Name _____ Date _____

3.6 Quadratic Inequalities

For use with Exploration 3.6

Essential Question How can you solve a quadratic inequality?

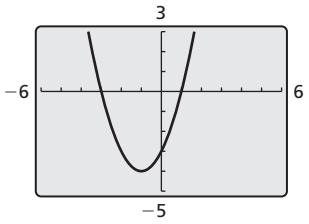
1 EXPLORATION: Solving a Quadratic Inequality

Work with a partner. The graphing calculator screen shows the graph of

$f(x) = x^2 + 2x - 3.$

Explain how you can use the graph to solve the inequality

$x^2 + 2x - 3 \leq 0.$



Then solve the inequality.

2 EXPLORATION: Solving Quadratic Inequalities

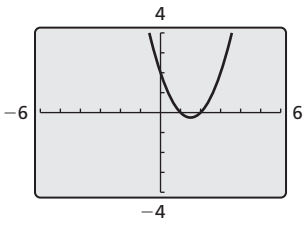
Work with a partner. Match each inequality with the graph of its related quadratic function on the next page. Then use the graph to solve the inequality.

a. $x^2 - 3x + 2 > 0$ **b.** $x^2 - 4x + 3 \leq 0$ **c.** $x^2 - 2x - 3 < 0$

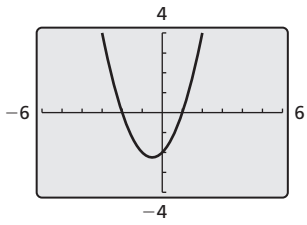
d. $x^2 + x - 2 \geq 0$ **e.** $x^2 - x - 2 < 0$ **f.** $x^2 - 4 > 0$

3.6 Quadratic Inequalities (continued)

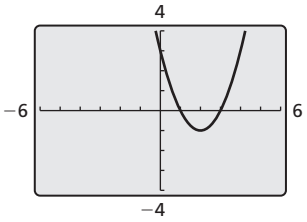
A.



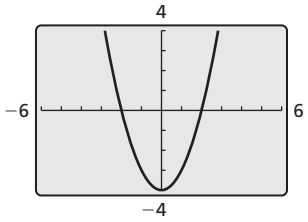
B.



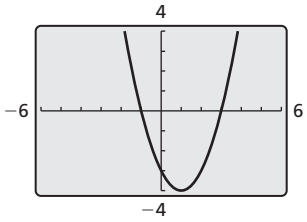
C.



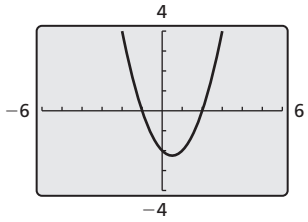
D.



E.



F.



Communicate Your Answer

3. How can you solve a quadratic inequality?

4. Explain how you can use the graph in Exploration 1 to solve each inequality. Then solve each inequality.

a. $x^2 + 2x - 3 > 0$ **b.** $x^2 + 2x - 3 < 0$ **c.** $x^2 + 2x - 3 \geq 0$

Name _____ Date _____

3.6 Notetaking with Vocabulary

For use after Lesson 3.6

In your own words, write the meaning of each vocabulary term.

quadratic inequality in two variables

quadratic inequality in one variable

Core Concepts

Graphing a Quadratic Inequality in Two Variables

To graph a quadratic inequality in one of the following forms,

$y < ax^2 + bx + c$ $y > ax^2 + bx + c$

$y \leq ax^2 + bx + c$ $y \geq ax^2 + bx + c$,

follow these steps.

Step 1 Graph the parabola with the equation $y = ax^2 + bx + c$. Make the parabola *dashed* for inequalities with < or > and *solid* for inequalities with ≤ or ≥.

Step 2 Test a point (x, y) inside the parabola to determine whether the point is a solution of the inequality.

Step 3 Shade the region inside the parabola if the point from Step 2 is a solution. Shade the region outside the parabola if it is not a solution.

Notes:

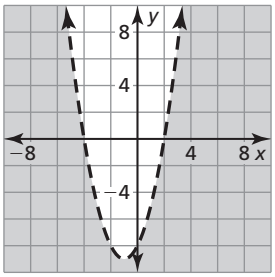
Name_____ Date _____

3.6 Notetaking with Vocabulary (continued)

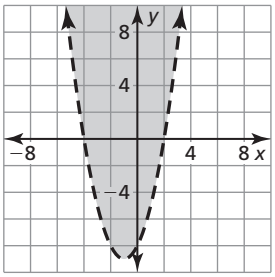
Extra Practice

In Exercises 1–4, match the graph with its inequality. Explain your reasoning.

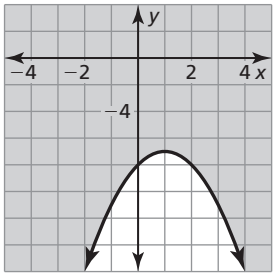
1.



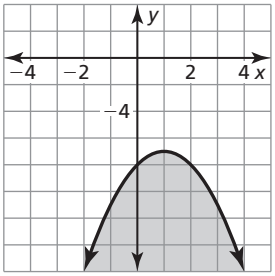
2.



3.



4.



A. $y < x^2 + 2x - 8$

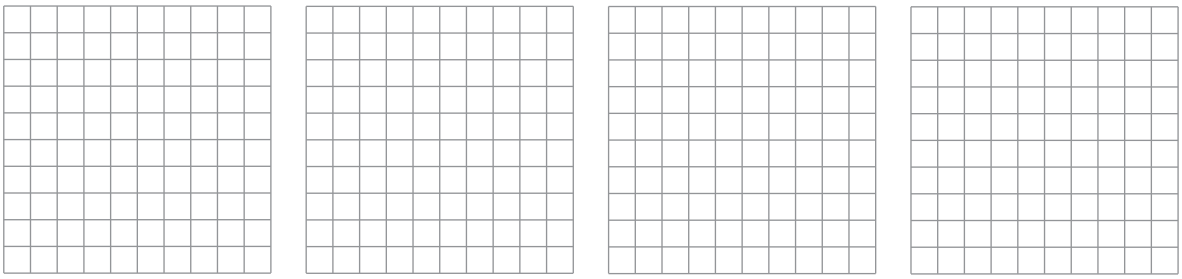
B. $y \leq -x^2 + 2x - 8$

C. $y > x^2 + 2x - 8$

D. $y \geq -x^2 + 2x - 8$

In Exercises 5–8, graph the inequality.

5. $y < x^2 + 2$ **6.** $y \leq -5x^2$ **7.** $y \geq -(x + 4)^2 - 1$ **8.** $y < 4x^2 + 4x + 1$



9. Accident investigators use the formula $d = 0.01875v^2$, where d is the braking distance of a car (in feet) and v is the speed of the car (in miles per hour) to determine how fast a car is going at the time of an accident. For what speeds v would a car leave a tire mark on the road of over 1 foot?

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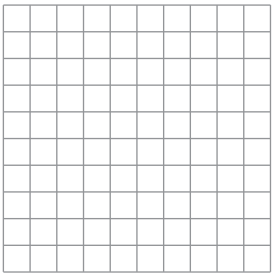
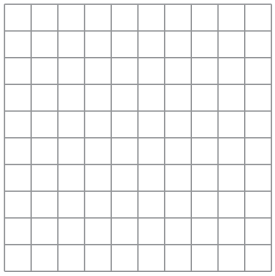
3.6 Notetaking with Vocabulary (continued)

In Exercises 10–12, graph the system of quadratic inequalities.

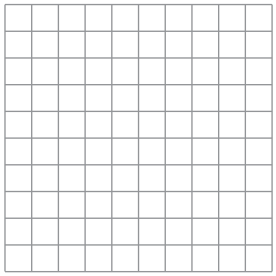
10. $y \leq -x^2$
$y > -3x^2 + 3$



11. $y \geq x^2 + 5x$
$y \geq (x + 2)^2 - 1$



12. $y > x^2 - 7x - 8$
$y < -x^2 + 6x + 5$



In Exercises 13–15, solve the inequality algebraically.

13. $16x^2 > 100$

14. $x^2 \leq 15x - 34$

15. $-\frac{1}{5}x^2 + 10x \geq -25$

16. The profit for a hot dog company is given by the equation $y = -0.02x^2 + 140x - 2500$, where x is the number of hot dogs produced and y is the profit (in dollars). How many hot dogs must be produced so that the company will generate a profit of at least \$150,000?