Basic Equations Example

An equation says that two expressions have equal values. Solving a linear equation means finding the variable value that makes this statement true. The balance principle allows the same operation on both sides without changing equality; inverse operations undo addition and multiplication. Systematic equation-solving methods have a long history, including al-Khwarizmi's influential ninth-century algebra treatise, but equations were not invented by a single person. This example isolates x and checks the result in the original equation.

Worked example

Solve 3x + 7 = 22.

FORMULA / RULE USED

Balance principle: if A = B, then A − c = B − c; if A = B and c ≠ 0, then A/c = B/c.

Step-by-step solution

STEP 1 · Subtract 7 from both sides

Undo the addition while keeping the equation balanced.

3x + 7 − 7 = 22 − 7, so 3x = 15

STEP 2 · Divide both sides by 3

Undo multiplication by 3 to isolate x.

3x/3 = 15/3, so x = 5

STEP 3 · State the solution

The equation has one solution.

Solution set: {5}

Answer

ANSWER

The solution is x = 5.

Check

Substitute 5 into the original equation. The left side equals the right side.

3(5) + 7 = 15 + 7 = 22