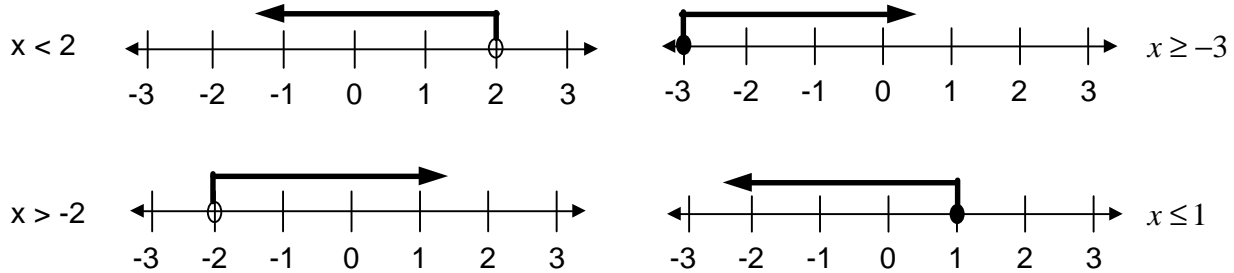


Section 6.1 Solving Linear Inequalities

The graph of an inequality in one variable is a set of points or a range on a number line. Some examples follow:



Note how $<$ and $>$ start with an empty circle while \geq and \leq start with a filled in circle. The empty circle shows that the solution does not include the end point. The filled in circle shows that the end point is included in the solution.

We can write inequalities to express real life situations.

Example 1: You need to have at least \$60 for your trip to Disney Land. If you can earn \$7 per day for x days, write an inequality relating the number of days, the \$ per day, and the amount of money you need to earn for the trip.

x = number of day worked
 \$7 = amount of money per day

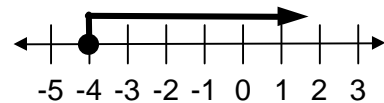
$$7x = 60$$

Note: we use \geq because the amount has to be at least \$60.

To solve linear inequalities we use exactly the same steps as solving equations. There is one important exception... **if you multiply or divide both sides of the inequality by a *negative* number you must *reverse* the inequality symbol(s).**

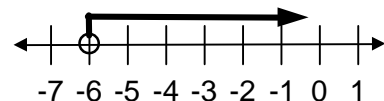
Example 2: Solve $x + 7 = 3$ and graph the solution.

$$\begin{aligned} x + 7 &= 3 \\ x + 7 - 7 &= 3 - 7 && \text{subtract 7 from both sides} \\ x &= -4 \end{aligned}$$



Example 3: Solve $\frac{x}{3} > -2$ and graph the solution.

$$\begin{aligned} \frac{x}{3}(3) &> -2(3) && \text{multiply both sides by 3} \\ x &> -6 \end{aligned}$$

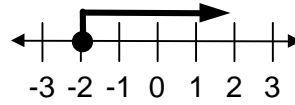


Example 4: $-3x \leq 6$

$$\frac{-3x}{-3} \leq \frac{6}{-3} \quad \text{Divide both sides by } -3$$

$$x \geq -2$$

Since we are dividing by a negative number, we must reverse the sign.



Example 5: $-\frac{2}{3}x < -4$

$$\left(-\frac{3}{2}\right)\left(-\frac{2}{3}\right)x < -4\left(-\frac{3}{2}\right)$$

$$x > 6$$

Multiply both sides by $-3/2$ and reverse the inequality.

Since we are multiplying by a negative number, we must reverse the sign.

