

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

Write, solve, and graph compound inequalities using and or or.

Essential Question

How do and and or change which values belong to a solution set?

Name _____

Date _____

DO NOW

1. Solve $2x - 3 \leq 5$.

2. Solve $5 - x < 2$.

3. Solve $2(x + 1) > 2x + 7$.

SEE IT

Compare these rules: $x \geq -2$ and $x < 4$; $x \leq -2$ or $x > 4$. Which rule includes 0? Which includes 6?

Quick Write | 2 Minutes

In everyday language, how does meeting both requirements differ from meeting at least one?

PART II INVESTIGATE**BUILD THE IDEA**

x	$x \geq -2$	$x < 4$	Both (and)?	Either (or)?
-3				
-2				
0				
4				
6				

1. Graph $x \geq -2$ and $x < 4$ together. Mark their overlap. Then graph the union of those same two sets. What happens?

2. Solve $-3 < 2x + 1 \leq 9$. Operate on all three expressions, or separate the inequalities.

3. Solve $2x + 1 < -5$ or $3x - 2 \geq 10$. Graph both solution rays.

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

A compound inequality joins two inequalities. *And* takes the intersection: both must be true. *Or* takes the union: at least one must be true. In interval notation, parentheses exclude endpoints; brackets include them. Always use parentheses with $\pm\infty$. Use $\cup$ for a union.

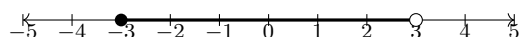
WORKED MODEL

$$-5 < -2x + 1 \leq 7$$

$$-6 < -2x \leq 6$$

$$3 > x \geq -3$$

Thus $-3 \leq x < 3$, or $[-3, 3)$. Both signs reverse when dividing by -2 .



FOCUSED PRACTICE

Show your steps. Draw requested graphs in the workspace.

1. Write and graph: x is greater than -1 and at most 5 .
2. Solve and graph $2 \leq x + 3 < 7$.
3. Solve $-1 < -2x + 3 \leq 9$.
4. Solve $x + 2 < -1$ or $2x \geq 8$.
5. Solve $x > 4$ and $x \leq 1$; then solve $x > 4$ or $x \leq 6$.
6. A device works from 10°C through 30°C . Use $C = \frac{5}{9}(F - 32)$ to find its operating range in Fahrenheit.

Math Write | 5 Minutes

Explain why and usually gives an overlap while or gives a union. Can either produce all real numbers or no solution? Use examples.

PART IV PUZZLE PRACTICE

Homework

What does a pair of endpoints enclose?

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

1. $-2 < x + 1 \leq 5$

2. $1 \leq 2x - 3 < 7$

3. $-5 < -2x + 1 \leq 7$

4. $x + 2 < -1$ or $x - 1 > 4$

5. $3x - 2 \geq 7$ and $x + 4 \leq 9$

6. $x < 0$ and $x \geq 2$

7. $x \leq 4$ or $x > 1$

8. $2x + 1 < -3$ or $3x - 2 \geq 10$

ANSWER BANK

V: $3 \leq x \leq 5$

N: $2 \leq x < 5$

L: $x < -2$ or $x \geq 4$

E: $x < -3$ or $x > 5$

A: all real numbers

T: $-3 \leq x < 3$

R: no solution

I: $-3 < x \leq 4$

1	2	3	4	6	5	7	8
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