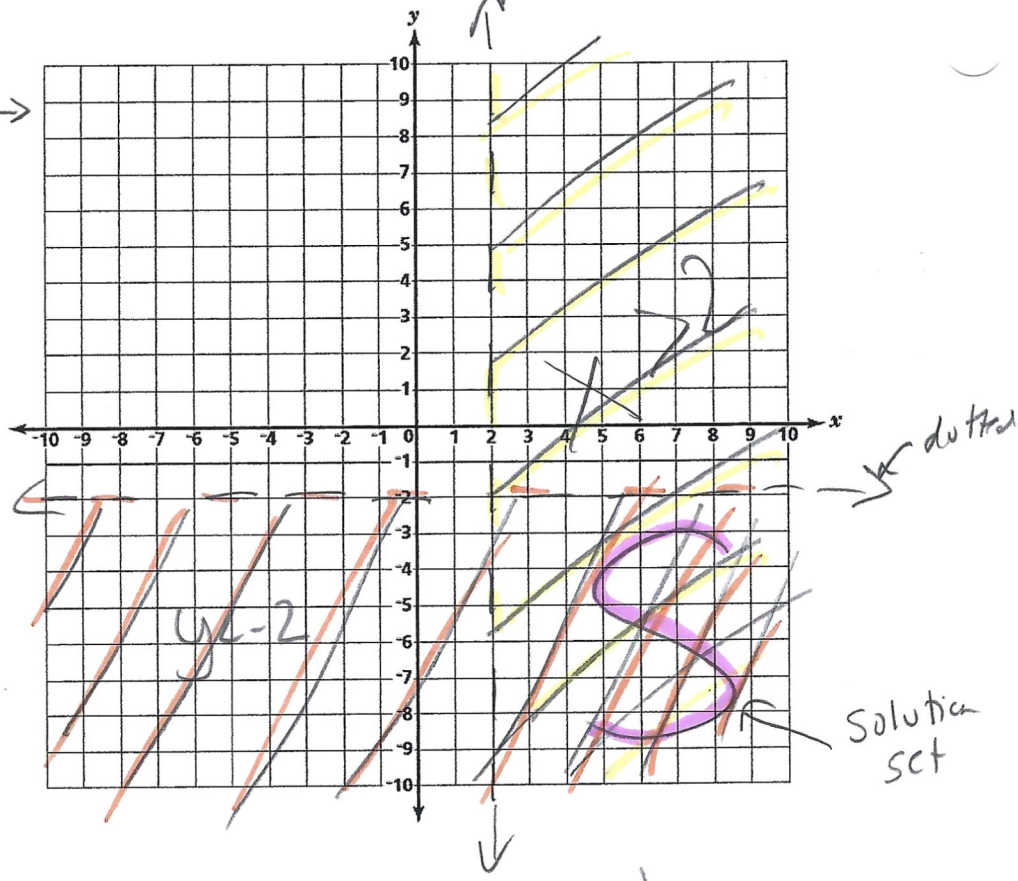
- m = undefined
- B = NO y-int
- dotted
- shade above

T.P.
(5, 0)
$x > 2$
$5 > 2$ ✓

$y < -2$

- m = zero
- $B = -2$
- dotted
- shade below

T.P.
(4, -3)
$y < -2$
$-3 < -2$ ✓



Example 3:

Graph the system of inequalities and name a point in the solution set. (-3, 9)

$2x + y \leq 6$

$x + y - 2 > 0$

$2x + y \leq 6$

$-2x \quad -2x$

$y \leq -2x + 6$

$m = -\frac{2}{1}$ ↓ →

$B = 6$

- solid
- Shade below

T.P.
(0, 0)
$2x + y \leq 6$
$2(0) + 0 \leq 6$
$0 + 0 \leq 6$
$0 \leq 6$

$x + y - 2 > 0$

$-x \quad -x$

$y - 2 > -x + 0$

$+2 \quad +2$

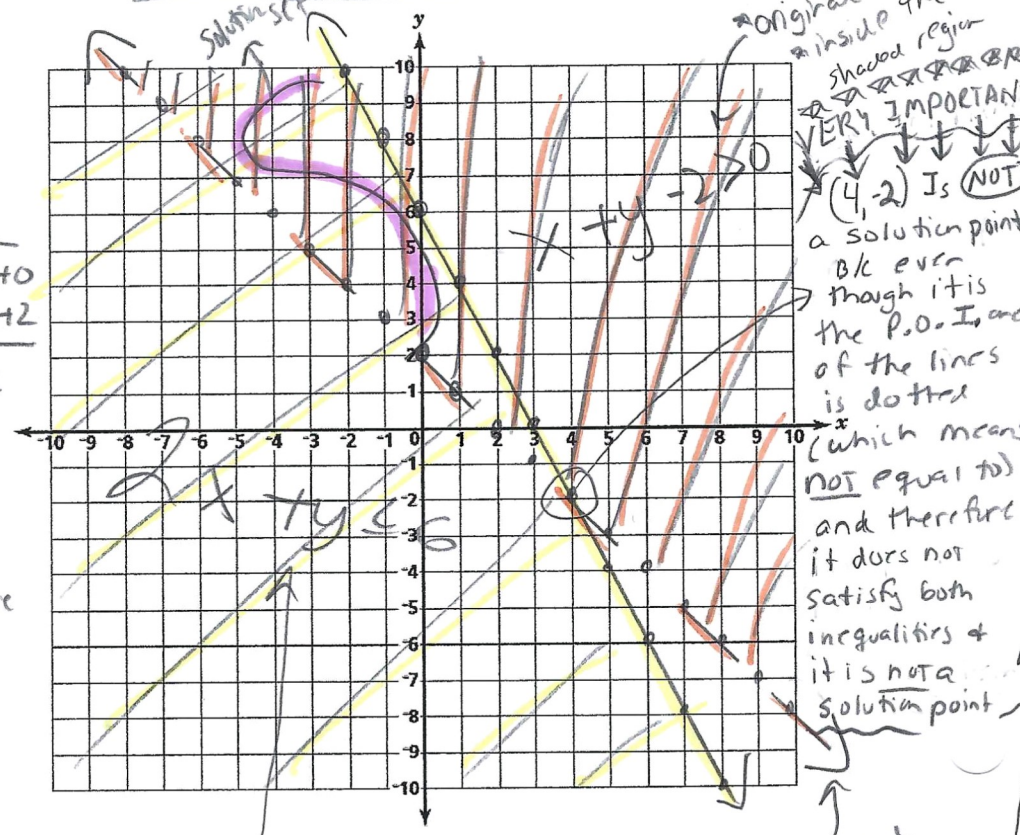
$y > -x + 2$

$m = -\frac{1}{1}$ ↓ →

$B = 2$

- dotted
- shade above

T.P.
(6, 2)
$x + y - 2 > 0$
$6 + 2 - 2 > 0$
$6 > 0$ ✓



* original * inside the shaded region

VERY IMPORTANT

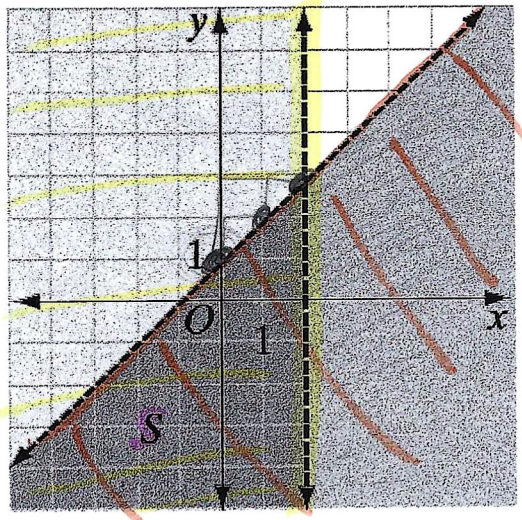
(4, -2) Is NOT a solution point b/c even though it is the P.O.I. and of the lines is dotted (which means NOT equal to) and therefore it does not satisfy both inequalities & it is not a solution point

dotted

* This is always asked on the regents

* original * inside shaded region

4) Write the system of inequalities whose solution set is labeled S



$x < 2$

$y < x + 1$

$m = 1$
$B = 1$
• dotted
• shaded below
$y < x + 1$

m = undefined
B = NONE
• dotted
• shade below
$x < 2$

$y > 2x$ $\quad x \geq 2$

5) In Ms. Dwyer's class, the number of boys is more than twice the number of girls. There are at least 2 girls. There are no more than 10 boys.

$y \leq 10$

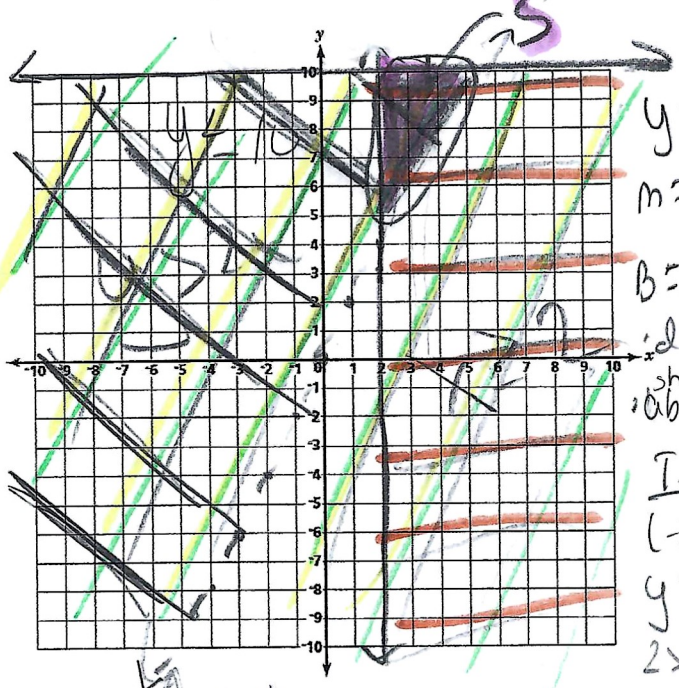
(a) Write the three sentences given above as three inequalities, letting x equal the number of girls and y equal the number of boys.

(b) On a set of axes, graph the three inequalities written in part (a)

(c) Label the solution set of the system of inequalities S.

(d) Do the coordinates of every point in the region represent the possible number of girls and number of boys in Ms. Dwyer's class? Explain your answer. NO B/C you can't have half or part of a person. Or a Negative #

(e) Write an ordered pair that could represent the number of girls and boys in Ms. Dwyer's class. (3,8)



$y > 2x$
$m = \frac{2}{1}$
$B = 0$
• dotted
• shade above
T.P
$(-2, 2)$
$y > 2x$
$2 > 2(-4)$
$2 > -8$ ✓

$x \geq 2$
m = undefined
B = NONE
• solid
• shade above
T.P.
$(5, 0)$
$x \geq 2$
$5 \geq 2$ ✓

$y \leq 10$
$m = 0$
$B = 10$
• solid
• shade Below
T.P
$(9, 0)$
$y \leq 10$
$0 \leq 10$ ✓