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The Playoffs
Graphing Inequalities

Vocabulary

Define the term in your own words

1. half-plane

A half-plane is half of a coordinate plane which represents the graph of a linear inequality. A line determined by the inequality divides the plane into two half-planes and the inequality symbol indicates which half-plane contains the solutions.

Problem Set

Write a linear inequality in two variables to represent each problem situation.

1. Tanya is baking zucchini muffins and pumpkin muffins for a school event. She needs at least 500 muffins for the event.

$x + y \geq 500$

2. Hiro needs to buy new pens and pencils for school. Pencils cost $1 each and pens cost $2.50 each. He has $10 to spend.

$x + 2.5y \leq 10$

3. Patti makes decorative flower pots. It costs her $20 to purchase the materials for each pot. She wants to charge more than $6 per hour of labor plus her materials cost for each pot.

$y > 6x + 20$

4. Jose and Devon are working on a construction job together. Devon can put in 4 times as many hours per week as Jose. Together they must work at least 80 hours per week.

$4x + y \geq 80$

5. The Foxes are playing the Titans. The Titans have been scoring 28 or more points per game this season. Between 7-point touchdowns and 3-point field goals, the Foxes need to score more than the Titan's lowest score to have a hope of winning the game.

$7x + 3y > 28$

6. Jack made twice his fundraising goal, which was less than the total that Cameron raised. Cameron raised $14 more than 5 times her goal.

$2y < 5x + 14$

Tell whether the graph of each linear inequality will have a dashed line or a solid line. Explain your reasoning.

7. $x - 3y \le 32$

The line will be solid because the symbol is $\le$.

8. $8y + 7x > 15$

The line will be dashed because the symbol is $>$.

9. $y < 14x + 9$

The line will be dashed because the symbol is $<$.

10. $-5.2y - 8.3x \le -28.6$

The line will be solid because the symbol is $\le$.

11. $\frac{2}{3}x + \frac{4}{9}y \ge 3$

The line will be solid because the symbol is $\ge$.

12. $y - 17 > x + 8$

The line will be dashed because the symbol is $>$.

13. $185x + 274y \ge 65$

The line will be solid because the symbol is $\ge$.

14. $36 < 9y - 2x$

The line will be dashed because the symbol is $<$.

For each inequality, use the test point (0, 0) to determine which half-plane should be shaded.

15. $5x + 7y > -13$

$5(0) + 7(0) > -13$

$0 > -13$

The half-plane that includes (0, 0) should be shaded because the inequality is true for that point.

16. $y - 30 \le 9x$

$0 - 30 \le 9(0)$

$-30 \le 0$

The half-plane that includes (0, 0) should be shaded because the inequality is true for that point.

17. $-8y > 6x + 12$

$-8(0) > 6(0) + 12$

$0 \not> 12$

The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.

18. $46 \ge -5y + 10x$

$46 \ge -5(0) + 10(0)$

$46 \ge 0$

The half-plane that includes (0, 0) should be shaded because the inequality is true for that point.

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19. $31.9x + 63.7y < -44.5$

$31.9(0) + 63.7(0) < -44.5$

$0 \not< -44.5$

The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.

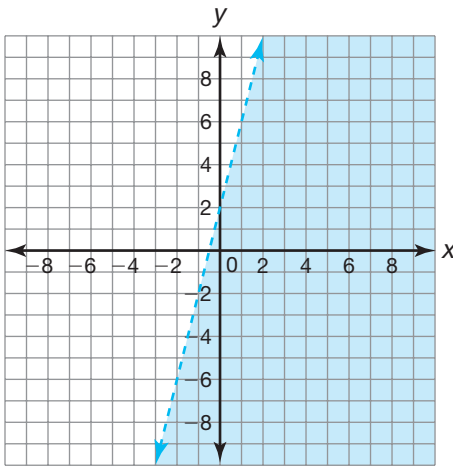**20.** $y - \frac{5}{6} > \frac{1}{2}x + \frac{1}{3}$

$0 - \frac{5}{6} > \frac{1}{2}(0) + \frac{1}{3}$
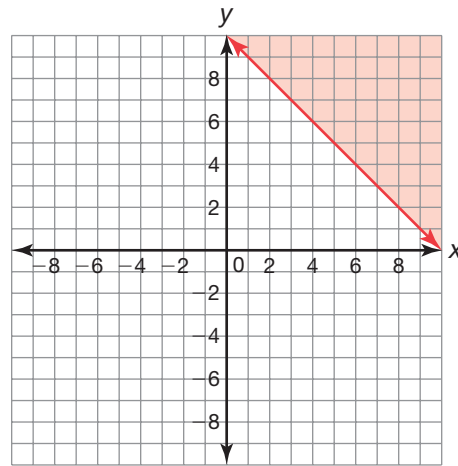
$-\frac{5}{6} \not> \frac{1}{3}$

The half-plane that does not include (0, 0) should be shaded because the inequality is false for that point.
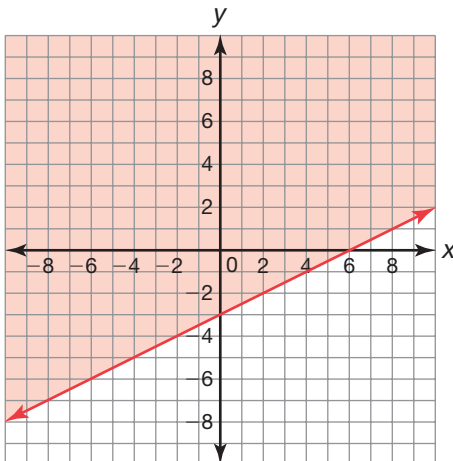
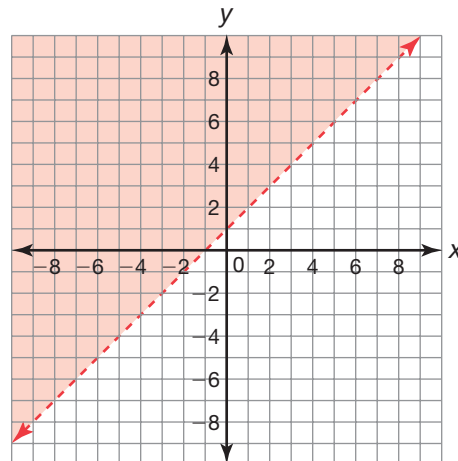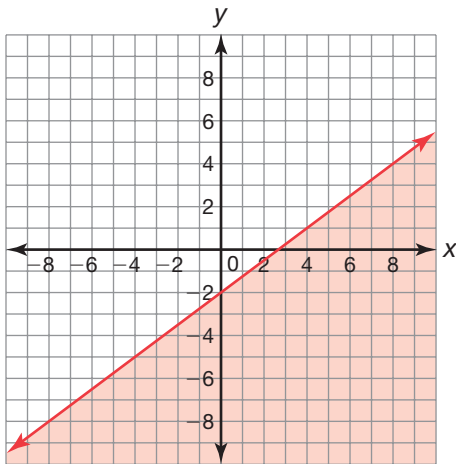Graph each linear inequality.

21. $y < 4x + 2$

22. $y \geq 10 - x$

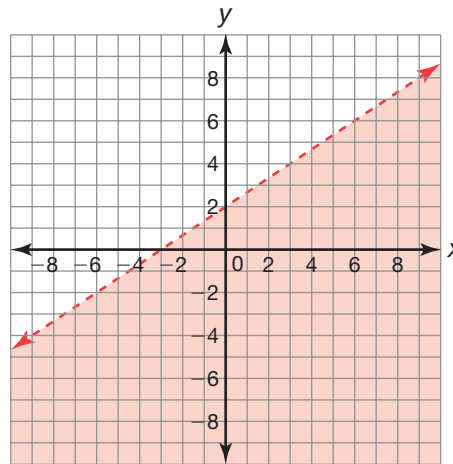**23.** $y \geq \frac{1}{2}x - 3$

24. $-x + y > 1 \quad \rightarrow \quad y > x + 1$

**25.** $3x - 4y \geq 8 \rightarrow y \leq \frac{3}{4}x - 2$

26. $\frac{3}{8}y - \frac{1}{4}x < \frac{3}{4} \rightarrow y < \frac{2}{3}x + 2$

Graph each inequality and determine if the ordered pair is a solution for the problem situation.

27. Marcus has 50 tokens to spend at the school carnival. The Ferris wheel costs 7 tokens and the carousel costs 5 tokens. The inequality $7x + 5y \leq 50$ represents the possible ways Marcus could use his tokens on the two rides. Is the ordered pair (6, 3) a solution for the problem situation?

No. The ordered pair (6, 3) is not a solution to the inequality. It is not in the shaded half-plane.
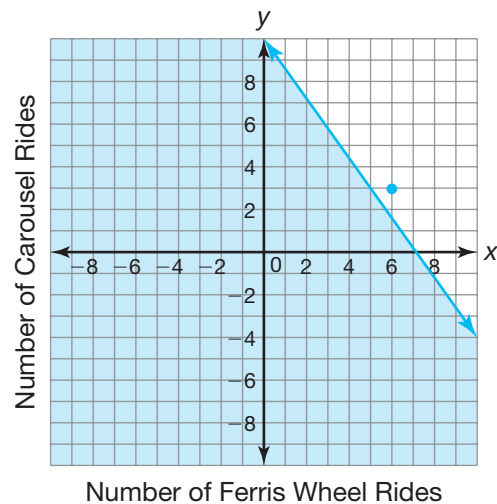
28. Sophia has $2 to buy oranges and apples. Oranges cost $0.45 each and apples cost $0.25 each. The inequality $0.45x + 0.25y \leq 2$ represents the possible ways Sophia could spend her $2. Is the ordered pair (2, 3) a solution for the problem situation?
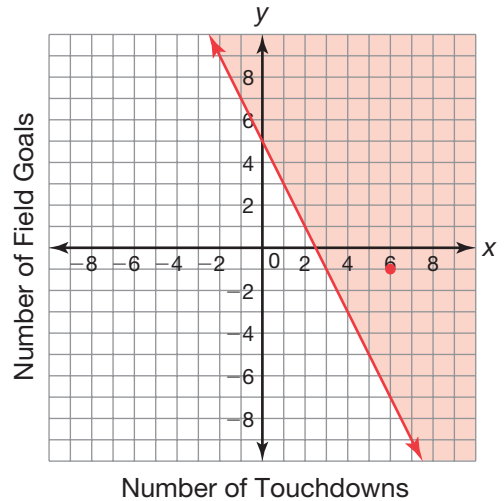
Yes. The ordered pair (2, 3) is a solution to the inequality. It is in the shaded half-plane.


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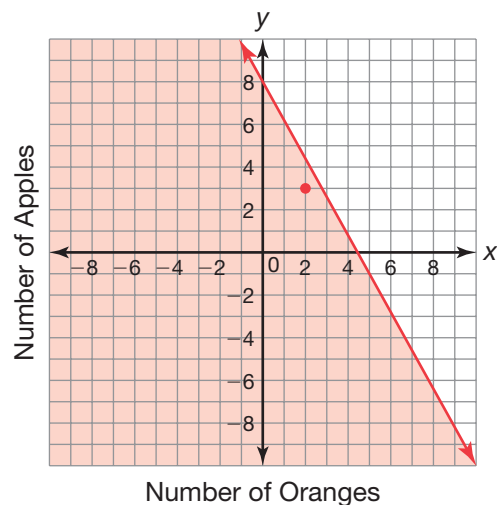
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29. Noah plays football. His team's goal is to score at least 15 points per game. A touchdown is worth 6 points and a field goal is worth 3 points. Noah's league does not allow teams to try for the extra point after a touchdown. The inequality $6x + 3y \geq 15$ represents the possible ways Noah's team could score points to reach their goal. Is the ordered pair $(6, -1)$ a solution for the problem situation?

No. The ordered pair $(6, -1)$ is not a solution for the problem situation. It is in the correct shaded half-plane, but it is not a reasonable answer because Noah's team cannot score a negative number of field goals.


Number of Field Goals / Number of Touchdowns

30. Lea has \$5 to buy notebooks and pens. Notebooks cost \$1.25 each and pens cost \$0.75 each. The inequality $1.25x + 0.75y \leq 5$ represents the possible ways Lea could spend her \$5. Is the ordered pair $(5, 2)$ a solution for the problem situation?

No. The ordered pair $(5, 2)$ is not a solution to the inequality. It is not in the shaded half-plane.

Number of Pens / Number of Notebooks

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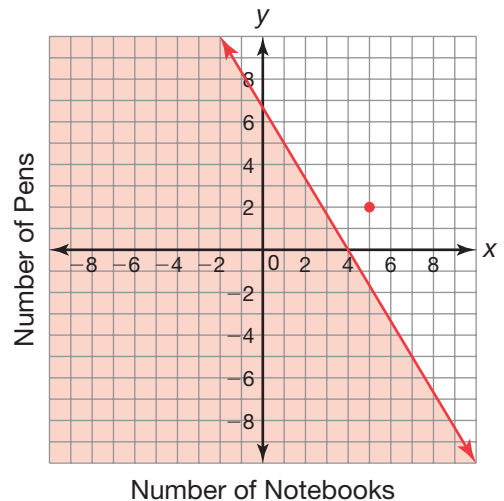
31. Leon has $10 to buy squash and carrots. Squash cost $1.50 each and carrots cost $2.75 per bunch. The inequality $1.50x + 2.75y \leq 10$ represents the possible ways Leon could spend his $10. Is the ordered pair $(-2, 4)$ a solution for the problem situation?

No. The ordered pair $(-2, 4)$ is not a solution for the problem situation. It is in the correct shaded half-plane, but it is not a reasonable answer because Leon cannot purchase a negative nmber of squash.

Number of Bunches of Carrots

Number of Squash
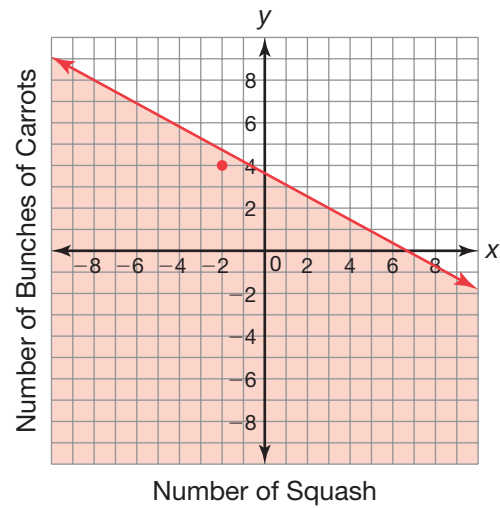
32. Olivia makes and sells muffins and scones at a school bake sale. She sells muffins for $0.50 each and scones for $0.80 each. She hopes to raise at least $20. The inequality $0.50x + 0.80y \geq 20$ represents the possible ways Olivia could reach her goal. Is the ordered pair $(20, 32)$ a solution for the problem situation?

Yes. The ordered pair $(20, 32)$ is a solution to the inequality. It is in the shaded half-plane.

Number of Scones

Number of Muffins

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