THINKING
WRITING

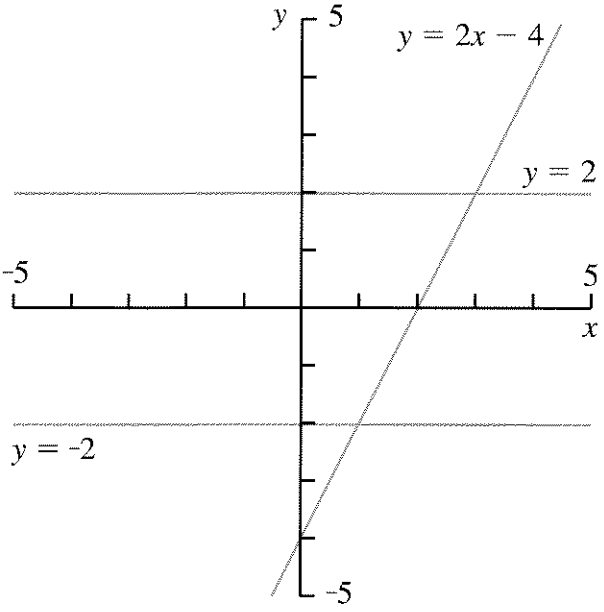
7.B Graphing Inequalities

COMPOUND INEQUALITIES

Definition: An inequality that contains more than one inequality symbol is called a *compound inequality.*

Example: $3 < 2x < 8$ is read *2x is between 3 and 8.*

The figure shows the graphs of the line $y = 2x - 4$ and the horizontal lines $y = 2$ and $y = -2$.



1. What are the coordinates of the points of intersection of $y = 2x - 4$ with each of the horizontal lines?

2. Look only at the part of the line $y = 2x - 4$ that is between the lines $y = 2$ and $y = -2$.

a. Give the coordinates of some of the points on this part of the line.

b. On this part of the line, how large can the y-coordinate get? How small?

c. On this part of the line, how large can the x-coordinate get? How small?

We say that the *solution* of the compound inequality $-2 < 2x - 4 < 2$ is

$$1 < x < 3.$$

Notice that the solution is also a compound inequality, but it is simpler than the original one. It tells us what values of x make the first inequality true.

3. Explain how the graph above can be used to show that the solution to the inequality is $1 < x < 3$.

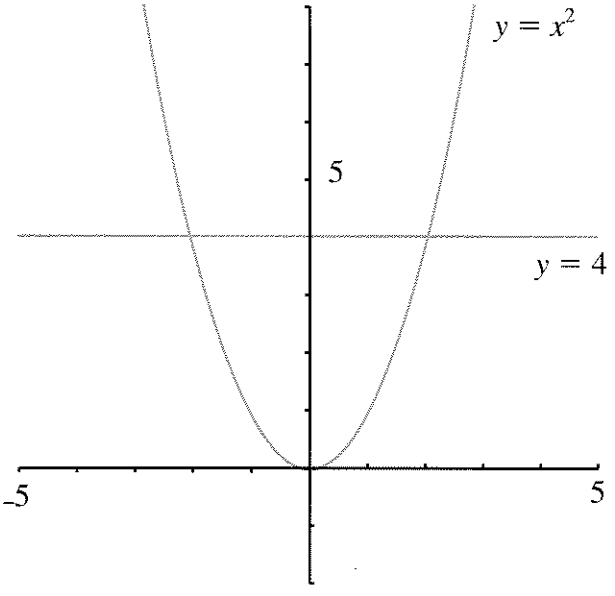
4. a. Graph the horizontal lines $y = 3$, $y = 8$, and $y = 3x + 5$.

b. Use your graph to find the solution of the compound inequality

$$3 < 3x + 5 < 8.$$

QUADRATIC INEQUALITIES

Sometimes an inequality is not compound, but it has a compound solution. An example is the inequality $x^2 < 4$. The two graphs shown can be used to solve this inequality.



5. Look at the part of the graph of $y = x^2$ that is below the graph of $y = 4$.

a. Give the coordinates of four points that lie on this part of the graph.

b. On this part of the curve, how large can the x-coordinate get? How small?

c. Write the solution to this inequality.

6. The same graph can also be used to solve the inequality $x^2 > 4$. In this case, the solution cannot be written as a compound inequality. Instead it is written in two parts,

$$x < -2 \text{ or } x > 2.$$

Explain why the solution has two parts.

7. On the same pair of axes, make an accurate graph of $y = x^2$, $y = 1$, and $y = 9$. Use your graphs to solve these inequalities.

a. $x^2 < 9$ b. $x^2 > 9$

c. $x^2 < 1$ d. $x^2 > 1$

e. $1 < x^2 < 9$

8. Use the graph to estimate the solution to

$$x^2 > 5.$$

9. Solve these without a graph.

a. $x^2 < 16$ b. $x^2 > 16$

c. $x^2 > 0$ d. $x^2 < 0$

10. **Report** Write an illustrated report summarizing what you have learned in this assignment. Use examples, including at least one quadratic, and at least one compound, inequality.