

PART I GET STARTED**Today's Mathematics**

Solve by multiplication or division, including negative factors.

Essential Question

Why must multiplying or dividing by a negative reverse the inequality?

Name _____

Date _____

DO NOW

1. Solve and graph $x + 5 \leq 2$.

2. Solve $-4 < y - 3$.

3. Check whether $x = -3$ satisfies $x + 5 \leq 2$.

SEE IT

Compare $2 < 5$, then compare -2 and -5 . Explain the change using positions on a number line.

Quick Write | 2 Minutes

What do you predict will happen when both sides of an inequality are multiplied by a negative number?

PART II INVESTIGATE**BUILD THE IDEA**

x	$3x$	$3x > 6?$	$-3x$	$-3x > 6?$
-3				
-2				
0				
2				
3				

1. Write the solution sets of $3x > 6$ and $-3x > 6$. Include values not listed in the table.

2. Use a number-line reflection to explain why multiplication by -1 reverses order.

3. Solve $\frac{x}{-4} \leq 3$. Check one solution in the original inequality.

COMPARE AND EXPLAIN

Discuss your rule with a partner. Use a specific value or a number-line model to support it.

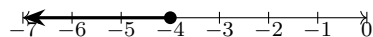
PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

Multiplying or dividing both sides by a positive number preserves direction. Multiplying or dividing both sides by a negative number reverses direction. A negative number appearing somewhere in the problem is not enough to require reversal. Never divide by zero.

WORKED MODEL

$$\begin{aligned} -5x &\geq 20 \\ \frac{-5x}{-5} &\leq \frac{20}{-5} \\ x &\leq -4 \end{aligned}$$



FOCUSED PRACTICE

Show your steps. Draw requested graphs in the workspace.

1. Solve and graph $4x < 20$.

2. Solve and graph $-3y \leq 12$.

3. Solve $\frac{z}{-2} > 5$.

4. Solve $-\frac{2}{3}a \geq 4$.

5. Solve $-18 > 6b$.

6. Each shelf uses 8 inches of a 120-inch wall. Write and solve an inequality; give the maximum whole number of shelves.

Math Write | 5 Minutes

Explain when the symbol must reverse. Compare dividing by a negative with subtracting a negative.

PART IV PUZZLE PRACTICE

Homework

What do you do when your smoke alarm goes off?

Complete each exercise. Match its answer to an answer-bank letter. Write that letter in every decoder box bearing the exercise number.

1. $4x < 24$

2. $\frac{x}{6} \geq -3$

3. $-2.3x > 23$

4. $-15 \geq \frac{x}{3}$

5. $\frac{x}{4} > -4.1$

6. $9 \leq -1.5x$

7. $-6x > -\frac{1}{4}$

8. $4.2x \geq -12.6$

9. Write and solve: three times x is at least -18 .10. Write and solve: the quotient of x and -7 is less than 8.

ANSWER BANK

N: $x < -10$

U: $x \leq -6$

R: $x < \frac{1}{24}$

A: $x > -16.4$

I: $x \geq -6$

T: $x < 6$

F: $x \geq -3$

E: $x > -56$

T: $x \leq -45$

R: $x \geq -18$

7	6	3		5	8	1	10	2		9	4
---	---	---	--	---	---	---	----	---	--	---	---