

NAME \_\_\_\_\_

DATE \_\_\_\_\_

PERIOD \_\_\_\_\_

# Unit 6, Lesson 15: Efficiently Solving Inequalities

Let's solve more complicated inequalities.

## 15.1: Lots of Negatives

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

- Predict what you think the solutions on the number line will look like.
- Select **all** the values that are solutions to  $-x \geq -4$ :
  - 3
  - 3
  - 4
  - 4
  - 4.001
  - 4.001
- Graph the solutions to the inequality on the number line:



## 15.2: Inequalities with Tables

- Let's investigate the inequality  $x - 3 > -2$ .

$x$	-4	-3	-2	-1	0	1	2	3	4
$x - 3$	-7		-5				-1		1

- Complete the table.
- For which values of  $x$  is it true that  $x - 3 = -2$ ?
- For which values of  $x$  is it true that  $x - 3 > -2$ ?
- Graph the solutions to  $x - 3 > -2$  on the number line:



NAME \_\_\_\_\_

DATE \_\_\_\_\_

PERIOD \_\_\_\_\_

2. Here is an inequality:  $2x < 6$ .

a. Predict which values of  $x$  will make the inequality  $2x < 6$  true.

b. Complete the table. Does it match your prediction?

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

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



3. Here is an inequality:  $-2x < 6$ .

a. Predict which values of  $x$  will make the inequality  $-2x < 6$  true.

b. Complete the table. Does it match your prediction?

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

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



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

NAME \_\_\_\_\_

DATE \_\_\_\_\_

PERIOD \_\_\_\_\_

### 15.3: Which Side are the Solutions?

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

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

b. Is  $-4x + 5 \geq 25$  true when  $x$  is 0? What about when  $x$  is 7? What about 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  $\frac{4}{3}x + 3 = \frac{23}{3}$ .

b. Is  $\frac{4}{3}x + 3 < \frac{23}{3}$  true when  $x$  is 0?

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



3. Solve the inequality  $3(x + 4) > 17.4$  and graph the solutions on the number line.



4. Solve the inequality  $-3(x - \frac{4}{3}) \leq 6$  and graph the solutions on the number line.



NAME

DATE

PERIOD

**Are you ready for more?**

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

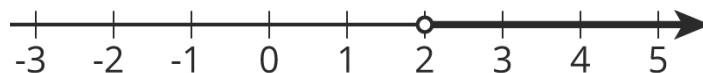
**Lesson 15 Summary**

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.

NAME

DATE

PERIOD

## Unit 6, Lesson 15: Efficiently Solving Inequalities

1. a. Consider the inequality  $-1 \leq \frac{x}{2}$ .

i. Predict which values of  $x$  will make the inequality true.

ii. Complete the table to check your prediction.

$x$	-4	-3	-2	-1	0	1	2	3	4
$\frac{x}{2}$									

b. Consider the inequality  $1 \leq \frac{-x}{2}$ .

i. Predict which values of  $x$  will make it true.

ii. Complete the table to check your prediction.

$x$	-4	-3	-2	-1	0	1	2	3	4
$-\frac{x}{2}$									

2. Diego is solving the inequality  $100 - 3x \geq -50$ . He solves the equation  $100 - 3x = -50$  and gets  $x = 50$ . What is the solution to the inequality?

- A.  $x < 50$
- B.  $x \leq 50$
- C.  $x > 50$
- D.  $x \geq 50$

3. Solve the inequality  $-5(x - 1) > -40$ , and graph the solution on a number line.

4. Select **all** values of  $x$  that make the inequality  $-x + 6 \geq 10$  true.

- A. -3.9
- B. 4
- C. -4.01

NAME \_\_\_\_\_

DATE \_\_\_\_\_

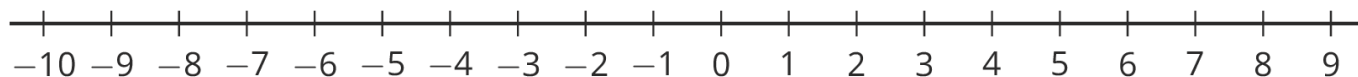
PERIOD \_\_\_\_\_

- D. -4
- E. 4.01
- F. 3.9
- G. 0
- H. -7

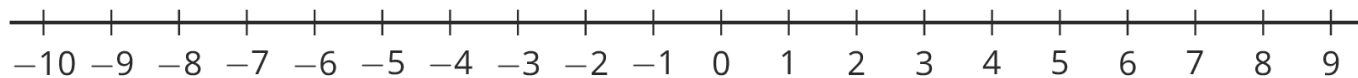
(from Unit 6, Lesson 13)

5. Draw the solution set for each of the following inequalities.

a.  $x > 7$



b.  $x \geq -4.2$



(from Unit 6, Lesson 13)

6. The price of a pair of earrings is \$22 but Priya buys them on sale for \$13.20.

a. By how much was the price discounted?

b. What was the percentage of the discount?

(from Unit 4, Lesson 12)