

3-1

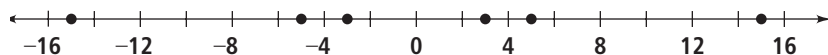
Inequalities and Their Graphs



Vocabulary

Review

1. Cross out any points that are NOT solutions of the equation $-5g = -15$.



2. Write two equations using 3, 13, and k .

Vocabulary Builder

inequality (noun) in ee KWAL uh tee

inequality symbols

$<$, $>$, \geq , \leq , \neq

Definition: An **inequality** is a mathematical sentence that uses an **inequality symbol** to compare the values of two expressions.

Examples: The mathematical sentences $3 > 2$, $5 + 7 < 21$, and $x - 2 \leq 4$ are **inequalities**.

Nonexamples: The mathematical sentences $4 + 4 = 8$ and $x - 5 = 1$ are *not* **inequalities**. They are equations.

Use Your Vocabulary

3. Where does each mathematical sentence belong? Write each *inequality* or equation in the correct box.

$17 \geq 5$

$3x = 9$

$2x > 5$

$2(4) = 8$

$8 < 3x$

Inequality

Equation

4. Complete each *inequality* with $<$, $>$, \leq , or \geq .

$z < 4$, so 4 z

$g \geq -2$ so -2 g

$m < 7$, so 7 m



Problem 1 Writing Inequalities

Got It? What is an inequality that represents the verbal expression?

all real numbers p greater than or equal to 1.5

Use the verbal expression. Write T for *true* or F for *false*.

5. A real number p could be less than 1.5.

6. A real number p could be equal to 1.5.

7. A real number p could be greater than 1.5.

8. Circle the symbol that represents “greater than or equal to.”

$<$ $>$ \leq \geq

9. Complete the inequality that represents the verbal phrase.

p 1.5



Problem 2 Identifying Solutions by Evaluating

Got It? Consider the numbers -1 , 0 , 1 , and 3 . Which are solutions of $13 - 7y \leq 6$?

10. Check whether -1 is a solution of the inequality. Complete the steps below.

$13 - 7y \leq 6$ Write the original inequality.

$13 - 7 \cdot$ ≤ 6 Substitute the value for y .

$13 -$ ≤ 6 Multiply.

≤ 6 Simplify.

11. Underline the correct word(s) to complete each sentence.

When y is replaced with -1 , the inequality is true / false .

So, -1 is / is not a solution.

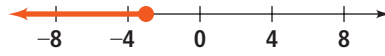
12. Repeat with the other possible solutions: 0 , 1 , and 3 .

13. Circle the numbers that are solutions of $13 - 7y \leq 6$.

-1 0 1 3

A closed dot on a graph means the number is part of the solution. An open dot on a graph means the number is *not* part of the solution.

14. The endpoint of each graph is -3 . Is -3 a solution of the inequality represented by the graph? Explain why or why not.



15. Write the endpoint of each graph of an inequality. Then explain why the endpoint *is* or *is not* a solution of the inequality.





Problem 3 Graphing an Inequality

Got It? What is the graph of the inequality $x > -4$?

16. Circle the words that complete the sentence.

The solutions of the inequality $x > -4$ are all numbers ? -4 .

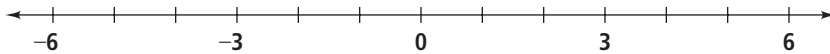
greater than less than greater than or equal to less than or equal to

17. Underline the correct word or words to complete each sentence.

The graph of $x > -4$ includes / does not include -4 .

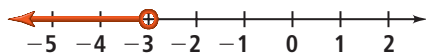
The graph of $x > -4$ will have an open / a closed dot at -4 .

18. Graph the solutions of the inequality $x > -4$ on the number line.



Problem 4 Writing an Inequality From a Graph

Got It? What inequality represents the graph?



19. Circle all statements that describe the graph.

open dot shaded to the right of -3 numbers greater than -3 are included
 closed dot shaded to the left of -3 numbers less than -3 are included

20. **Multiple Choice** Which inequality represents the graph?

(A) $x > -3$ (B) $x < -3$ (C) $x \geq -3$ (D) $x \leq -3$



Problem 5 Writing Real-World Inequalities

Got It? Reasoning The inequality $s \leq 8$ describes a situation where s is a legal speed. Can the speed be *all* real numbers less than or equal to 8? Explain.



21. Write *stopped*, *moving*, or *doesn't make sense* to describe each speed. Then circle a word to answer the question.

Speed	Description	Is it possible?
5	<input type="text"/>	Yes / No
0	<input type="text"/>	Yes / No
-3	<input type="text"/>	Yes / No

22. Can the speed be *all* real numbers less than or equal to 8? Explain.



Lesson Check • Do you UNDERSTAND?

Compare and Contrast What are some situations you could model with $x \geq 0$? How do they differ from situations you could model with $x > 0$?

23. Use the situations at the right. Write each one on the correct line.

$x \geq 0$:

$x > 0$:

24. Describe how the situations for $x \geq 0$ differ from the situations for $x > 0$.

- Counting numbers
- Length of a poster
- One baseball team's score
- Whole numbers
- Distance from your home to a park
- Inches of rain



Math Success

Check off the vocabulary words that you understand.

inequality

solution of an inequality

graph of an inequality

Rate how well you can *write and graph inequalities*.

