Section 6.3

Introduction to Linear Inequalities

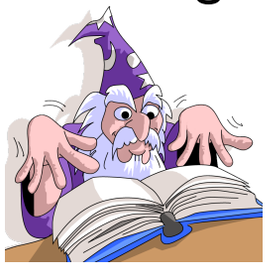
Tallest man
7 feet 9 inches
or 2.36m tall

>

Smallest man
29 inches
or 0.74m tall

What is an inequality?

We use inequalities to model situations
that can be described by a
range of numbers instead of a single number.



"Pick a number greater than 7."

When one quantity is....

less than $<$

greater than $>$

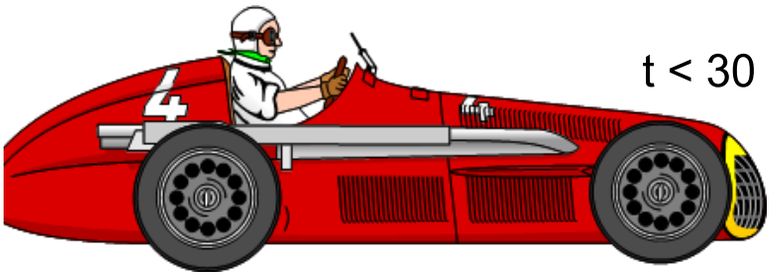
less than or equal to $\leq$

greater than or equal to $\geq$

Which of these inequalities describes the time, *t* minutes, for which a car could be legally parked?

$t > 30$ $t \geq 30$

$t < 30$ $t \leq 30$



Define a variable and write an inequality for each of the following situation:

Variable: *s,* speed

Inequality: $s \leq 55$

Variable: *t,* temperature

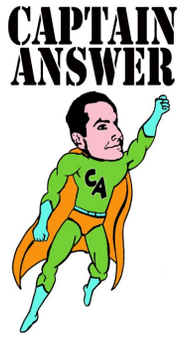
Inequality: $t < 4$

Variable: *h,* height

Inequality: $h \geq 102$

Variable:

Inequality: .



Determining whether a number is a solution to an inequality

Is each number a solution of the inequality $b \geq -4$?

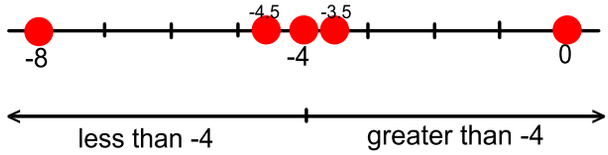
-8 -3.5 -4 -4.5 0

We can do this in TWO different ways:

Method 1: Using a Number Line

Show all numbers on a line.

The solution of $b \geq -4$ is all numbers that are greater than (to the right) or equal to -4.



For a number to be greater than -4, it must lie to the right of -4.

a) -8 is to the left of -4, so -8 is **not** a solution
b) -3.5 is to the right of -4 so -3.5 **is** a solution
c) -4 is equal to itself, so it **is** a solution
d) -4.5 is to the left of -4, so -4.5 is **not** a solution
e) 0 is to the right of -4, so 0 **is** a solution

Method 2: Use Substitution.

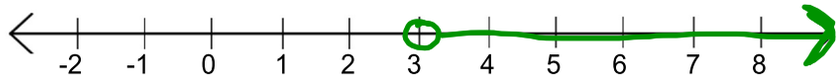
Substitute each number for *b* in the inequality $b \geq -4$.

Determine whether the resulting inequality is true or false.

a) Since $-8 \geq -4$ is false, -8 is not a solution.
b) Since $-3.5 \geq -4$ is true, -3.5 is a solution.
c) Since $-4 = -4$, -4 is a solution.
d) Since $-4.5 \geq -4$ is false, -4.5 is not a solution.
e) Since $0 \geq -4$ is ture, 0 is a solution.

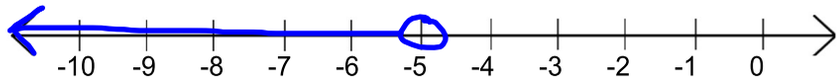
Graphing inequalities

$a > 3$

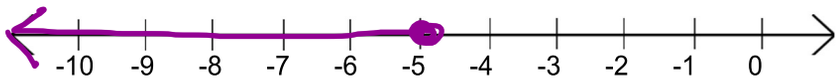


$a \geq 3$

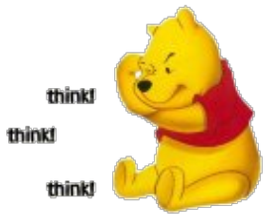
$b < -5$



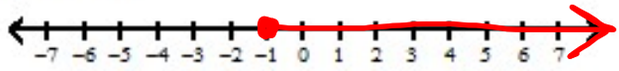
$b \leq -5$



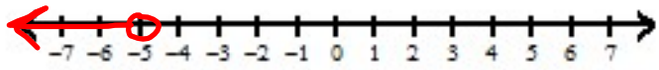
You try



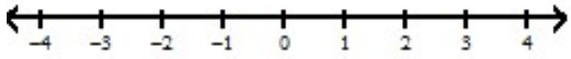
1) $k \geq -1$

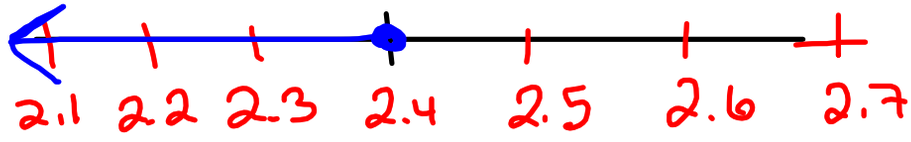


2) $x < -5$



3) $a \leq 2.4$



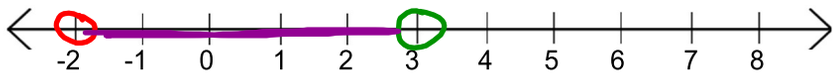


Graphing inequalities

$-2 < p < 3$

$p > -2$

$p < 3$

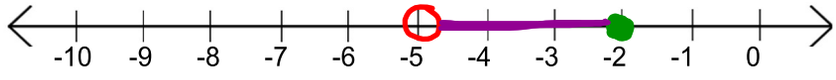


$0 \leq a \leq 8$

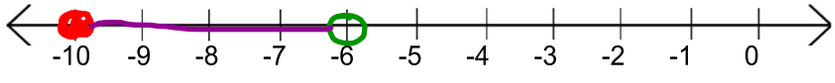
$a \geq 0$

$a \leq 8$

$-5 < t \leq -2$

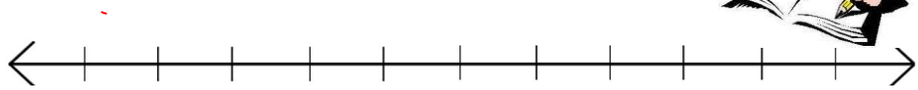


$-10 \leq g < -6$



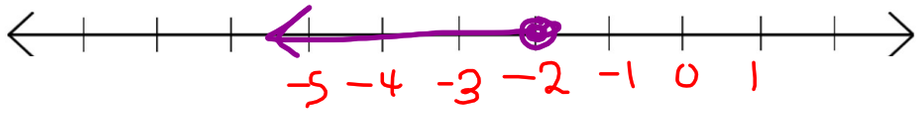
Graph each inequality on a number line.
Write 4 numbers that are solutions of the inequality.

a) $t > -5$



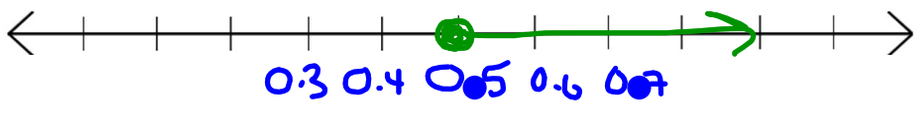
b) $-2 \geq x$

$x \leq -2$

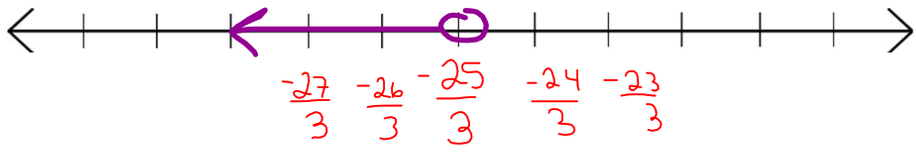


c) $0.5 \leq a$

$a \geq 0.5$

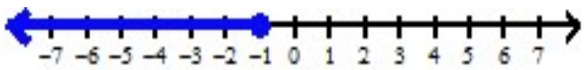


d) $p < -\frac{25}{3}$



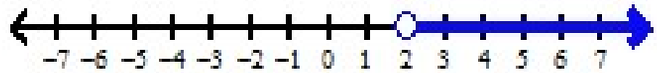
Write the inequality given by the following graph.

1)

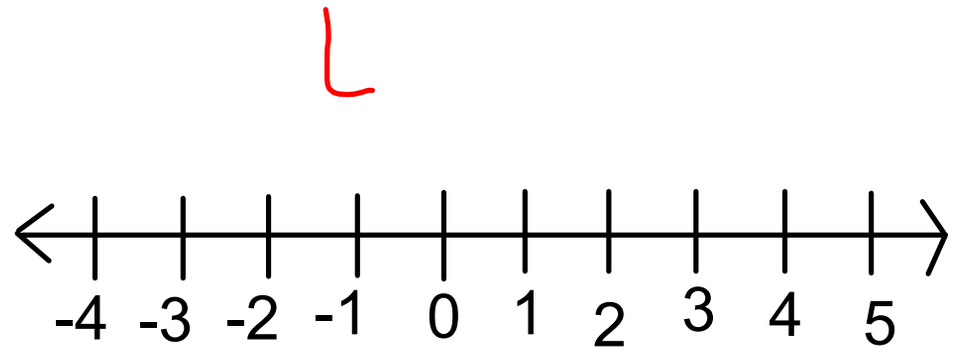


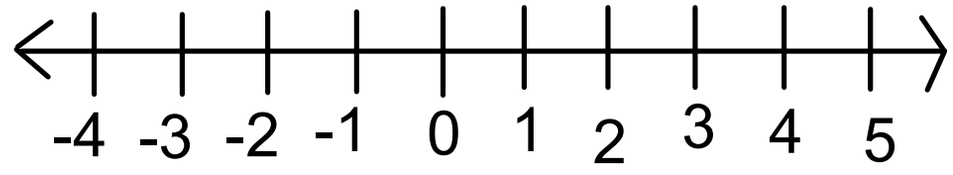
$t \leq -1$

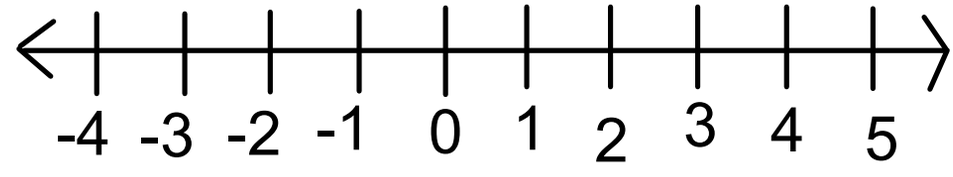
2)



$t > 2$

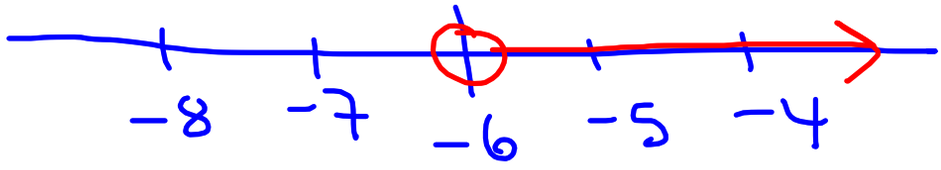

-4 -3 -2 -1 0 1 2 3 4 5


-4 -3 -2 -1 0 1 2 3 4 5


-4 -3 -2 -1 0 1 2 3 4 5

$-6 < t$

$t > -6$



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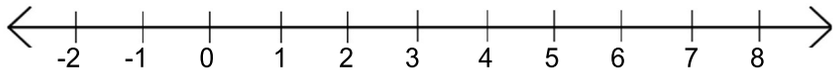
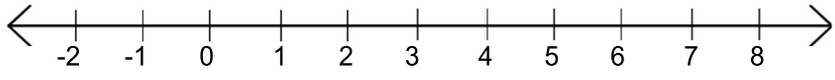
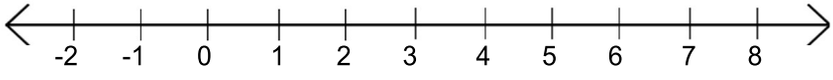
Questions: 3(aceg), 4, 7(ac)

8,9, 11a,12,13(aceg)


-2 -1 0 1 2 3 4 5 6 7 8


-2 -1 0 1 2 3 4 5 6 7 8


-2 -1 0 1 2 3 4 5 6 7 8