

Inequality Trail

Solve, compare, and graph two-step inequalities.

GRADE 8 • MA.8.AR.2.2

MA.8.AR.2.2 "Solve two-step linear inequalities in one variable and represent solutions algebraically and graphically."

NAME _____

DATE _____

KEEP THE INEQUALITY BALANCED

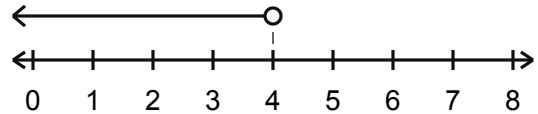
Use inverse operations to get x alone, just as you do with equations. If you multiply or divide both sides by a negative number, reverse the inequality sign. On a number line, use an open circle for $<$ or $>$ and a closed circle for $\leq$ or $\geq$. Draw the solution ray just above the printed scale and align its endpoint with the boundary value. A real-world context may restrict the algebraic solution to nonnegative whole numbers.

WORKED EXAMPLE

Solve and graph: $7x + 2 < 30$

1. Subtract 2 from both sides: $7x < 28$.
2. Divide both sides by 7: $x < 4$.
3. Place an open circle at 4 and shade to the left.

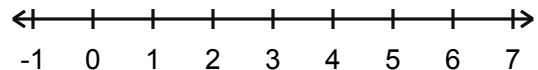
Answer: $x < 4$; open circle at 4, shaded left



PRACTICE 4 problems

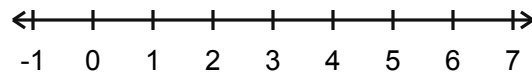
1 Solve and graph: $3x + 5 \leq 20$

ANSWER _____



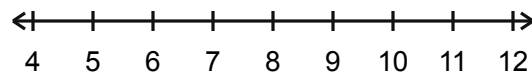
2 Solve and graph: $-5x + 1 > -14$

ANSWER _____



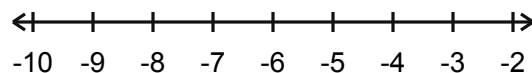
3 Solve and graph: $2(x - 3) \geq 10$

ANSWER _____



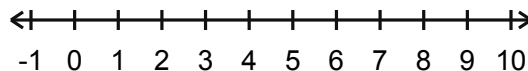
4 Solve and graph: $4 > -x/2 + 1$

ANSWER _____

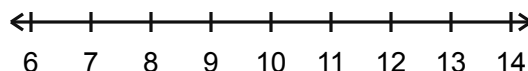


APPLY IT Show your work

- 1** A game pass has a \$5 start fee and costs \$3 each month. You can spend no more than \$29. Let x be the number of months. Write and solve an inequality. Then graph the algebraic solution over real numbers and state the greatest whole number of months you can buy.



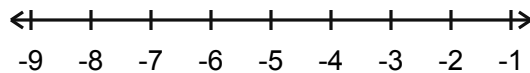
- 2** Student council sells sticker sheets for \$5 each and pays a \$12 booth fee. It wants to earn at least \$38 after paying the fee. Let x be the number of sticker sheets sold. Write and solve an inequality. Then graph the algebraic solution over real numbers and state the least whole number of sticker sheets needed.



CHALLENGE One step up

Solve and graph: $-3(x + 2) < 9$. Explain why the inequality direction changes and why the endpoint is open or closed.

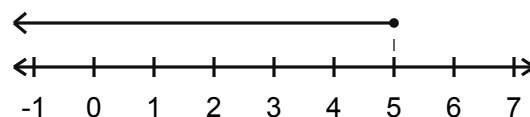
WORK SPACE AND ANSWER



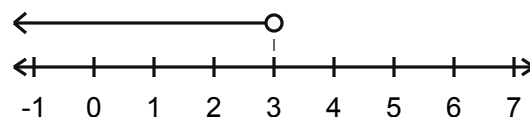
Teacher rays sit above the scale to make open/closed endpoints distinct from tick marks. Equivalent rays drawn on the line are correct. Applied graphs show algebraic solutions over real numbers; contextual answers also impose the stated nonnegative whole-number restrictions. Require both algebra and a graph.

PRACTICE 1

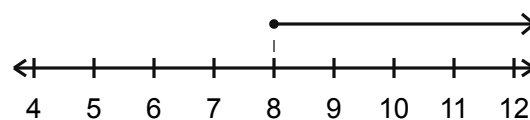
$x \leq 5$; closed circle at 5, ray left.

**PRACTICE 2**

$x < 3$; open circle at 3, ray left.

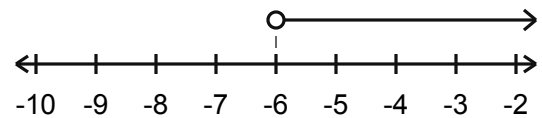
**PRACTICE 3**

$x \geq 8$; closed circle at 8, ray right.



PRACTICE 4

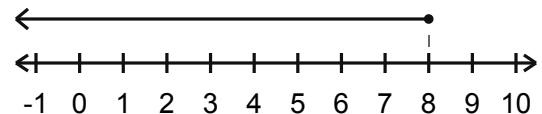
$x > -6$; open circle at -6 , ray right.



APPLY IT 1

$5 + 3x \leq 29$, $x \leq 8$; closed circle at 8, shaded left. The greatest whole number of months is 8. In context, x must be one of the whole numbers 0 through 8.

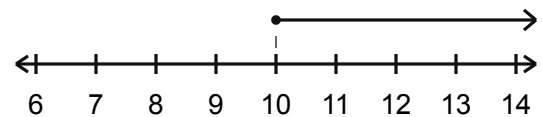
Write $5 + 3x \leq 29$ because the total cannot be more than \$29. Subtract 5 and divide by 3 to get $x \leq 8$.



APPLY IT 2

$5x - 12 \geq 38$, $x \geq 10$; closed circle at 10, shaded right. The least whole number of sticker sheets is 10. In context, x is a whole number at least 10.

Write $5x - 12 \geq 38$ because money earned after the booth fee must be at least \$38. Add 12 and divide by 5 to get $x \geq 10$.



CHALLENGE

$x > -5$. Divide by -3 and reverse $<$ to $>$: $x + 2 > -3$.

Subtract 2. The circle at -5 is open because equality is excluded; draw the ray right.

