

Unit 6 Lesson 15 Efficiently Solving Inequalities

Let's solve inequalities with negative variables.

15.1 Activity: Lots of Negatives

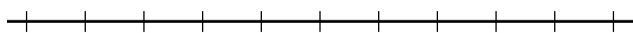
Here is an inequality: $x \geq -4$.

1. Select all the values that are solutions to $x \geq -4$:

- | | | |
|-------|-------|-----------|
| a. 3 | c. 4 | e. 4.001 |
| b. -3 | d. -4 | f. -4.001 |

2. Test your solutions in the inequality. (Plug in the number for x).

3. Graph the solutions to the inequality on the number line.



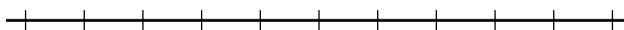
Here is an inequality: $-x \geq -4$.

4. Select all the values that are solutions to $-x \geq -4$:

- | | | |
|-------|-------|-----------|
| a. 3 | c. 4 | e. 4.001 |
| b. -3 | d. -4 | f. -4.001 |

5. Test your solutions in the inequality.

6. Graph the solutions to the inequality on the number line.



15.2 Activity: Inequalities with Tables

1. Here's an inequality: $2x < 6$.

a. Complete the table.

x	-4	-3	-2	-1	0	1	2	3	4
$2x$									

b. What values of x make the inequality $2x < 6$ true?

c. Graph the solutions to $2x < 6$ on the number line:



2. Here's an inequality: $-2x < 6$.

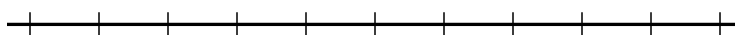
a. Complete the table.

x	-4	-3	-2	-1	0	1	2	3	4
$-2x$									

b. What values of x make the inequality $-2x < 6$ true?

c. Graph the solutions to

$-2x < 6$ on a number line:



d. **How are the solutions to $2x < 6$ different from the solutions to $-2x < 6$?**

e. **What happens when you divide (or multiply) by a negative variable in an inequality?**

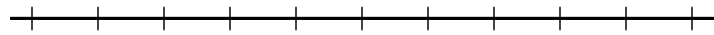
15.3 Activity: Which Side are the Solutions? (Thin slice this at the whiteboards)

1. Let's investigate $-4x + 5 \geq 25$.

a. Solve $-4x + 5 = 25$.

b. Is $-4x + 5 \geq 25$ true when x is 0? when x is 7? when x is -7 ?

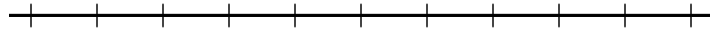
c. Graph the solutions to $-4x + 5 \geq 25$ on the number line.



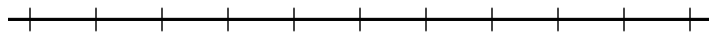
2. Let's investigate $\frac{4}{3}x + 3 < \frac{23}{3}$.

a. Solve the inequality.

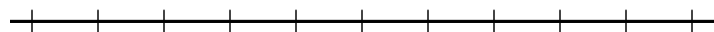
b. Graph the solutions to $\frac{4}{3}x + 3 < \frac{23}{3}$ on the number line.



3. Solve and graph the solution of the inequality $-3(x + 4) > 17$.



4. Solve and graph the solution of the inequality $-3(x - \frac{4}{3}) \leq 6$.



Unit 6 Lesson 15 Print Out: Solving Inequalities Efficiently

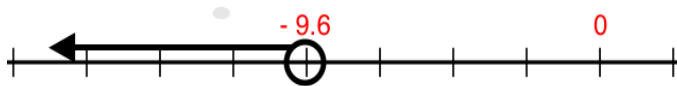
Complete the sentence: *When multiplying or dividing by a negative number in an inequality,* _____.

Incorrect Work

$$-5x + 14 \geq 62$$

$$-5x \geq 48$$

$$x \geq -9.6$$



Correct Work

What are the two mistakes?

-
-

Do the work correctly below:

Unit 6 Lesson 15 Print Out: Solving Inequalities Efficiently

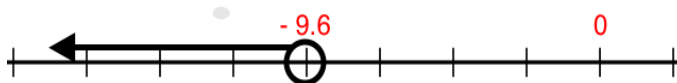
Complete the sentence: *When multiplying or dividing by a negative number in an inequality,* _____.

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Do the work correctly below:

Lesson 15 Summary

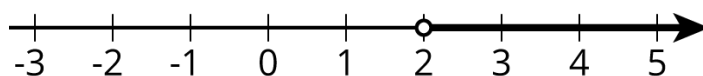
Write at least three different inequalities whose solution is $x > -10$. Find one with x on the left side that uses a $<$.

Here is an inequality: $3(10 - 2x) < 18$. The solution to this inequality is all the values you could use in place of x to make the inequality true.

In order to solve this, we can first solve the related equation $3(10 - 2x) = 18$ to get the solution $x = 2$. That means 2 is the boundary between values of x that make the inequality true and values that make the inequality false.

To solve the inequality, we can check numbers greater than 2 and less than 2 and see which ones make the inequality true.

Let's check a number that is greater than 2: $x = 5$. Replacing x with 5 in the inequality, we get $3(10 - 2 \cdot 5) < 18$ or just $0 < 18$. This is true, so $x = 5$ is a solution. This means that all values greater than 2 make the inequality true. We



can write the solutions as $x > 2$ and also represent the solutions on a number line:

Notice that 2 itself is not a solution because it's the value of x that makes $3(10 - 2x)$ *equal* to 18, and so it does not make $3(10 - 2x) < 18$ true.

For confirmation that we found the correct solution, we can also test a value that is less than 2. If we test $x = 0$, we get $3(10 - 2 \cdot 0) < 18$ or just $30 < 18$. This is false, so $x = 0$ and all values of x that are less than 2 are not solutions.

Lesson Goals

- ❑ I can solve inequalities by solving a related equation and then checking

which values are solutions to the original inequality.

- ❑ I can graph the solutions to an inequality on a number line.