

# Grade 6 - Solving One-Step Equations - Lesson

Common Core 6.EE.B.5, 6.EE.B.6, 6.EE.B.7 · [maths-pdf.fr/en/](https://maths-pdf.fr/en/)

**To solve a one-step equation, use the inverse operation on both sides. Subtract to undo addition, add to undo subtraction, divide to undo multiplication, and multiply to undo division. For  $x + 5 = 12$ , subtract 5 to get  $x = 7$ . A solution is the value that makes the equation true, so check it by substitution.**

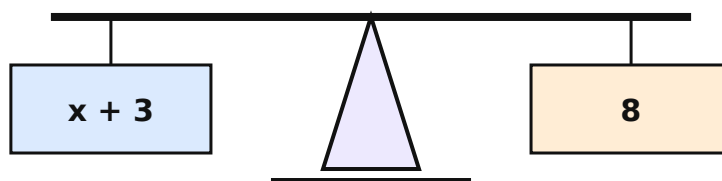
**Grade 6** · Common Core State Standards: **6.EE.B.5, 6.EE.B.6, 6.EE.B.7**

## Key facts

- A solution makes an equation true; check by substituting.
- Do the same operation to both sides to keep the equation balanced.
- Use the inverse operation: add and subtract, multiply and divide.
- Tape diagrams show addition and multiplication equations.
- Write an equation from a story by naming the unknown with a variable.

## What is an equation and a solution?

An **equation** says two expressions are equal, like  $x+3=8$ . A **solution** is a value of the variable that makes the equation true. To test a value, substitute it. Since  $5+3=8$ , the number 5 is a solution.



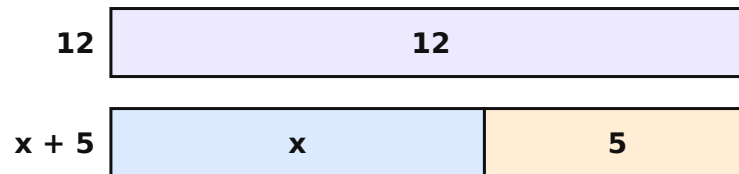
An equation is a balance. Keep both sides equal.

## Solving one-step equations

Use the **inverse operation** on *both* sides: subtract to undo addition, add to undo subtraction, divide to undo multiplication, and multiply to undo division. Equations stay true when you do the same thing to both sides.

## How do you solve equations with addition and subtraction?

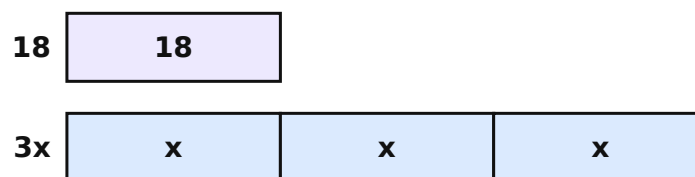
For  $x+5=12$ , subtract 5 from both sides to get  $x=7$ . A tape diagram shows the whole 12 split into the parts  $x$  and 5.



The unknown part is  $12 - 5 = 7$ .

## How do you solve equations with multiplication and division?

For  $3x=18$ , divide both sides by 3 to get  $x=6$ . For  $\frac{x}{5}=4$ , multiply both sides by 5 to get  $x=20$ .



Each part is  $18 / 3 = 6$ .

| Equation     | Undo with     | Solution |
|--------------|---------------|----------|
| $x + 5 = 12$ | subtract 5    | $x = 7$  |
| $x - 5 = 12$ | add 5         | $x = 17$ |
| $5x = 20$    | divide by 5   | $x = 4$  |
| $x / 5 = 4$  | multiply by 5 | $x = 20$ |

Use the inverse operation.

Always check your solution by substituting it into the *original* equation, not into a step you rewrote. If you solved  $x-6=14$  and got  $x=20$ , check  $20-6=14$ . A correct check proves your work and catches slips such as adding when you should have subtracted. When the equation has a decimal or a fraction, the steps do not change. Only the arithmetic is different, so use what you know about decimals and fractions.

## How do you write an equation for a story?

1. Choose a variable for the unknown quantity and say what it means.
2. Write an equation that matches the story.

3. Solve it using the inverse operation.
4. Check the answer in the original story.

**Example:** After spending \$14, Maya has \$23. Let  $x$  be her starting money. Then  $x - 14 = 23$ , so  $x = 23 + 14 = 37$ . She started with \$37. Equations can also have decimals and fractions, such as  $x + 3.5 = 8.2$ , which gives  $x = 4.7$ .

## Questions about solving one-step equations

### What does it mean to solve an equation?

Solving an equation means finding the value of the variable that makes the equation true. For  $x + 5 = 12$ , the solution is 7.

### How do you check a solution?

Substitute the value for the variable and see whether both sides are equal. For  $x = 7$  in  $x + 5 = 12$ ,  $7 + 5 = 12$  is true.

### What is an inverse operation?

An inverse operation undoes another operation. Subtraction undoes addition, and division undoes multiplication.

### Why do you do the same thing to both sides?

An equation is like a balanced scale. If you change one side, you must change the other so the sides stay equal.

### How do you solve an equation with a fraction coefficient?

Multiply both sides by the reciprocal of the fraction. For  $(2/3)x = 8$ , multiply by  $3/2$  to get  $x = 12$ .