5.1 Notes

GOAL **Solve inequalities using addition and subtraction.**

Vocabulary

The **graph of an inequality** in one variable is the set of points that represent all solutions of the inequality.

Equivalent inequalities are inequalities that have the same solutions.

Common Student Errors

- Using a closed circle to graph any inequality

  Tip Reinforce to students that a closed circle represents that the value is included in the solution of the inequality and an open circle represents that the value is not included in the solution of the inequality.

- Only plotting the point and not shading the number line to the left or to the right of the point

  Tip Remind students that in order to complete the graph of an inequality, they must plot the point and shade the number line to the right or to the left of the inequality.

Example: Graph $x > 6$.

Student graph:

A demonstration like this may help:

For inequalities such as $x < a$ or $x \leq a$, shade to the left because the symbols $<$ and $\leq$ point to the left.

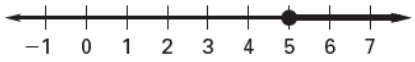
For inequalities such as $x > a$ or $x \geq a$, shade to the right because the symbols $>$ and $\geq$ point to the right.

EXAMPLE 1 Write and graph an inequality

You must be at least 5 years old to go to kindergarten in Pennsylvania. Use this fact to write and graph an inequality that describes the age requirement.

Solution

Let a represent the age in years. The value of a must be greater than or equal to 5. So, an inequality is $a \geq 5$.



Exercises for Examples 1 and 2

Write and graph an inequality that describes the situation.

1. An infant car seat is designed for babies and toddlers weighing less than 40 pounds.

2. A sign on a store display says items are \$4 or higher.

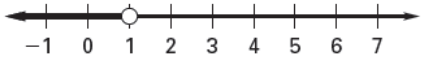
Write an inequality represented by the graph.

3. 

4. 

EXAMPLE 2 ## Write an inequality from a graph

Write an inequality represented by the graph.



Solution

The open circle means that 1 is not a solution of the inequality. Because the numbers to the left of 1 are shaded, all numbers less than 1 are solutions.

An inequality represented by the graph is $x < 1$.

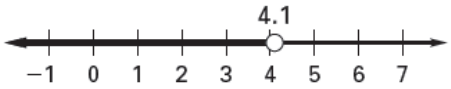
EXAMPLE 3 Solve an inequality using addition

Solve $x - 1.3 < 2.8$. Graph your solution.

Solution

$x - 1.3 < 2.8$	Write original inequality.
$x - 1.3 + 1.3 < 2.8 + 1.3$	Add 1.3 to each side.
$x < 4.1$	Simplify.

The solutions are all real numbers less than 4.1. Check by substituting a number less than 4.1 for x in the original inequality.



CHECK	$x - 1.3 < 2.8$	Write original inequality.
	$3 - 1.3 \stackrel{?}{<} 2.8$	Substitute 3 for x.
	$1.7 < 2.8$ ✓	Solution checks.

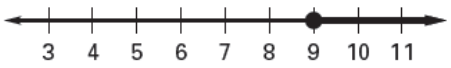
EXAMPLE 4 Solve an inequality using subtraction

Solve $13 \leq x + 4$. Graph your solution.

Solution

$13 \leq x + 4$	Write original inequality.
$13 - 4 \leq x + 4 - 4$	Subtract 4 from each side.
$9 \leq x$	Simplify.

You can rewrite $9 \leq x$ as $x \geq 9$. The solutions are all real numbers greater than or equal to 9.



Exercises for Examples 3 and 4

Solve the inequality. Graph your solution.

5. $x - 7 \leq -3$

6. $5.1 > y - 2.7$

7. $z + 9 < -1$

8. $6 \leq w + 1.5$