

# Linear equations and inequalities

Topic cliff notes / objectives, key ideas and examples

## Learning objectives

- Solve a linear equation using balanced operations.
- Solve and represent a linear inequality.

## Key ideas

- Apply the same operation to both sides of an equation; check by substituting the solution.
- Expand brackets, collect variable terms on one side, then isolate the unknown.
- Strict inequalities exclude the boundary; inclusive inequalities include it.

$<, >$  exclude;  $\leq, \geq$  include

- Multiplying or dividing an inequality by a negative reverses the inequality sign.
- On a number line: an open circle excludes the boundary; a filled circle includes it.

## Worked example

Solve the equation by keeping both sides balanced.

$$3(x + 2) = 2x + 11 \implies 3x + 6 = 2x + 11$$

$$x + 6 = 11 \implies x = 5$$

Check both sides.

$$3(5 + 2) = 21 = 2(5) + 11$$

**Answer**

$$x = 5$$

## Quick example

Solve the inequality, reversing the sign when dividing by a negative.

$$-2x < 8 \implies x > -4$$

**Answer**

$$x > -4$$

## Watch out

Reverse the inequality sign only when multiplying or dividing by a negative, not when adding or subtracting.

