Understanding Math

# Concept: Solving Inequalities

**Name:**

## COMPUTER COMPONENT

**Instructions:** Select the computer program *Understanding Equations* (Neufeld)
Follow the instructions to the Main Menu.
Select *Solving Inequalities* from the Main Menu.

Work through all sections of this topic **in order**:

- *Comparing Integers*
- *Inequalities*
- *Inequalities on the Number Line*
- *Solving Inequalities*
- *Solving Compound Inequalities*

*Additional Required Materials: Pencil Crayons*

*Notice: You will not be finishing the entire topic before stopping to complete some* **OFF COMPUTER EXERCES**.

As you work through the computer exercises, make your notes in the **NOTES** section of this page.

When you reach the end of the section *Solving Compound Inequalities* on the computer, move on to the **OFF COMPUTER EXERCISES** below**.**

## NOTES:

Remember:

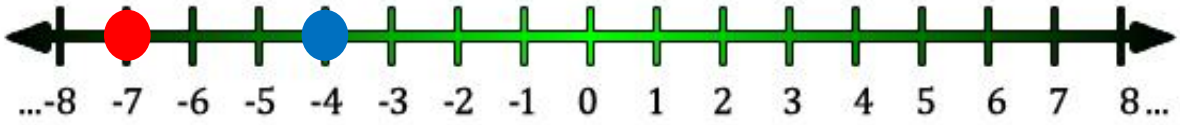
- Negative numbers are **less** than zero and less than **positive** numbers.

- **0** is less than **positive** numbers but greater than **negative** numbers.

- Positive numbers are greater than **negative** numbers and **greater** than zero.

Practice:

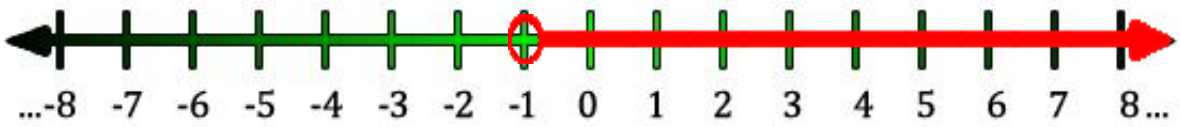
1. Mark where –7 and -4 are on the number line.




Fill in the inequality.

$$-7 \boxed{<} -4$$

2. A graph of the inequality is given below.




Fill in the inequality: $x \boxed{>} -1$

3. Fill in the blanks.

**Inequalities** are mathematical **statements** involving the symbols

> **( greater than )**, < ( **less than** ),

≥( **greater than or equal to** ), and

≤( **less than or equal to** ),

4. The solution to an **inequality** is a value that makes the inequality **true.**

5. When solving an inequality you can:
   - Add the **same** quantity to **both** sides
   - Subtract the **same** quantity from **both** sides
   - Multiply or divide **both** sides by the same **positive** quantity
   - If you multiply or divide **both** sides by a **negative** quantity, the inequality **sign** must be **reversed.**

Remember: When one **multiplies** or **divides** by a **negative** number, the inequality sign is **reversed.**

Example:

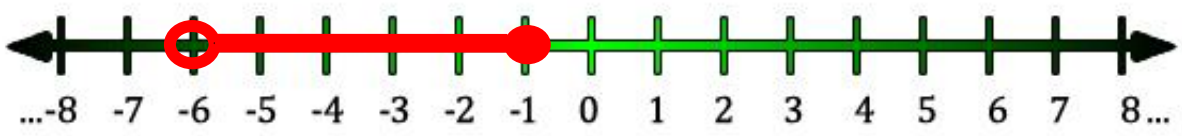
| | | |
|---|---|---|
| | $6 > 3$ | (True) |
| Multiply both sides by -3 | $6 \times \mathbf{(-3)} > 3 \times \mathbf{(-3)}$ | (**False**) |
| … but by reversing the sign: | $6 \times \mathbf{(-3)} < 3 \times \mathbf{(-3)}$ | (**True**) |

**Compound Inequalities** are **two** inequalities joined by the terms **'and' or 'or'.**

- A compound inequality contains the terms "**and**" or "**or**" .

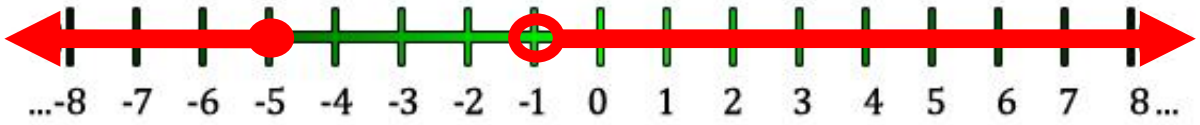
- A compound inequality with "**and**" is true only if **both parts** of it are true.

  Example: Graph $x > -6$ and $x \leq 1$ (*Hint: remember the open and closed dots*)



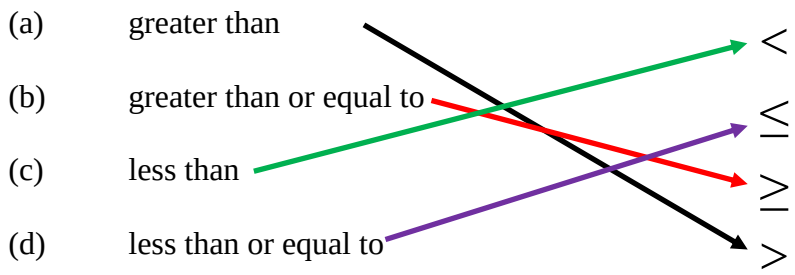

- A compound inequality with "**or**" is true if **one or both** of its inequalities are true.

  Example: Graph $x > 1$ or $x \leq -5$ (*Hint: remember the open and closed dots*)



**OFF COMPUTER EXERCISES**

1. Match the signs

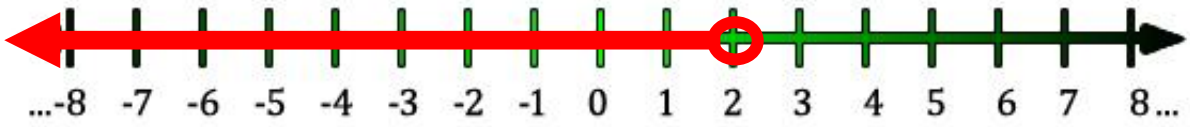



2. Determine what values of x make each inequality true. *Graph each answer.*

(a) $x + 3 < 5$

$x + 3 - 3 < 5 - 3$

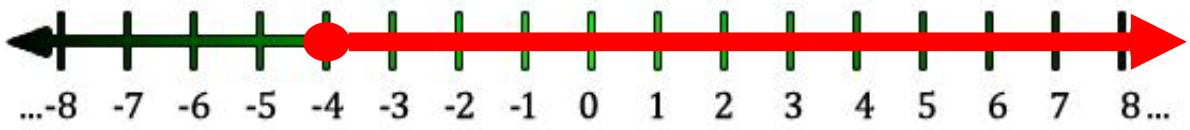
$x < 2$




(b) $\frac{x}{4} \geq -1$

$(4)\frac{x}{4} \geq -1(4)$

$x \geq -4$



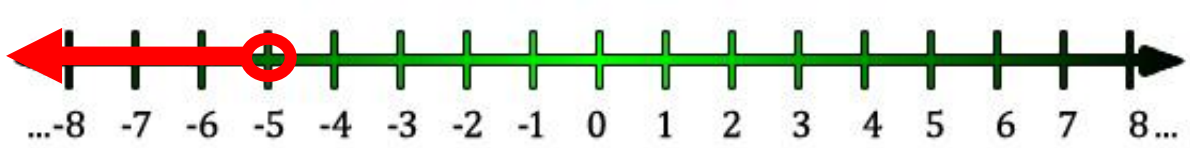
(c)

$$4x - 1 > 5x + 4$$

$+1)$ $\quad 4x > 5x + 5$

$-5x)$ $\quad -x > 5$

$\times -1)$ $\quad x < -5$



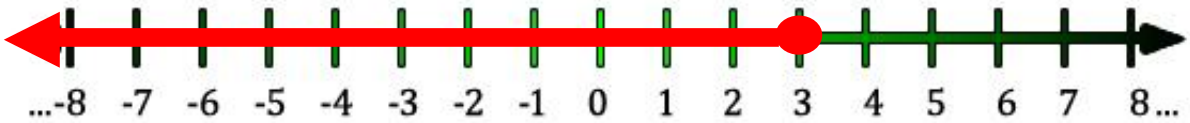

(d)

$$8x - 1 \leq 5x + 8$$

$-5x)$ $\quad 3x - 1 \leq 8$

$+1)$ $\quad 3x \leq 9$

$\div 3)$ $\quad x \leq 3$



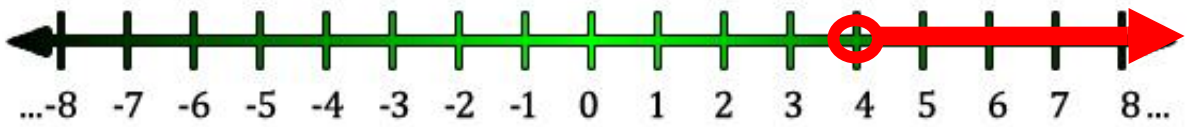

(e)

$$3x - 3 < 5x - 11$$

$+3)$ $\quad 3x < 5x - 8$

$-5x)$ $\quad -2x < -8$

$\div -2)$ $\quad x > 4$



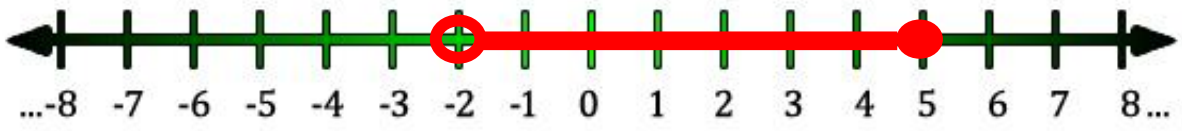
3. For what values of w is $\frac{w}{4} + \frac{1}{4} \geq \frac{w}{2} - \frac{5}{4}$

$$\frac{w}{4} + \frac{1}{4} \geq \frac{w}{2} - \frac{5}{4}$$

| | | | |
|---|---|---|---|
| ×4 ) | w + 1 | ≥ | 2w - 5 |
| -1) | w | ≥ | 2w - 6 |
| -2w) | -w | ≥ | -6 |
| ×-1) | w | ≤ | 6 |

4. Graph the following:

(a) $x > -2$ and $x \leq 5$




(b) $x \geq -2$ or $x < 6$