

What is an equation?

A mathematical statement that says two expressions are equal

eg $4x + 3 = 15$

What is a solution to an equation?

A solution is a value or set of values for which the evaluation of each expression is equal i.e. where the equation is true.

In this class, we are typically interested in solutions over the real numbers (e.g. fractions, decimals, radicals, etc) (focus on 1 variable)

Q: Can an equation have exactly 1 solution?

A: Yes. eg $4x + 3 = 15 \Rightarrow x = 3$

Q: Can an equation have exactly 0 solutions?

A: Yes. eg $x + 2 = 5 + x$

OR $1 + 2 = 5$ ✗

Q: Can an equation have infinitely many solutions?

A: Yes. eg $x + 1 = 2x - x + 1$

OR $x = x$ $x \in \mathbb{R}$

* Q: Can an equation have exactly 2 solutions?

A: Yes. eg $x^2 = 4$ $x = -2, 2$

Solving Equations

Whenever you change one expression, you must make the same change to the other.

If you do this, you never lose solutions.

eg $4x + 3 = 15$
 $-3 \quad -3$

Key: Try to isolate variable

$4x + (3 - 3) = 15 - 3$

$$4x + 0 = 12$$

$$4x = 12$$

$$\div 4 \quad \div 4$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$x = \boxed{3}$$