

Flip the Sign

Solve inequalities with negative rational numbers.

GRADE 7 • 7.PFA.4.b

7.PFA.4.b "Investigate and explain how the solution set of a linear inequality is affected by multiplying or dividing both sides of the inequality statement by a rational number less than zero."

NAME _____

DATE _____

THE BIG IDEA

When you multiply or divide both sides of an inequality by a rational number less than zero, reverse the inequality sign. Reversing the sign keeps the same solutions true.

WORKED EXAMPLE

Solve: $(-3/5)x \leq 12$

1. Multiply both sides by $-5/3$. Reverse $\leq$ to $\geq$.
2. $x \geq 12(-5/3)$
3. $x \geq -20$

Answer: $x \geq -20$

PRACTICE 6 problems

1 Solve: $-2x > 14$

ANSWER _____

2 Solve: $x / (-4) \leq -6$

ANSWER _____

3 Solve: $(-1/2)x \geq 9$

ANSWER _____

4 Solve: $x / (-9/4) < 7$

ANSWER _____

5 Solve: $(-7/8)x > -10$

ANSWER _____

6 Solve: $-8x \leq -4$

ANSWER _____

APPLY IT Show your work

- 1** Jordan's phone battery is at 30%. It drops 4 percentage points each hour while streaming. Jordan plans to plug in only when the battery is 6% or lower. How many hours must Jordan stream before plugging in?

WORK SPACE

ANSWER _____

- 2** The school art club has \$46 in its supply fund. It spends \$8 on each paint set and wants at least \$14 left. What is the greatest number of paint sets the club can buy?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Solve and explain why the inequality sign changes: $(-4/7)(x + 2) \leq 8$

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Solve: $-2x > 14$	$x < -7$
2	Solve: $x / (-4) \leq -6$	$x \geq 24$
3	Solve: $(-1/2)x \geq 9$	$x \leq -18$
4	Solve: $x / (-9/4) < 7$	$x > -63/4$
5	Solve: $(-7/8)x > -10$	$x < 80/7$
6	Solve: $-8x \leq -4$	$x \geq 1/2$

PART 2 • APPLY IT

1. **Jordan must stream for at least 6 hours.** Write $30 - 4x \leq 6$. Subtract 30, then divide by -4 and reverse the inequality to get $x \geq 6$.
2. **The club can buy at most 4 paint sets.** Write $46 - 8x \geq 14$. Subtract 46, then divide by -8 and reverse the inequality to get $x \leq 4$.

CHALLENGE

$x \geq -16$. Multiplying both sides by $-7/4$ reverses $\leq$ to $\geq$ because $-7/4$ is negative.

Accept equivalent inequality forms, such as a correct solution written in words. Students should reverse the inequality sign whenever they multiply or divide by a negative rational number.