

# Inequality Trail

*Solve, graph, and make sense of limits.*

**GRADE 7 • 7.PAR.3.2**

**7.PAR.3.2** "Construct algebraic inequalities to solve problems, leading to inequalities of the form  $px \pm q > r$ ,  $px \pm q < r$ ,  $px \pm q \leq r$ , or  $px \pm q \geq r$ , where  $p$ ,  $q$ , and  $r$  are specific rational numbers..."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## TURN LIMITS INTO INEQUALITIES

Use an inequality sign that matches the situation, then isolate  $x$  with inverse operations. When you divide or multiply 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  $\geq$ .

## WORKED EXAMPLE

Solve and graph:  $7x - 8 \leq 34$

1. Add 8 to both sides:  $7x \leq 42$ .
2. Divide both sides by 7:  $x \leq 6$ .
3. Graph a closed circle at 6 and shade left.

**Answer:  $x \leq 6$**

## PRACTICE 6 problems

**1** Solve and graph:  $3x + 2 > 17$

ANSWER \_\_\_\_\_

**2** Solve and graph:  $-4x + 1 \leq 13$

ANSWER \_\_\_\_\_

**3** Solve and graph:  $5x - 9 < 11$

ANSWER \_\_\_\_\_

**4** Solve and graph:  $-2x - 1 \geq 9$

ANSWER \_\_\_\_\_

**5** Solve and graph:  $\frac{1}{2}x + 1 \geq 10$

ANSWER \_\_\_\_\_

**6** Solve and graph:  $-\frac{3}{5}x + 1 > -2$

ANSWER \_\_\_\_\_

## APPLY IT Show your work

- 1** A gaming club charges \$12 for a season pass and \$4 for each tournament you enter. You can spend no more than \$32. Let  $x$  be the number of tournaments. Write an inequality, solve it, graph it, and explain what the solution means.

WORK SPACE

ANSWER \_\_\_\_\_

- 2** Jordan has \$45 saved for headphones and earns \$3 for each dog walk. The headphones cost at least \$60. Let  $x$  be the number of dog walks. Write an inequality, solve it, graph it, and explain what the solution means.

WORK SPACE

ANSWER \_\_\_\_\_

## CHALLENGE One step up

### CHALLENGE

An online game charges a \$4.50 membership fee and \$1.50 for each avatar item. You have a budget of \$12.00. Let  $x$  be the number of avatar items. Write and solve an inequality, graph the algebraic solution, and explain which values of  $x$  make sense in this situation.

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## PART 1 • PRACTICE

| # | PROBLEM                             | ANSWER                                          |
|---|-------------------------------------|-------------------------------------------------|
| 1 | Solve and graph: $3x + 2 > 17$      | $x > 5$ ; open circle at 5, shade right.        |
| 2 | Solve and graph: $-4x + 1 \leq 13$  | $x \geq -3$ ; closed circle at -3, shade right. |
| 3 | Solve and graph: $5x - 9 < 11$      | $x < 4$ ; open circle at 4, shade left.         |
| 4 | Solve and graph: $-2x - 1 \geq 9$   | $x \leq -5$ ; closed circle at -5, shade left.  |
| 5 | Solve and graph: $1/2x + 1 \geq 10$ | $x \geq 18$ ; closed circle at 18, shade right. |
| 6 | Solve and graph: $-3/5x + 1 > -2$   | $x < 5$ ; open circle at 5, shade left.         |

## PART 2 • APPLY IT

1.  **$4x + 12 \leq 32$ ;  $x \leq 5$ . Graph a closed circle at 5 and shade left. You can enter at most 5 tournaments.**

Subtract 12 to get  $4x \leq 20$ , then divide by 4. Because tournaments are counted in whole numbers, possible values are 0 through 5.

2.  **$45 + 3x \geq 60$ ;  $x \geq 5$ . Graph a closed circle at 5 and shade right. Jordan needs at least 5 dog walks.** Subtract 45 to get  $3x \geq 15$ , then divide by 3. The closed circle shows that 5 dog walks is enough.

## CHALLENGE

**$1.50x + 4.50 \leq 12.00$ ;  $x \leq 5$ . Graph a closed circle at 5 and shade left. Since avatar items must be whole items and cannot be negative,  $x$  can be 0, 1, 2, 3, 4, or 5.**

Accept equivalent inequalities with the variable and constant terms on opposite sides. Accept correct number-line descriptions that use the matching open or closed circle and shading direction.