

6-5**Inequalities****What You'll Learn**

To express and identify solutions of inequalities

New Vocabulary inequality, graph of an inequality, solution of an inequality

CONTENT STANDARDS

6.EE.5, 6.EE.6, 6.EE.8, 6.NS.7.d

Why Learn This?

Inequalities can tell you time limits, the height limits for amusement-park rides, and many other things.

Don't cross this field unless you can do it in 9.9 seconds. The bull can do it in 10.



An **inequality** is a mathematical sentence that contains $<$, $>$, \leq , \geq , or \neq . Real-world situations can sometimes be represented by inequalities.

Inequality Symbols

$<$	less than	$>$	greater than
\leq	less than or equal to	\geq	greater than or equal to
	\neq		not equal to

EXAMPLE Writing an Inequality

1 Time The sign above warns you to cross the field in less than 10 seconds. Write an inequality that represents the time limit.

Words your time is less than bull's time



Let t = your time.

Inequality $t < 10$

The inequality is $t < 10$.

Table talk - what words go in each box?

Symbol	Meaning
$<$	is less than
$>$	is <input type="text"/> than
\leq	is <input type="text"/> than or equal to
\geq	is <input type="text"/> than or equal to
\neq	is <input type="text"/> equal to

Example

- 1 **Writing an Inequality** Maria threw the softball more than 90 feet. Write an inequality that represents the distance.

Words**Inequality**Let m = the distance Maria threw the softball. m

>

The inequality is .**Quick Check**


1. Skydivers jump from an altitude of 14,500 feet or less. Write an inequality to express the altitude from which skydivers jump.

The **graph of an inequality** shows all solutions of the inequality. A **solution of an inequality** is any number that makes the inequality true. An open circle on a graph shows that the number is *not* a solution. A closed circle shows that the number *is* a solution.

EXAMPLE Graphing Inequalities


2 Write the inequality. Then graph the inequality.

a. You ride your scooter more than 2 miles.

Let k = your distance.  $k > 2$

The number line shows integers from -1 to 5. An open circle is drawn at 2, and a pink ray extends to the right from this circle.

b. The temperature is at most 5 degrees below zero.

Let t = temperature.  $t \leq -5$

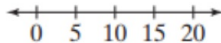
The number line shows integers from -10 to 0. A closed circle is drawn at -5, and a pink ray extends to the left from this circle.

Examples

2 **Graphing Inequalities** Write the inequality for the situation. Then graph the inequality.

a. Everyone in our class is 10 years old or older.

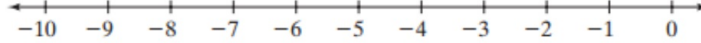
Let a = the age of a person in our class, $a \geq 10$.

 ← Use a closed circle to show that the ages include 10 years old. Include all the numbers greater than 10.

The number line shows integers from 0 to 20. A closed circle is drawn at 10, and a pink ray extends to the right from this circle.

b. The temperature is 6 degrees below zero or colder.

Let t = the temperature, $t \square -6$.



The number line shows integers from -10 to 0. A closed circle is drawn at -6, and a pink ray extends to the left from this circle.

You can use an inequality to show which numbers meet a limit.

EXAMPLE Identifying Solutions of an Inequality



- 3 **Roller Coasters** You must be at least 48 inches tall to ride a certain roller coaster. Which of the children in the table can ride the roller coaster?

Words child's height is at least 48 inches



Let h = the child's height.

Inequality $h \geq 48$

Name	Height
Sally	$48\frac{1}{2}$ in.
Dean	48 in.
Kelsey	$46\frac{3}{4}$ in.

Decide whether the inequality is true or false for each person.

Sally $48\frac{1}{2} \geq 48$ Dean $48 \geq 48$ Kelsey $46\frac{3}{4} \geq 48$
true true false

Sally and Dean may ride the roller coaster.

- 3 **Identifying Solutions of an Inequality** In order to get a bulk discount, a company must order at least 15 computers. Company X ordered 17 new computers. Do they qualify for the discounted rate?

Words

order

is at least

15 computers



Let c = computers in the order

Inequality

c



Decide whether the inequality is true or false for Company X.

$17 \geq 15$ true

Company X qualify for the discounted rate.


Quick Check

2. You spend at least 2 hours studying. Write the inequality for the situation. Then graph the inequality.



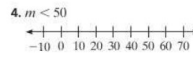
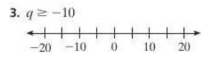
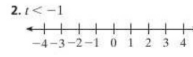
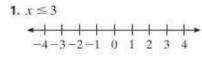
3. You must be at least 48 inches tall to ride a certain roller coaster. Ian is 3 ft 11 in. tall. Is Ian tall enough to ride the roller coaster?

Check Your Understanding

- Vocabulary** A graph of an inequality shows all the ? of the inequality.
- Reasoning** Are the solutions of $x < 3$ and $x \leq 3$ the same? Explain.
- Write an inequality for the graph. 

Practice 6-5 Inequalities

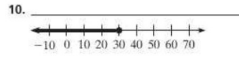
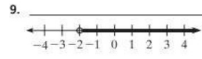
Graph each inequality on a number line.



For each inequality, tell whether the number in bold is a solution.

5. $x < 7$; **7** _____ 6. $p > -3$; **3** _____
 7. $z \leq 12$; **4** _____ 8. $n > 3$; **6** _____

Write an inequality for each graph.



Write a real-world statement for each inequality.

11. $d \geq 60$ _____
 12. $w \leq -10$ _____

Write and graph an inequality for each statement.

13. You can walk there in 20 minutes or less. 14. Each prize is worth over \$150.

15. A species of catfish, *Malapterurus electricus*, can generate up to 350 volts of electricity.

- a. Write an inequality to represent the amount of electricity generated by the catfish.

- b. Draw a graph of the inequality you wrote in part (a).

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