

Inequality Trail Map

Solve, graph, and use inequalities in real situations.

GRADE 8 • 8.PFA.5

8.PFA.5 "The student will write and solve multistep linear inequalities in one variable, including problems in context that require the solution of a multistep linear inequality in one variable..."

NAME _____

DATE _____

KEEP BOTH SIDES BALANCED

Simplify each side first by distributing and combining like terms. Use inverse operations to isolate x , and reverse the inequality sign only when you multiply or divide by a negative number. Use an open circle for $<$ or $>$ and a closed circle for $\leq$ or $\geq$.

WORKED EXAMPLE

Solve and graph: $7(x - 5) \leq 4x - 14$

1. Distribute 7: $7x - 35 \leq 4x - 14$.
2. Subtract $4x$: $3x - 35 \leq -14$.
3. Add 35: $3x \leq 21$.
4. Divide by 3: $x \leq 7$.

Answer: $x \leq 7$; draw a closed circle at 7 and shade left.

PRACTICE 6 problems

1 Solve and graph: $2x + 8 \leq 24$

ANSWER _____

2 Solve and graph: $-3x + 2 > 17$

ANSWER _____

3 Solve and graph: $5(x + 3) - 7 \geq 3x + 11$

ANSWER _____

4 Solve and graph: $4x - 9 < 2(x + 6) + 1$

ANSWER _____

5 Solve and graph: $(\frac{3}{4})x + 2 \leq (\frac{1}{4})x + 8$

ANSWER _____

6 Solve the inequality. Which values are solutions: -2, 1, 4, 7? Also graph the solution. $3(x - 1) + 2 > 2x + 5$

ANSWER _____

APPLY IT Show your work

- 1** Ava has a \$6 store credit for a music app. The app charges a \$12 activation fee and \$5 per month. Ava can spend at most \$47 total. Write and solve an inequality to find how many whole months she can pay for.

WORK SPACE

ANSWER _____

- 2** The school esports team sells snack vouchers for \$9 each. It pays \$24 for printing and \$15 to reserve a table. The team wants a profit of at least \$96. Write and solve an inequality to find the number of vouchers it must sell.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Solve, graph, and explain your reasoning: $(\frac{2}{3})(3x - 6) + 5 > (\frac{1}{2})(4x + 10) - 3$

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Solve and graph: $2x + 8 \leq 24$	$x \leq 8$; draw a closed circle at 8 and shade left.
2	Solve and graph: $-3x + 2 > 17$	$x < -5$; draw an open circle at -5 and shade left.
3	Solve and graph: $5(x + 3) - 7 \geq 3x + 11$	$x \geq 3/2$; draw a closed circle at $3/2$ and shade right.
4	Solve and graph: $4x - 9 < 2(x + 6) + 1$	$x < 11$; draw an open circle at 11 and shade left.
5	Solve and graph: $(3/4)x + 2 \leq (1/4)x + 8$	$x \leq 12$; draw a closed circle at 12 and shade left.
6	Solve the inequality. Which values are solutions: -2, 1, 4, 7? Also graph the solution. $3(x - 1) + 2 > 2x + 5$	$x > 6$; 7 is the only listed solution. Draw an open circle at 6 and shade right.

PART 2 • APPLY IT

- $5x + 12 - 6 \leq 47$; $x \leq 41/5$, so Ava can pay for at most 8 whole months.** Subtract the one-time credit from the activation fee, then add the monthly cost. Solve $5x + 6 \leq 47$ and use whole-number months.
- $9x - 24 - 15 \geq 96$; $x \geq 15$. The team must sell at least 15 vouchers.** Income is $9x$, and the two costs are subtracted from income. Solve $9x - 39 \geq 96$.

CHALLENGE

No solution; graph no points. Simplifying gives $2x + 1 > 2x + 2$, then $1 > 2$, which is false.

Accept equivalent algebraic forms and correctly labeled number-line graphs. For context problems, accept the inequality before simplification as long as it represents the situation correctly.