

3.6 Start Thinking

The following steps can be used to graph a linear inequality. Replace the underlined words as needed to explain how to graph a quadratic inequality.

Graph the line with $y = mx + b$. Make the line *dashed* for inequalities with $<$ or $>$ and *solid* for inequalities with \leq or \geq .

Test a point (x, y) above the line to determine whether the point is a solution to the inequality.

Shade the region above the line if the point is a solution. Shade the region below the line if the point is not a solution.

3.6 Warm Up

Graph the inequality.

1. $x - y < 5$

2. $2x + y > 10$

3. $y \geq -3$

4. $6x - 3y < 5$

3.6 Cumulative Review Warm Up

Solve the system of linear equations using the substitution method.

1. $-x - 3y + 8z = 43$

$$8x - 5y - 2z = 57$$

$$7x - 2y - 3z = 40$$

2. $-3x - 3y + 7z = 67$

$$3z = 21$$

$$-3x + 2y - 2z = -16$$

3.6**Practice A**

In Exercises 1–4, graph the inequality.

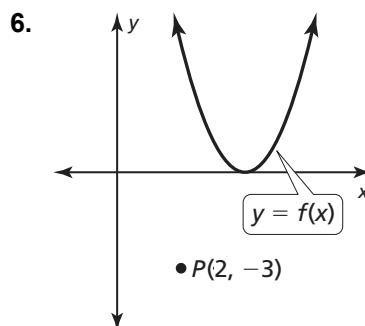
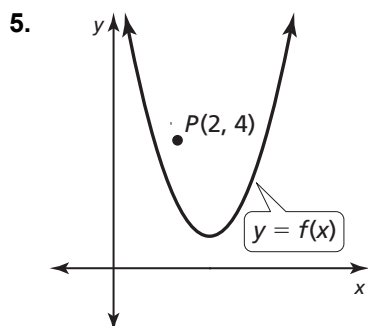
1. $y > x^2$

2. $y \leq -3x^2$

3. $y \geq x^2 - 5$

4. $y < x^2 - 3x$

In Exercises 5 and 6, use the graph to write an inequality in terms of $f(x)$ so point P is a solution.



In Exercises 7 and 8, graph the system of quadratic inequalities.

7. $y \leq -2x^2$

8. $y < 4x^2$

$y > x^2 - 3$

$y < 2x^2 - 4$

In Exercises 9–12, solve the inequality algebraically.

9. $9x^2 > 16$

10. $x^2 - 8x + 7 \geq 0$

11. $x^2 + 10x \leq -21$

12. $2x^2 - 11x < -9$

In Exercises 13–16, solve the inequality by graphing.

13. $x^2 - 2x + 2 > 0$

14. $x^2 + 5x - 3 \leq 0$

15. $x^2 + 6x \leq -5$

16. $x^2 + 4x > -1$

17. An oceanfront lot has a perimeter of 250 feet and an area of at least 2500 square feet.

- Write an inequality describing this situation.
- Describe the possible widths of the oceanfront lot.

3.6 Practice B

In Exercises 1–4, graph the inequality.

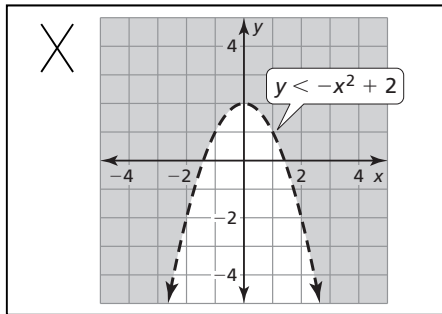
1. $y \leq x^2 + 3$

2. $y > x^2 + 2x - 3$

3. $y < -(x + 1)^2 + 2$

4. $y \geq -x^2 + 4x$

5. Describe and correct the error in graphing $y < -x^2 + 2$.



In Exercises 6 and 7, graph the system of quadratic inequalities.

6. $y \leq -x^2 + 3$

7. $y > x^2 - x + 4$

$y \geq 2x^2 - 3x + 1$

$y < x^2 + 2x - 4$

In Exercises 8–11, solve the inequality algebraically.

8. $2x^2 - 6 > -11x$

9. $2x^2 - 5x + 3 \leq 1$

10. $\frac{1}{2}x^2 + 3x \geq 2$

11. $\frac{1}{3}x^2 - 2x < 9$

In Exercises 12–15, solve the inequality by graphing.

12. $2x^2 - 6 > -3x$

13. $4x^2 + 3x - 5 \leq 1$

14. $\frac{1}{2}x^2 + x \leq 2$

15. $\frac{2}{3}x^2 + 2x > 4$

16. An object is dropped from a building. The height h (in feet) of the object after t seconds can be modeled by $h(t) = -16t^2 - 28t + 25$.

- a. At what height was the object initially dropped? Explain.
- b. Write an inequality that you can use to find the t -values for which the object was in the air.
- c. Based on your results from parts (a) and (b), use a graphing calculator to determine the time intervals in which the object was in the air.

3.6 Enrichment and Extension

Quadratic Inequalities

You are a sales representative for a fashion and accessory wholesaler specializing in handbags. The price per handbag varies based on the number of handbags purchased in each order. Beginning with a price of \$368 for one handbag, the price of each additional handbag purchased is reduced by \$2.

Fill in the table to represent the prices and revenue of handbags.

| Number of handbags purchased | Price per handbag (dollars) | Revenue per order (dollars) |
|------------------------------|-----------------------------|-----------------------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| ⋮ | ⋮ | ⋮ |
| x | | |

- Write a function for the revenue.
- What is the maximum revenue per order?
- How many handbags must be purchased to attain maximum revenue?
- Assume that it costs \$30 to produce each handbag and that you spend an average of \$312 in fixed costs per order. Based on only these two factors, what is the function for the costs?
- In order to have a profit, the revenue must be greater than the costs. Write an inequality for the profit.
- How many handbags do you need to sell to make a profit?
- What is the maximum profit per order? How many handbags must be sold to earn the maximum profit per order?

3.6 Puzzle Time

If Seagulls Fly Over The Sea, What Flies Over The Bay?

Write the letter of each answer in the box containing the exercise number.

Match the inequality with its graph.

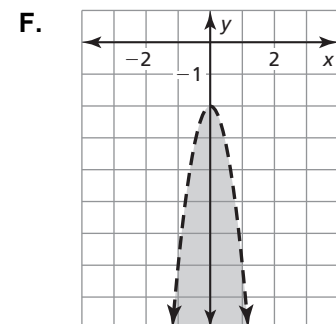
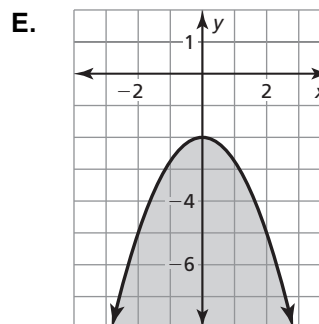
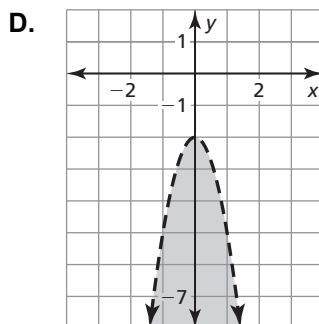
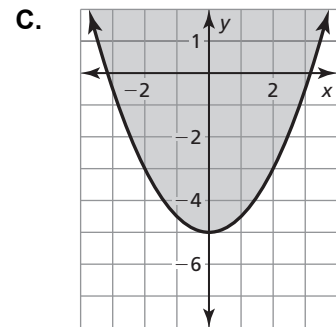
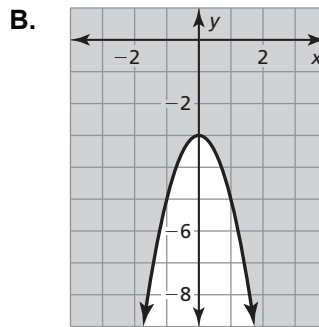
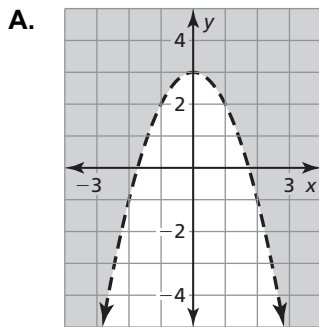
1. $y + 2x^2 < -x^2 - 2$ 2. $y \geq \frac{1}{2}x^2 - 5$

3. $-10x^2 - 2y > 4$ 4. $4y + 3x^2 \leq -8$

5. $-x^2 - y < -3$ 6. $\frac{y + 2x^2}{3} \geq -1$

Answers

L. A
 G. F
 B. D
 A. C
 E. E
 S. B



| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|