

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

Write, solve, graph, and interpret addition and subtraction inequalities.

Essential Question

Why does adding the same number preserve the direction of an inequality?

DO NOW

1. Write an inequality for “a number is at most -3 .”
2. Graph $x > 2$ on your paper.
3. Is -2 a solution of $x + 5 \geq 4$? Show substitution.
4. Evaluate $-\frac{5}{6} + \frac{1}{3}$.

SEE IT

Begin with $-4 < 1$. Add 3 to both sides, then subtract 2 from both sides of the original comparison. Draw or describe how the two numbers move on a number line. Is their order preserved?

QUICK WRITE | 2 MINUTES

Explain why adding a negative number does not require reversing the inequality symbol.

PART II INVESTIGATE

SHIFT BOTH SIDES

Solve, check an included and an excluded value, and describe each graph.

No.	Inequality	Operation on both sides	Solution and graph description
1	$x + 4 < 7$		
2	$x - 5 \geq -8$		
3	$-2 \leq x + 3$		
4	$x + (-6) > -9$		

THINK LIKE A MATHEMATICIAN

1. Why are $x - 5 \geq -8$ and $x + 2 \geq -1$ equivalent inequalities?

2. For $-2 \leq x + 3$, why does writing the final result as $x \geq -5$ not represent a negative-number multiplication?

CREATE OR COMPARE

Create two different addition or subtraction inequalities with solution set $x < -4$. Check an included value, an excluded value, and the endpoint.

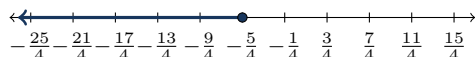
PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

Adding or subtracting the same number on both sides preserves an inequality's solution set and comparison direction. Isolate the variable, then graph all solutions. Check the endpoint and one value on each side. Contexts may limit solutions to nonnegative or whole-number values.

WORKED MODEL

Solve $t + \frac{3}{4} \leq -\frac{1}{2}$. Subtract $\frac{3}{4}$ from both sides: $t \leq -\frac{5}{4}$. The endpoint is included. Check $t = -2$: $-\frac{5}{4} \leq -\frac{1}{2}$ is true; $t = 0$ gives $\frac{3}{4} \leq -\frac{1}{2}$, false.



TRY IT

1. $x - 8 > -3$



2. $x + 2.6 \leq -1.4$



3. $x + \frac{1}{6} \geq -\frac{1}{2}$



4. A van can carry at most 850 kilograms. It already carries 615 kilograms. Write and solve an inequality for additional cargo c . Include the context restriction.

MATH WRITE | 5 MINUTES

A student solves $x - (-4) < 7$ and reports $x < 11$. Explain the sign error and correct the solution. Does $x = 3$ belong?

PART IV PUZZLE PRACTICE

Homework

Name _____

Date _____

Solve each item. Graph on your own paper. Match your result to the answer bank and put its letter in the numbered box. Decode a useful mathematical reminder.

1. $x + 3 < -2$

2. $x - 4 \geq -2$

3. $x + 6 > 6$

4. $x - 2 \leq 5$

5. $x + 4 \geq 3$

6. $x - 5 < -1$

7. $x + 7 \leq 4$

8. $x - 3 > 3$

ANSWER BANK

O $x < 4$	S $x > 0$	H $x > 6$	T $x < -5$
T $x \leq -3$	T $x \leq 7$	E $x \geq 2$	B $x \geq -1$

1

2

3

4

5

6

7

8