Activity

4-5 Systems of Linear Inequalities

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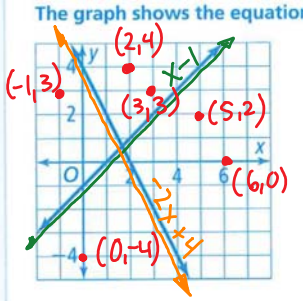
EXPLORE & REASON

The graph shows the equations $y = x - 1$ and $y = -2x + 4$.



A. Choose some points above and below the line $y = x - 1$. Which of them are solutions to $y > x - 1$? Which are solutions to $y < x - 1$?

greater : above
$(-1,3), (2,4), (3,3)$

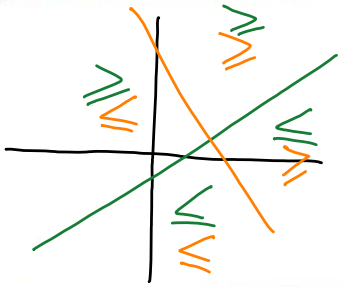
less than : below
$(5,2), (6,0), (0,-4)$

B. Choose some points above and below the line $y = -2x + 4$. Which of them are solutions to $y > -2x + 4$? Which are solutions to $y < -2x + 4$?

greater : above
$(2,4), (3,3), (5,2), (6,0)$

less than : below
$(-1,3), (0,-4)$

C. **Look for Relationships** The two lines divide the plane into four regions. How can you describe each region in terms of the inequalities in parts A and B? MP.7



HABITS OF MIND

Reason Are points on the line part of any of the four regions described in Part C? Explain. MP.2

yes... solid line: shared between two regions

Notes

$y = mx + b$

Assess

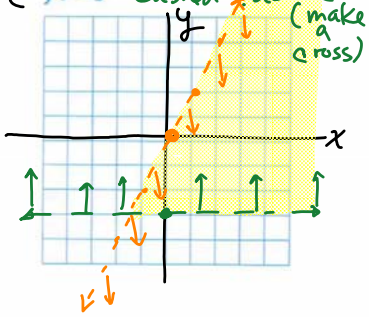
EXAMPLE 1 Try It! Graph a System of Inequalities

1. Graph each system of inequalities.

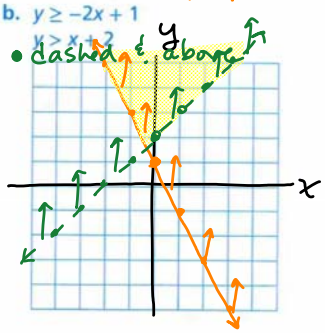
Both: TRUE

a. $y < 2x$ • dashed & below
$y > -3$ • dashed & above (make a cross)

→ overlap



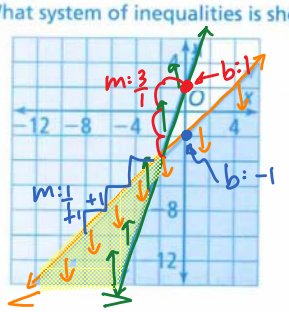
b. $y \geq -2x + 1$ • solid & above
$y > x + 2$ • dashed & above



EXAMPLE 2 Try It! Write a System of Inequalities From a Graph

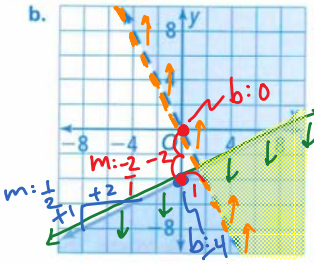
2. What system of inequalities is shown by each graph?

a.



$y \leq 1x - 2$ & $y \geq 3x + 2$

b.



$y > -2x$

$y \leq \frac{1}{2}x - 4$

&

HABITS OF MIND

Use Appropriate Tools What would the graph of a system of inequalities with no solutions look like? MP.5

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Do You UNDERSTAND?

1. ESSENTIAL QUESTION How is the graph of a system of linear inequalities related to the solutions of the system of inequalities?

2. **Error Analysis** A student say that (0, 1) is a solution to the following system of inequalities.

$y > x$

$y > 2x + 1$

She says that (0, 1) is a solution because it is a solution of $y > x$. Explain the error that the student made. MP.3

3. **Vocabulary** How many inequalities are in a *system of inequalities*?

4. **Use Appropriate Tools** Is it easier to describe the solution of a system of linear inequalities in words or to show it using a graph? Explain. MP.5

Do You KNOW HOW?

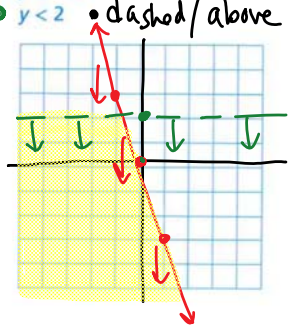
Identify the boundary lines for each system of inequalities.

5. $y > -3x + 4$ dashed
$y \leq 8x + 1$ solid

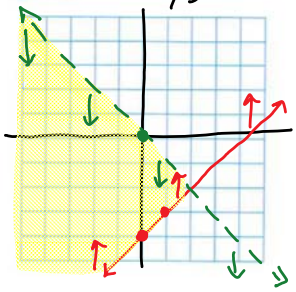
6. $y < -6x$ dashed
$y \geq 10x - 3$ solid

Graph each system of inequalities.

7. $y \leq -3x$ • solid / below
$y < 2$ • dashed / above
horiz line



8. $y \geq x - 4$ • solid / above
$y < -x$ • dashed / below



9. What system of inequalities is shown by the graph?