

Unit 2.1 Inequalities and Their Graphs

Inequality: is an open sentence that contains one of five inequality symbols.

$<, >, \leq, \geq, \neq$ (not equal to) $\{ x > 10, 5 \leq 5, 2 \neq 4$

Identifying Solutions of Inequalities

solutions of an inequality → any number that makes the inequality a **TRUE** statement.

Ex: $x < 4$ means x (can) = $-4.2, 1.93, \cancel{4}, -11.5$, $x \geq 12$ means x (can) = $13, 40, 12, 12.0000000001$
 ↑ Equal to

Example 1: Is each number a solution of $3 + 2x < 8$?

- a.) $-2 \rightarrow 3 + 2(-2) < 8 \rightarrow 3 - 4 < 8 \rightarrow -1 < 8$ ✓ Circle one: **YES** (TRUE) NO (FALSE)
- b.) $3 \rightarrow 3 + 2(3) < 8 \rightarrow 3 + 6 < 8 \rightarrow 9 < 8$ ✗ Circle one: YES (TRUE) **NO** (FALSE)
- c.) $0 \rightarrow 3 + 2(0) < 8 \rightarrow 3 + 0 < 8 \rightarrow 3 < 8$ ✓ Circle one: **YES** (TRUE) NO (FALSE)

Graphing Inequalities: Understanding the Symbols

- Draw a circle for the inequalities' number (open – not underlined symbol, closed – underlined symbol)
- Shade for the direction of the inequalities' symbol (shade left – less than, shade right – greater than)

- $x >$ (Greater Than) → shade to the right, open circle
- $x \geq$ (Greater Than OR Equal to) → shade to the right, closed circle
- $x <$ (Less Than) → shade to the left, open circle
- $x \leq$ (Less Than OR Equal to) → shade to the left, closed circle
- $x \neq$ (Not EQUAL To) → shade both directions, open circle

You want the Variable to always be on the **LEFT SIDE** of the inequality symbol.

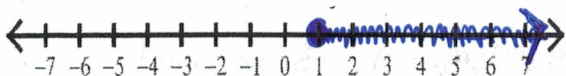
Note: If written where variable is on the right, then do the following so you can graph it:

- SWITCH** places of the # and variable. and **Flip/reverse** the inequality symbol
- so you would "graph" $3 \leq x$ as $x \geq 3$ and $-4 \geq x$ as $x \leq -4$

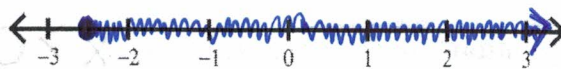


Example 2: Graph each inequality.

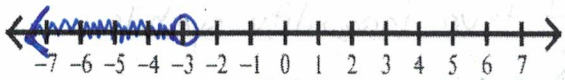
$x \geq 1$ closed circle, shaded right



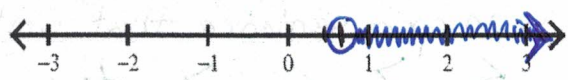
d.) $f \geq -2.5$ closed circle, shaded right



b.) $w < -3$ *open circle, shaded left*



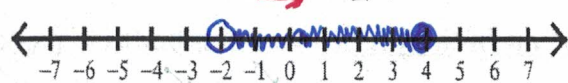
e.) $0.7 < h$ *Rewrite $\rightarrow h > 0.7$ open circle, shaded right*



c.) $0 > a$ *Rewrite $\rightarrow a < 0$ open circle, shaded left*



f.) $-2 < x \leq 4$ *AND $-2 < x \rightarrow x > -2$ $x \leq 4$*



Writing Inequalities: Working Backwards

Visually: From a Graph

- Two things to look for: 1.) The type of circle (or closed) 2.) The direction of shading (Left or Right)
- Define a variable (doesn't matter what you choose) *The default setting for inequalities is "X" and it is placed on the LEFT SIDE of inequality symbol.*

g.) $x \neq 13$



Verbally: From a Sentence

- Define a variable (pick what BEST represents the inequality)
- Make sure that the inequality fits the description; "DOES IT MAKE SENSE?"

Example 3: Write an inequality from each graph or sentence.

** Automatically put a variable on the left side and the number on the right.*

a.) *open circle < or ~~x~~ b/c shaded left* \rightarrow $x < -3$

b.) *closed circle ~~x~~ or \geq b/c shaded right* \rightarrow $x \geq 0$

c.) *closed circle \leq or \geq b/c shaded left* \rightarrow $x \leq 3$

d.) maximum speed on a highway is (65) miles per hour \rightarrow $s \leq 65$
S is speed

e.) the letter r is at least 2 \rightarrow $r \geq 2$

f.) the letter k is no more than 3 \rightarrow $k \leq 3$

g.) positive solutions for the variable x \rightarrow $x > 0$

h.) the letter h is not equal to 7 $h \neq 7$

