

## 7.5 Writing and Graphing Inequalities

ESSENTIAL QUESTION: How can you use a number line to represent solutions of an inequality.

An inequality is a mathematical sentence that compares expressions.

It contains the symbols.

SYMBOL	$<$	$>$	$\leq$	$\geq$
KEY PHRASES	*Less than *fewer than	*Greater than *More than	*less than or equal to *Is at most *is no more than	*Greater than or equal to *is at least *is no less than

### EXAMPLE 1->Writing Inequalities

Write the word sentence as an inequality.

1) A number  $c$  is less than  $-4$ .

$$c < -4$$

2) A number  $k$  plus 5 is greater than or equal to 8.

$$k + 5 \geq 8$$

3) Four times a number  $q$  is at most 16.

$$4q \leq 16$$

### ON YOUR OWN

Write the word sentence as an inequality.

1) A number  $n$  is greater than 1.

$$n > 1$$

2) Twice a number  $p$  is fewer than 7.

$$2p < 7$$

3) A number  $w$  minus 3 is less than or equal to 10.

$$w - 3 \leq 10$$

4) A number  $z$  divided by 2 is at least  $-6$ .

$$z \div 2 \geq -6$$

Solution of an inequality -> value that makes the inequality true.

Inequalities can have more than one solution.

Solutions of an inequality is called the solution set.

Value of $x$	$x + 3 \leq 7$	Is the inequality true?
3	$3 + 3 \stackrel{?}{\leq} 7$ $6 \leq 7$ ✓	yes
4	$4 + 3 \stackrel{?}{\leq} 7$ $7 \leq 7$ ✓	yes
5	$5 + 3 \stackrel{?}{\leq} 7$ $8 \not\leq 7$ ✗	no

### EXAMPLE 2->Checking Solutions

Tell whether the given value is a solution of the inequality.

1)  $x + 1 > 7$ ;  $x = 8$

2)  $7y < 27$ ;  $y = 4$

3)  $\frac{z}{3} \geq 5$ ;  $z = 15$

Solution  $x + 1 > 7$   
 $8 + 1 > 7$   
 $9 > 7$

Solution  $7y < 27$   
 $7(4) < 27$   
 $28 < 27$

$\frac{z}{3} \geq 5$  Solution

$\frac{15}{3} \geq 5$   
 $5 \geq 5$

### ON YOUR OWN

Tell whether the given value is a solution of the inequality.

1)  $b + 4 < 6$ ;  $b = 3$

2)  $9 - n \geq 6$ ;  $n = 3$

3)  $18 \div x \leq 10$ ;  $x = 3$

$b + 4 < 6$  not a  
 $3 + 4 < 6$   
 $7 < 6$  solution

$9 - n \geq 6$   
 $9 - 3 \geq 6$   
 $6 \geq 6$  solution

$18 \div x \leq 10$

$18 \div 3 \leq 10$

$6 \leq 10$  solution

### EXAMPLE 3->Graphing an Inequality

Graph the inequality.

1)  $g > 2$

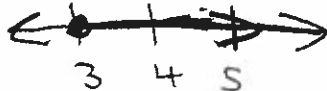
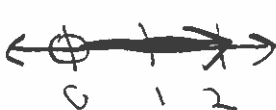
2)  $a < 4$

3)  $f \leq 7$



4)  $n > 0$

5)  $p \geq 3$



The graph of an inequality shows all the Solutions of the inequality on a number line.

An open circle is used when a number is not a solution. ( $<$  or  $>$ )

A closed circle is used when a number is a solution. ( $\leq$  or  $\geq$ )

An arrow to the left or right shows that the graph continues in that direction.

### EXAMPLE 4->Real Life Application

The NASA Solar Probe Plus can withstand temperatures up to an including ~~500~~ <sup>2600</sup> degrees F. Write and graph an inequality that represents the temperatures the probe can withstand.

$t \leq 2600$

