

1.6 Solving Inequalities

Solving Inequalities

- Solving inequalities follows the same procedures as solving equations.
- There are a few **special** things to consider with inequalities:
 - We need to look carefully at the inequality sign.
 - We also need to graph the solution set.

Review of Inequality Signs

$>$ greater than

$<$ less than

\geq greater than or equal

\leq less than or equal

How to graph the solutions

> Graph *greater than* any number. . .

open circle, line to the right



< Graph *less than* any number. . .

open circle, line to the left



\geq Graph *greater than or equal to* any number. . .

closed circle, line to the right



\leq Graph *less than or equal to* any number. . .

closed circle, line to the left



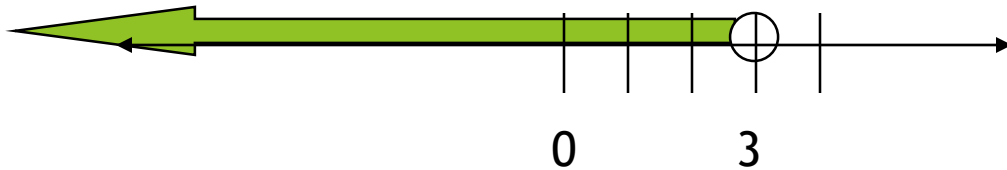
Solve the inequality:

$$x + 4 < 7$$

$$\underline{-4} \quad \underline{-4}$$

$$x < 3$$

- Subtract 4 from each side.
- Keep the same inequality sign.
- Graph the solution.
 - Open circle, line to the left.



There is one special case.

- Sometimes you may have to *reverse* the direction of the inequality sign!!
- That only happens when you *multiply or divide* both sides of the inequality by a **negative** number.

Example:

Solve: $-3y + 5 > 23$

$$\underline{-5} \quad \underline{-5}$$

- Subtract 5 from each side.

$$\underline{-3y} > \underline{18}$$

$$-3 \quad -3$$

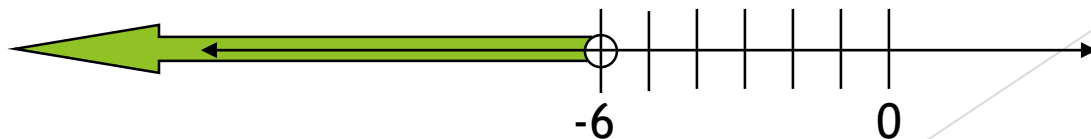
- Divide each side by **negative 3**.

$$y < -6$$

- **Reverse** the inequality sign.

- Graph the solution.

- Open circle, line to the left.



Try these:

- Solve $2x+3>x+5$
- Solve $-c-11>23$
- Solve $3(r-2)\leq 2r+4$

Solution: $2x + 3 > x + 5$

$$2x + 3 > x + 5 \quad \text{Given}$$

$$\underline{-3} \quad \underline{-3} \quad \text{Subtraction POE}$$

$$2x > x + 2$$

$$\underline{-x} \quad \underline{-x} \quad \text{Subtraction POE}$$

$$x > 2$$

How would you graph your solution?

open or closed dot?

dot at what number?

arrow going which direction?

Solution: $-c - 11 > 23$

$$-c - 11 > 23 \quad \text{Given}$$

$$\underline{\quad +11 \quad +11} \quad \text{Addition POE}$$

$$\underline{-c} > \underline{34}$$

$$\underline{-1} \quad \underline{-1} \quad \text{Division POE (dividing by negative)}$$

$$C < -34$$

How would you graph your solution?

open or closed dot?

dot at what number?

arrow going which direction?

Solution: $3(r-2) \leq 2r + 4$

$$3(r-2) \leq 2r + 4 \quad \text{Given}$$

$$3r - 6 \leq 2r + 4 \quad \text{Distributive POE}$$

$$\underline{\quad +6 \quad \quad +6} \quad \text{Addition POE}$$

$$3r \leq 2r + 10$$

$$\underline{-2r \quad -2r} \quad \text{Subtraction POE}$$

$$r \leq 10$$

How would you graph your solution?

open or closed dot?

dot at what number?

arrow going which direction?