

Solving Linear Inequalities

Examples of linear inequalities (in one variable):

$$x \leq 1 \quad \text{and} \quad 2n - 3 > 9$$

A solution of an inequality in one variable is a value of the variable that makes the inequality true.

(For instance, -2, 0, 0.872, and 1 are some of the many solutions of $x \leq 1$.)

IMPORTANT!!!

Transformations that produce equivalent inequalities remain the same **EXCEPT** to remember:

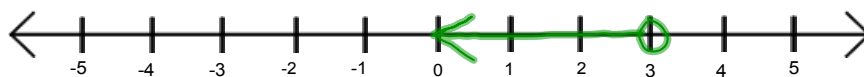
... When multiplying or dividing both sides by the same negative number, **REVERSE THE INEQUALITY**.

The **GRAPH** of an inequality in one variable consists of all points on a real number line that correspond to solutions of the inequality.

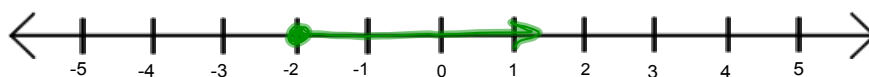
To graph an inequality in one variable, use an open dot for $<$ or $>$ and a solid dot for \leq or \geq .



For example, the graph of $x < 3$ and $x \geq -2$ are shown here:



$$x < 3$$

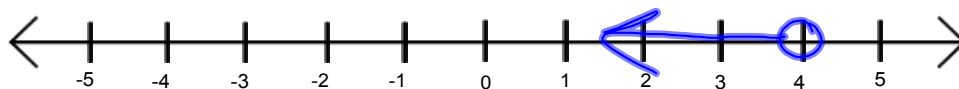


$$x \geq -2$$

Solve and Graph: $5y - 8 < 12$

$$\frac{5y}{5} < \frac{20}{5}$$

$$y < 4$$



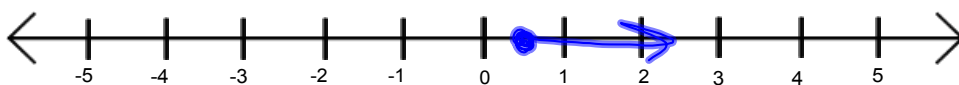
Solve and Graph: $2x + 1 \leq 6x - 1$

$$\frac{2x+2}{-2x} \leq \frac{6x-1}{-2x}$$

$$\frac{2}{4} \leq \frac{4x}{4}$$

$$\frac{1}{2} \leq x$$

$$x \geq \frac{1}{2}$$



The percent of households 'h' with cable television is modeled by $h = 2.3y + 44$, where 'y' is the number of years since 1998. Describe the years when the percent is less than 53.2.

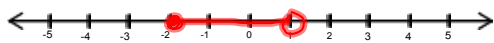
$$\begin{array}{l}
 y=3 \quad (2001) \\
 y=2 \quad (2000) \\
 y=1 \quad (1999) \\
 y=0 \quad (1998)
 \end{array}$$

$$\begin{array}{l}
 2.3y + 44 < 53.2 \\
 \quad \quad \quad -44 \quad \quad -44 \\
 \hline
 2.3y < 9.2 \\
 \quad \quad \quad \frac{2.3y}{2.3} < \frac{9.2}{2.3} \\
 \hline
 y < 4
 \end{array}$$

1998-2001

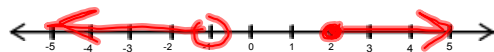
A **COMPOUND INEQUALITY** is two inequalities joined by "and" or "or". Here are two examples:

$$-2 \leq x < 1$$



All real numbers that are greater than or equal to -2 **AND** less than 1.

$$x < -1 \text{ or } x \geq 2$$



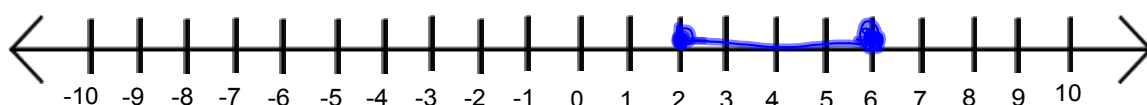
All real numbers that are less than -1 **OR** greater than or equal to 2.

Solve and Graph:

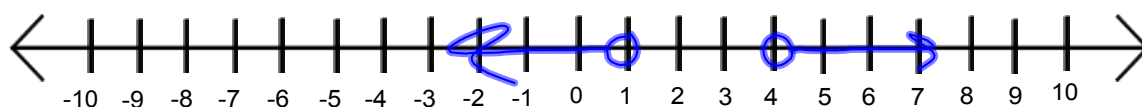
$$\underset{+8}{-2} \leq 3t \underset{+8}{-8} \leq \underset{+8}{10}$$

$$\underset{3}{6} \leq \underset{3}{3t} \leq \underset{3}{18}$$

$$2 \leq t \leq 6$$

**Solve and Graph: $2x + 3 < 5$ or $4x - 7 > 9$.**

$$\begin{array}{l} \underset{-3}{-3} \\ 2x < 2 \\ \textcircled{x < 1} \end{array} \quad \text{OR} \quad \begin{array}{l} \underset{+7}{+7} \\ 4x > 16 \\ \textcircled{x > 4} \end{array}$$



Assignment:

p. 45

14-50 even