

Fix it 1 One step: the inverse

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Do the inverse to both sides: + and – undo each other, and so do $\times$ and divide.

EXAMPLE

Solve $x - 7 = 12$.

1. 7 is taken from x . The inverse is +7.
2. +7 both sides: $x = 19$

YOUR TURN

- 1 Solve $x - 6 = 17$.

$$x = \underline{\quad 23 \quad}$$

- 2 Solve $7x = 56$.

$$x = \underline{\quad 8 \quad}$$

- 3 Solve $40 = 8x$.

$$x = \underline{\quad 5 \quad}$$

Check: Put your answer in place of x and read the equation. It must be true.

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Fix it 2 Two steps: the order

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Undo the + or – first, then the $\times$. Whatever you do, do it to both sides.

EXAMPLE

Solve $3x + 5 = 26$.

1. –5 both sides: $3x = 21$
2. Divide both sides by 3: $x = 7$

YOUR TURN

- 1 Solve $4x - 3 = 25$.

$$x = \underline{\quad 7 \quad}$$

- 2 Solve $7 + 5x = 52$.

$$x = \underline{\quad 9 \quad}$$

- 3 Solve $22 = 3x - 8$.

$$x = \underline{\quad 10 \quad}$$

Check: $3x + 5$ means $\times 3$, then + 5. Undo them the other way round: – 5, then divide by 3.

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Fix it 3 Expand the bracket

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Multiply every term inside the bracket by the number outside, signs and all. Then solve.

EXAMPLE

Solve $3(x - 4) = 18$.

1. Expand: $3x - 12 = 18$
2. +12 both sides: $3x = 30$
3. Divide both sides by 3: $x = 10$

YOUR TURN

1 Solve $5(x + 2) = 45$.

$x = 7$

2 Solve $4(2x - 3) = 36$.

$x = 6$

3 Solve $2(x + 6) + 3(x - 1) = 34$.

$x = 5$

Check: Count the terms: two terms inside the bracket give two terms when you expand it.

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Fix it 4 The unknown on both sides

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Take the smaller number of x from both sides. Then solve the two step equation that is left.

EXAMPLE

Solve $7x + 3 = 4x + 18$.

1. $4x$ is the smaller number of x .
2. $-4x$ both sides: $3x + 3 = 18$
3. -3 both sides: $3x = 15$
4. Divide both sides by 3: $x = 5$

YOUR TURN

1 Solve $6x - 5 = 2x + 23$.

$x = 7$

2 Solve $2x + 27 = 7x - 3$.

$x = 6$

3 Solve $4(x + 3) = x + 27$.

$x = 5$

Check: After the first step, x is on one side only.

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Fix it 5 Negative terms and answers

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A term keeps the sign in front of it. Divide by a negative and the sign changes. An answer can be negative.

EXAMPLE

Solve $11 - 3x = 26$.

1. The minus sign belongs to $3x$.
2. -11 both sides: $-3x = 15$
3. Divide both sides by -3 : $x = -5$

YOUR TURN

1 Solve $3x + 20 = 2$.

$$x = \underline{\underline{-6}}$$

2 Solve $9 - 2x = 15$.

$$x = \underline{\underline{-3}}$$

3 Solve $3 - 4x = x + 23$.

$$x = \underline{\underline{-4}}$$

Check: Substitute a negative answer in brackets: $11 - 3 \times (-5) = 11 + 15 = 26$.

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Fix it 6 Fractions in the equation

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Multiply every term on both sides by the denominator. The fraction goes, then solve.

EXAMPLE

Solve $\frac{x}{2} + 3 = 7$.

1. Multiply every term by 2: $x + 6 = 14$
2. -6 both sides: $x = 8$

YOUR TURN

1 Solve $\frac{x}{4} - 1 = 5$.

$$x = \underline{\underline{24}}$$

2 Solve $\frac{x-2}{5} = 3$.

$$x = \underline{\underline{17}}$$

3 Solve $\frac{3x+1}{2} = x + 4$.

$$x = \underline{\underline{7}}$$

Check: After the first line there is no fraction left, and every term was multiplied, numbers on their own too.

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Substitute your answer into each side of the equation on its own. Both sides must give the same number.

EXAMPLE

Is $x = 4$ the solution of $5x - 2 = 3x + 6$?

1. Left: $5 \times 4 - 2 = 18$
2. Right: $3 \times 4 + 6 = 18$
3. Both sides give 18, so yes.

YOUR TURN

1 Is $x = 3$ the solution of $4x + 1 = 2x + 7$?

Yes: both sides 13

2 Is $x = -2$ the solution of $7 - 3x = x + 11$?

No: left 13, right 9

3 Is $x = 9$ the solution of $\frac{x+3}{4} = x - 6$?

Yes: both sides 3

Check: Use the equation you were given, not a line of your working: a slip there would still check out.

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