Solving and Graphing Linear Inequalities

Solving One-Step Linear Inequalities

What's an inequality?

- Is a range of values,

rather than ONE set number

- An algebraic relation showing that a quantity is greater than or less than another quantity.

Speed limit:

$$55 \leq x \leq 75$$

Symbols

$<$ *Less than*

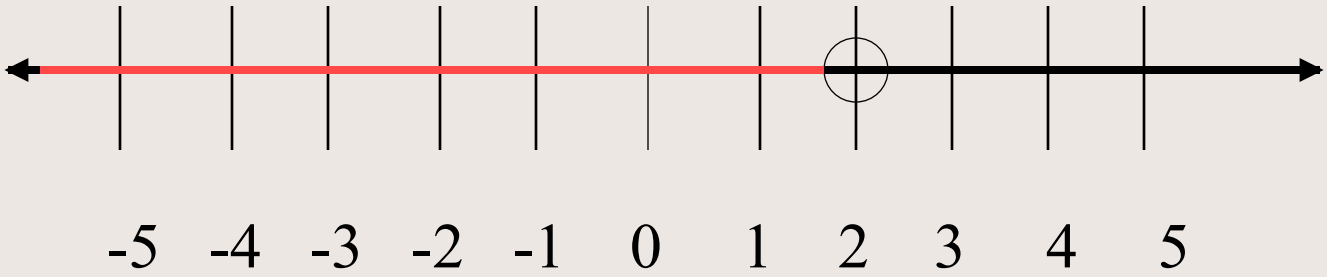
$>$ *Greater than*

$\leq$ *Less than OR EQUAL TO*

$\geq$ *Greater than OR EQUAL TO*

Solutions….

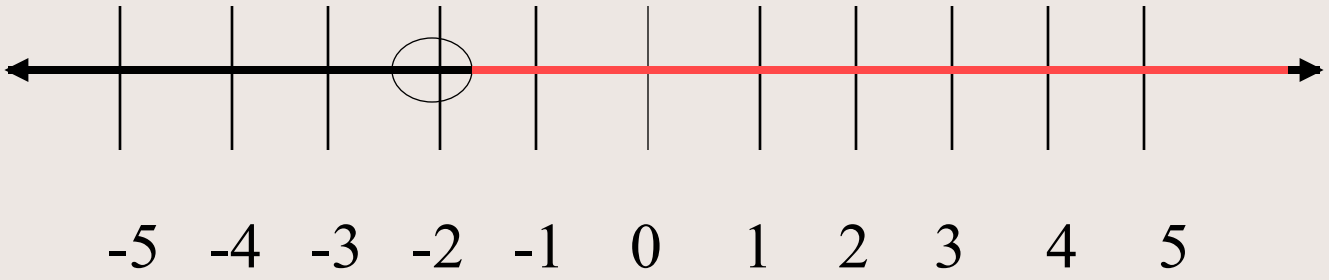
You can have a range of answers……



All real numbers less than 2

$x < 2$

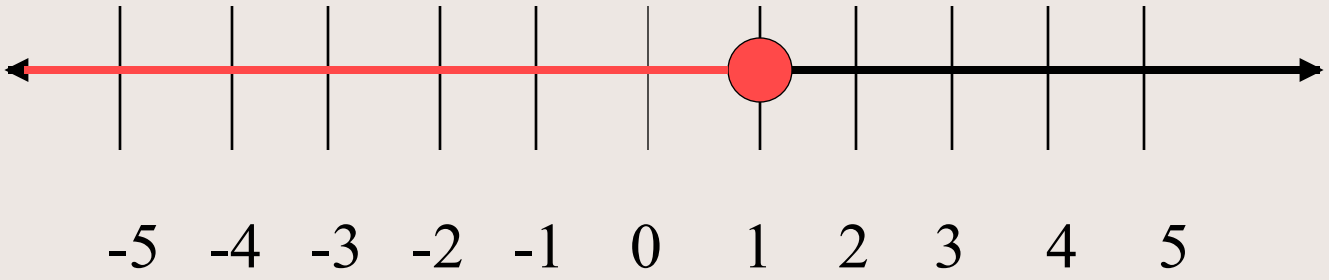
Solutions continued…



All real numbers greater than -2

$x > -2$

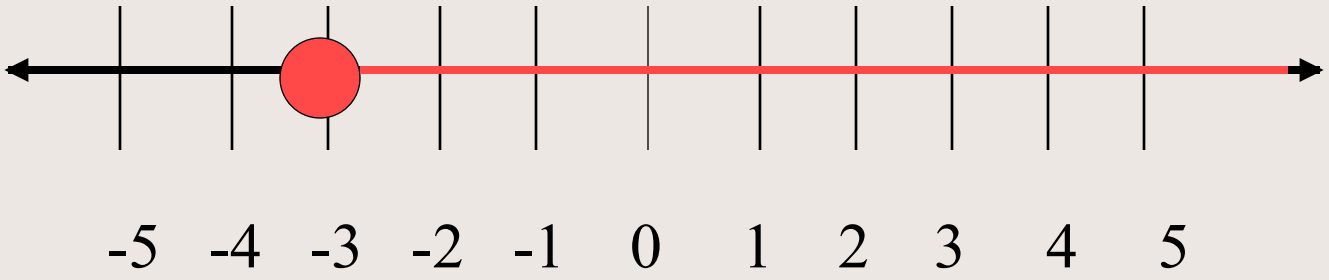
Solutions continued….



All real numbers less than or equal to 1

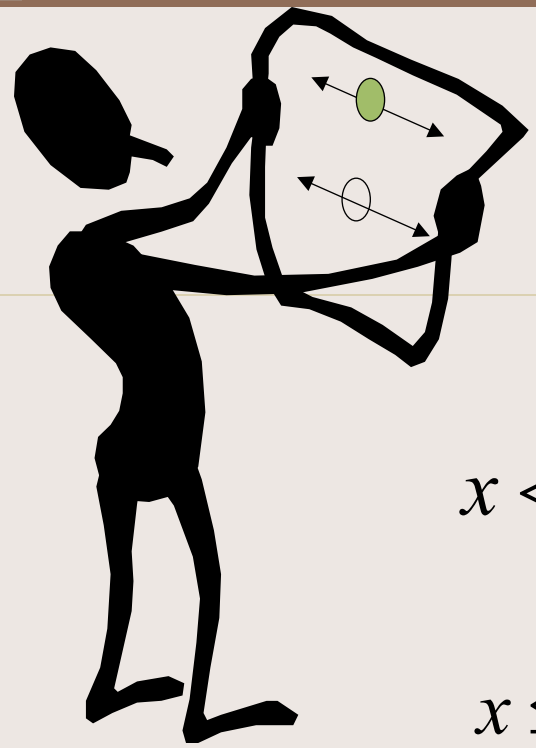
$$x \leq 1$$

Solutions continued…



All real numbers greater than or equal to -3

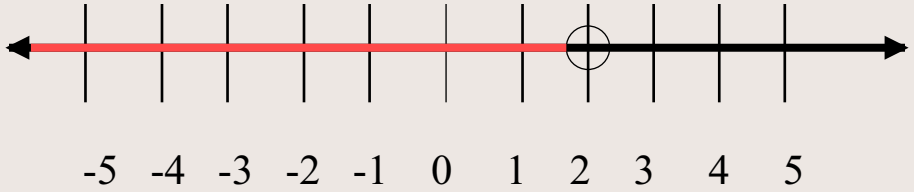
$$x \geq -3$$



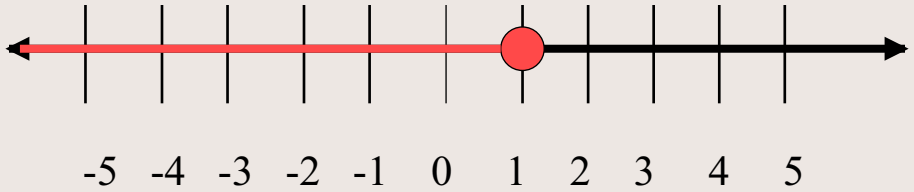
Did you notice,

Some of the dots were solid and some were open?

$x < 2$



$x \leq 1$



Why do you think that is?

If the symbol is > or < then dot is open because it can not be equal.

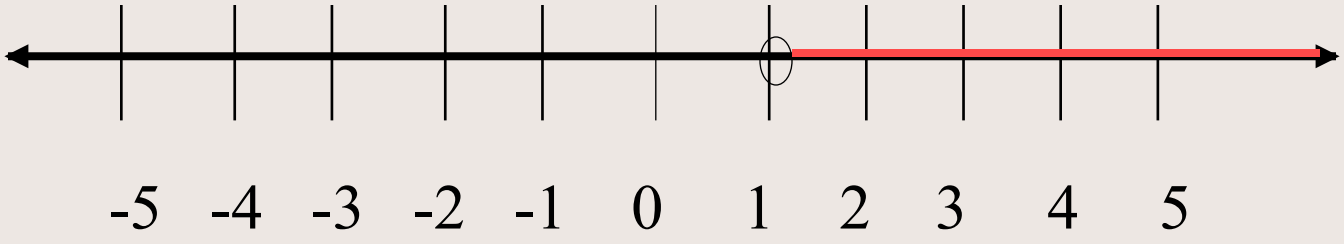
If the symbol is ≥ or ≤ then the dot is solid, because it can be that point too.

Write and Graph a Linear Inequality

Sue ran a 2-K race in 8 minutes. Write an inequality to describe the average speeds of runners who were faster than Sue. Graph the inequality.

Faster average speed $>$ $\dfrac{\text{Distance}}{\text{Sue's Time}}$ $s > \dfrac{2}{8}$

$s > \dfrac{1}{4}$



Solving an Inequality

Solving a linear inequality in one variable is much like solving a linear equation in one variable. **Isolate the variable on one side using inverse operations.**

Solve using addition:

$$x - 3 < 5$$

Add the same number to EACH side.

$$x - 3 < 5$$

$$+3 \quad +3$$

$$x < 8$$

Solving Using Subtraction

Subtract the same number from EACH side.

$$x + 6 \geq 10$$

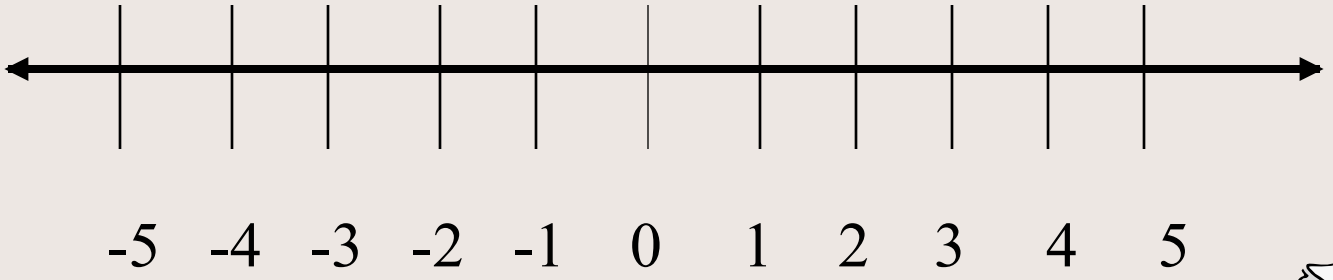
$$-6 \qquad -6$$

$$x \geq 4$$

Using Subtraction…

$x + 5 \geq 3$

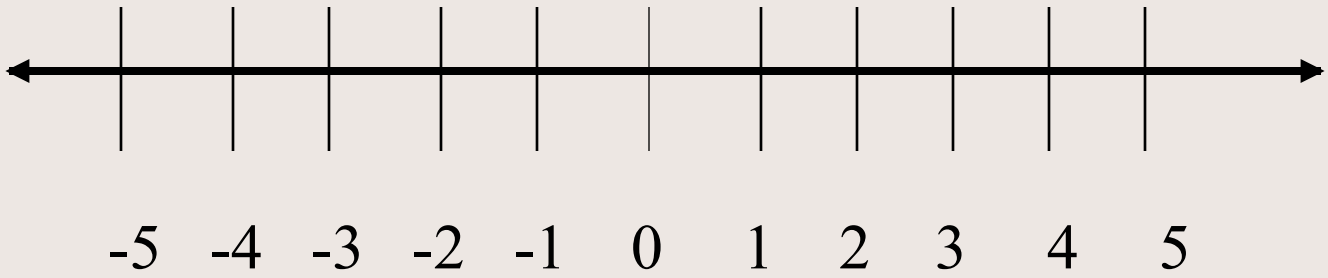
Graph the solution.



Using Addition…

$-2 > n - 4$

Graph the solution.



THE TRAP…..

When you **multiply or divide** each side of an inequality by a **negative number**, you must **reverse the inequality symbol** to maintain a true statement.

Solving using Multiplication

Multiply each side by the same positive number.

$$(2)\quad \frac{1}{2}x > 3\ (2)$$

$$x > 6$$

Solving Using Division

Divide each side by the same positive number.

$$\frac{3x}{3} \leq \frac{9}{3}$$

$$x \leq 3$$

Solving by multiplication of a negative

Multiply each side by the same **negative number** and **REVERSE** the inequality symbol.

$$(-1)\ -x < 4\ (-1)$$

Multiply by (-1).

See the switch

$$x > -4$$

Solving by dividing by a negative

Divide each side by the same **negative number** and **reverse** the inequality symbol.

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

$$x \geq 3$$

Homework

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22-54 evens

55-60

61 & 65