Algebra 1R
Chapter 6 & 7 – Day 4

Section 7.1 – Graphing Inequalities

Crankin' It Up For the Playoffs!

1. Coach Purvis is analyzing the scoring patterns of a few players on his basketball team. Bena has been averaging 20 points per game from scoring on two-point and three-point shots.

   a. If she scores 6 two-point shots and 2 three-point shots, will Bena meet her points-per-game average?

   $12 + 6 = 18$

   NO, Bena will not meet her goal

   b. If she scores 7 two-point shots and 2 three-point shots, will Bena meet her points-per-game average?

   $14 + 6 = 20$

   Yes, Bena will meet her points per game average exactly

   c. If she scores 7 two-point shots and 4 three-point shots, will Bena meet her points-per-game average?

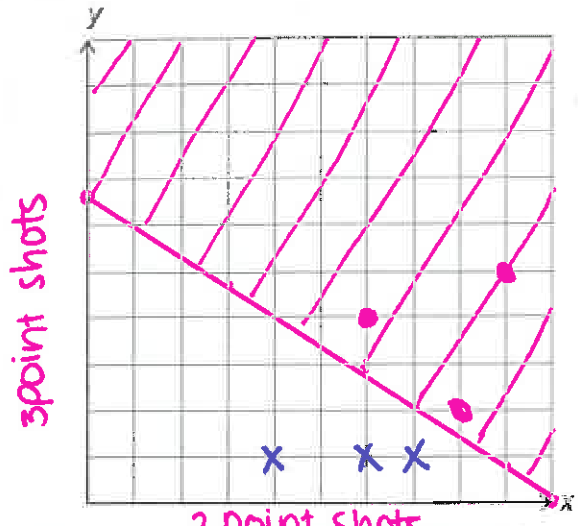
   $14 + 12 = 26$

   Yes, Bena will exceed her points per game average

2. Write an equation to represent the number of two-point shots and the number of three-point shots that total 20 points.

   $2x + 3y = 20$

3. Graph the equation you wrote in Question 2 on the coordinate plane shown.



$$2x + 3y = 20$$
$$-2x \qquad -2x$$
$$\frac{3y}{3} = \frac{-2x}{3} + \frac{20}{3}$$
$$y = -\frac{2}{3}x + 6\tfrac{2}{3}$$
$$m = \frac{-2}{3} \qquad b = 6\tfrac{2}{3}$$

4. Coach Purvis believes that Danvers High School can win the district playoffs if Bena scores at least 20 points-per-game.

   a. How can you rewrite the equation you wrote in Question 2 to represent that Bena must score at least 20 points-per-game?

   you could use an inequality

   b. Write an inequality in two variables that represents this problem situation.

   $2x + 3y \geq 20$

5. Complete the table of values.

Number of Two-Point Shots Scored	Number of Three-Point Shots Scored	Number of Total Points Scored
4	1	11
6	1	15
7	1	17
8	2	22
6	4	24
9	5	33

6. Use the data given in the table to plot the ordered pairs on the graph in Question 3. If the number of total points scored does not exceed Bena's points-per-game average, use an "x" to plot the point. If the number of total points scored meets or exceeds Bena's points-per-game average, use a dot to plot the point.

7. What do you notice about your graph?

The x's are on one side the dots on the other

8. What can you interpret about the solutions of the inequality from the graph?

The points represent shot combinations
the dots are when Bena's Points Per Game average are above 20pts and the x's are when her points per game average is below 20 pts.

9. Choose an ordered pair (different from the ordered pairs in the table you completed) located above the graph and an ordered pair that is located below the graph. Does your interpretation of the situation seem correct? Explain your reasoning.

(4,5) yes points above are greater than 20 points-per game average.

10. Shade the side of the graph that contains the combinations of shots that are greater than or equal to Bena's points-per-game average.

11. How do the solutions of the linear equation $2x + 3y = 20$ differ from the solutions of the linear inequality $2x + 3y \geq 20$? The solutions of the linear equation are points on the line. The solutions of the linear inequality include ½ the coordinate plane.

12. Does the ordered pair (6.5, 5.5) make sense as a solution in the context of this problem situation? Explain why or why not?

NO, Bena can not score ½ baskets.

Line or Dash? Above or Below?

The graph of a linear inequality is a half-plane, or half of a coordinate plane. A line, determined by the inequality, divides the plane into two half-planes and the inequality symbol indicates which half-plane contains all the solutions. These solutions are represented by shading the appropriate half-plane. If the inequality symbol is $\leq$ or $\geq$, the graph is represented by a solid line because the line is part of the solution set. If the symbol is $<$ or $>$, the graph does not include the line and is therefore represented by a dashed line.

1. Determine whether the graph of each inequality would be represented with a solid line or a dashed line on the coordinate plane.

a. $y > 9 - x$

dashed

b. $4x - 5y \geq 37$

solid

c. $x + \frac{2}{3}y \leq 6$

solid

d. $x + y < 4$

dashed

e. $7x - y > 12$

dashed

f. $y \leq 0.65x + 33$

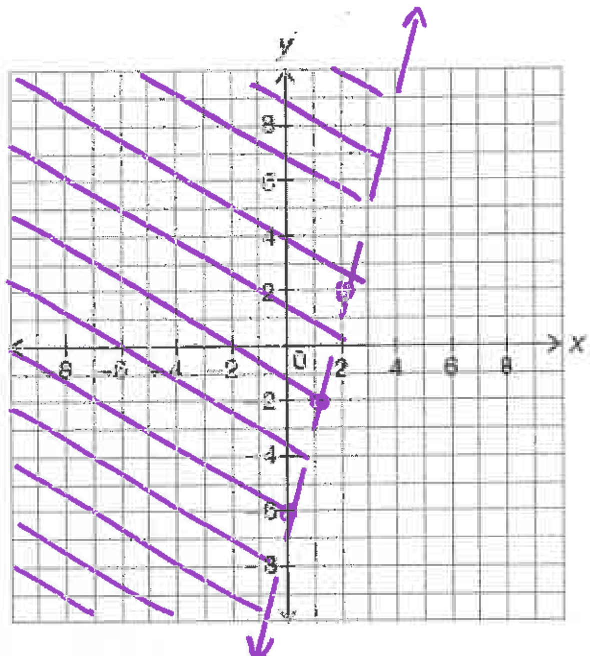
solid

2. Consider the linear inequality $y > 4x - 6$. The line that divides the plane is determined by the equation $y = 4x - 6$.

   a. Should the line representing this graph be a solid line or a dashed line? Explain your reasoning.

   dashed > does not include points on the line

   b. Graph the inequality on the coordinate plane shown.



$y > 4x - 6$

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

yint = -6

After you graph the inequality with either a solid or a dashed line, you need to decide which half-plane to shade. To make your decision, consider the point (0, 0). If (0, 0) is a solution, then the half-plane that contains (0, 0) contains all the solutions and should be shaded. If (0, 0) is *not* a solution, then the half-plane that does not contain (0, 0) contains all the solutions and should be shaded.

   c. Is (0, 0) a solution? Explain your reasoning.

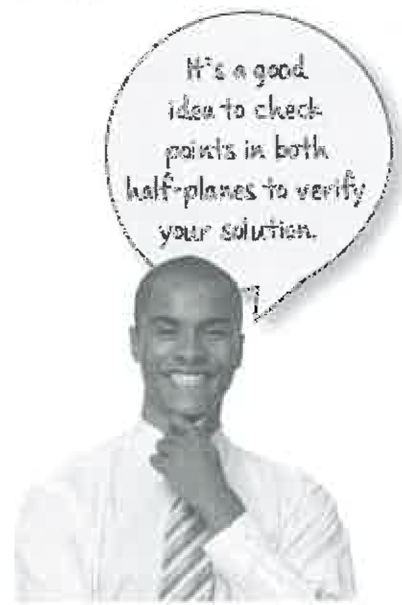
   $0 > 4(0) - 6$

   $0 > -6$

   true

   yes (0,0) is a solution

   d. Shade the correct half-plane on the coordinate plane.

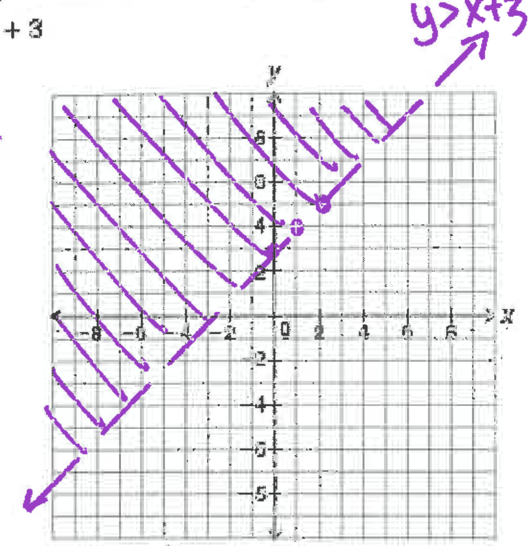


3. Graph each linear inequality. Then shade the half-plane that contains the solutions.

a. $y > x + 3$

$m = \frac{1}{1}$

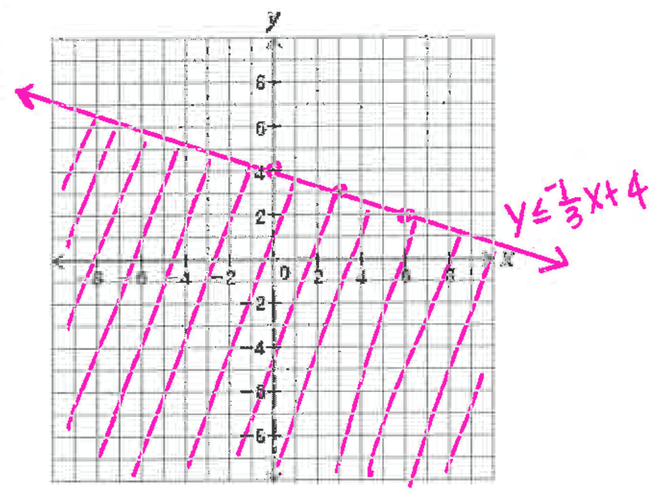
$b = 3$



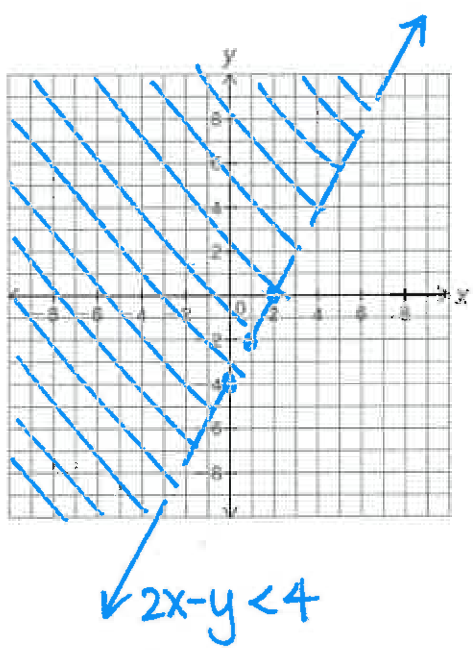
b. $y \le -\frac{1}{3}x + 4$

$m = -\frac{1}{3}$

$b = 4$



c. $2x - y < 4$



$2x - y < 4$

$-2x \quad -2x$

$\frac{-y}{-1} < \frac{-2x}{-1} + \frac{4}{-1}$

$y > 2x - 4$

$m = \frac{2}{1} \quad b = -4$