Instruction

Guided Practice 2.4.3

Example 1

Solve the inequality $\frac{-3x-4}{7} > 5$.

1. Isolate the variable by eliminating the denominator.

   In this inequality, the denominator means "divide by 7." Eliminate it by performing the inverse operation, multiplication. Multiply both sides of the inequality by 7.

   $$7 \bullet \frac{-3x-4}{7} > 7 \bullet 5$$
   $$-3x-4 > 35$$

2. Eliminate values that are subtracted from the variable term.

   To eliminate the –4, perform the inverse operation of adding 4 to both sides of the inequality.

   $$-3x-4 > 35$$
   $$\underline{\quad +4 \quad +4}$$
   $$-3x \quad > 39$$

3. Eliminate values that are multiplied by the variable.

   To eliminate the –3 that is multiplied by the variable, perform the inverse operation by dividing both sides of the inequality by –3.

   $$\frac{-3x}{-3} > \frac{39}{-3}$$
   $$x < -13$$

   Notice that the direction of the inequality symbol changed because we divided by a negative number.

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4. Verify your solution.

The solution to the original inequality, $\frac{-3x-4}{7}>5$, is all numbers less than –13. To check this, choose any number less than –13. Let's try –20. Be sure to substitute the value into the original inequality.

$\frac{-3x-4}{7}>5$	Original inequality
$\frac{-3(-20)-4}{7}>5$	Substitute –20 for x.
$\frac{60-4}{7}>5$	Multiply.
$\frac{56}{7}>5$	Subtract.
$8>5$	Simplify the fraction.

$8 > 5$ is a true statement. Therefore, all numbers less than –13 will result in a true statement.

Example 2

Solve the inequality $5x + 4 \geq 11 - 2x$.

1. Move the terms containing the variable to one side of the inequality.

Notice the variable x is on both sides of the inequality. Begin by choosing which side you want your variable to appear on. Just like with equations, this is a choice, but it is common to choose to have all variables on the left side of the inequality. Add $2x$ to both sides of the inequality.

$$5x+4 \geq 11-2x$$
$$\underline{+2x \qquad\quad +2x}$$
$$7x+4 \geq 11$$

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2. Eliminate values that are added to the variable term.

   Subtract 4 from both sides.

$$\begin{array}{r} 7x+4 \geq 11 \\ \underline{-4 \quad -4} \\ 7x \quad \geq 7 \end{array}$$

3. Eliminate values that are multiplied by the variable.

   To eliminate the 7 that is multiplied by the variable, perform the inverse operation by dividing both sides of the inequality by 7.

$$\frac{7x}{7} \geq \frac{7}{7}$$
$$x \geq 1$$

4. Verify your solution.

   The solution to the original inequality, $5x + 4 \geq 11 - 2x$, is all numbers greater than or equal to 1. Choose a number greater than or equal to 1, such as 2, and substitute it for all instances of x in the original inequality.

$5x + 4 \geq 11 - 2x$	Original inequality
$5(2) + 4 \geq 11 - 2(2)$	Substitute 2 for each instance of x.
$10 + 4 \geq 11 - 4$	Multiply.
$14 \geq 7$	Simplify. This is a true statement.

   Our check proved true, so we can be sure that our solution of $x \geq 1$ is accurate.