

solve it like an equation, with one rule that can turn the whole thing around

The rules, and the one that bites *

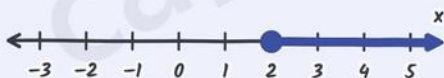
adding or subtracting keeps the sign $a < b \Rightarrow a + c < b + c$

multiplying by a positive keeps it $a < b, k > 0 \Rightarrow ka < kb$

multiplying by a negative FLIPS it $a < b, k < 0 \Rightarrow ka > kb$

at least k, no less than k $x \geq k$

at most k, no more than k $x \leq k$

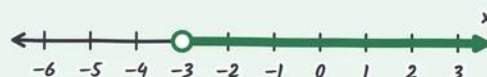


at least 2, written $x \geq 2$: a **filled dot** at 2 because the boundary counts, and the ray running right through every larger value

every move you make on an equation is legal here too, with exactly one exception: **multiplying or dividing by a negative reverses the direction**. Nothing else does

Q. Solve $5 - 3x < 2x + 20$.

- ① gather the x terms on the left: $5 - 3x - 2x < 20$
- ② $5 - 5x < 20$, then subtract 5: $-5x < 15$
- ③ divide both sides by -5, and **flip the sign** because -5 is negative



$x > -3$: a hollow dot at -3, excluded, and the ray running right; 0 lies inside it, -4 outside

Answer $x > -3$

test one number from your answer and one from outside it. At $x = 0$ the original reads $5 < 20$, true. At $x = -4$ it reads $17 < 12$, false. So the direction is right

Four signs, and the words that hide them

greater than

more than, over, exceeds.
The boundary is **excluded**

at least

no less than, minimum of, a floor. The boundary **counts**

less than

under, below, fewer than.
The boundary is **excluded**

at most

no more than, maximum of, capacity, budget. The boundary **counts**

capacity, budget and limit almost always mean **at most**, while requirement, quota and target almost always mean **at least**

Equation vs Inequality

Equation

- the answer is a **single value** of x
- the graph of a two-variable one is a line
- every legal move keeps the equals sign as it is

Inequality

- the answer is a **whole range** of values
- the graph of a two-variable one is a **region** on one side of a line
- dividing by a negative reverses the sign

the algebra is identical right up to the last division. That is why the flip is worth a deliberate pause every single time it happens