

# Algebra 1 - Systems of Linear Equations - Answer Key

Common Core A-REI.C.5, A-REI.C.6, A-REI.D.11, A-CED.A.3 · [maths-pdf.fr/en/](https://maths-pdf.fr/en/)

Use this key to check your work on the systems of equations worksheet. Every solution shows the steps, and the final answer appears in bold. If your answer differs, find the first line where your work and the key disagree, then redo the problem from there without looking.

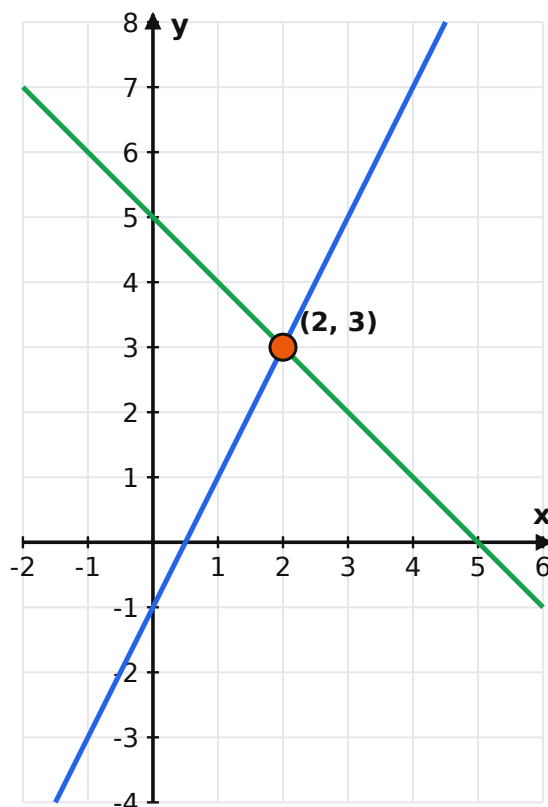
**Algebra 1** · Common Core State Standards: **A-REI.C.5, A-REI.C.6, A-REI.D.11, A-CED.A.3**

## Exercise 1 - Check a solution

First equation:  $3 = 2 + 1$  is true. Second equation:  $3 = -2 + 5$  is true.

**Yes, it is a solution**

## Exercise 2 - Solve by graphing



The lines meet at (2, 3).

The lines cross at (2,3). Check:  $2(2)-1=3$  and  $-2+5=3$ .

(2,3)

### Exercise 3 - Graph and read

Both lines pass through (-1,3):  $-1+4=3$  and  $-2(-1)+1=3$ .

(-1,3)

### Exercise 4 - Parallel lines

Both lines have slope 3 but different y-intercepts (2 and -4), so they are parallel.

**No solution**

### Exercise 5 - Same line

Divide the second equation by 2:  $y=2x+1$ . The equations describe the same line.

**Infinitely many solutions**

### Exercise 6 - Substitution with $y = 3x$

Substitute  $y=3x$ :  $x+3x=12$ , so  $4x=12$  and  $x=3$ .

Then  $y=3(3)=9$ .

(3,9)

### Exercise 7 - Substitution with x

Substitute:  $3(2y-1)+y=11$ . Distribute:  $6y-3+y=11$ .

$7y=14$ , so  $y=2$ . Then  $x=2(2)-1=3$ .

(3,2)

### Exercise 8 - Two slope-intercept equations

Set the expressions equal:  $-x+7=2x+1$ . Then  $6=3x$ , so  $x=2$ .

$$y = -2+7 = 5.$$

(2,5)

### Exercise 9 - Substitution after rearranging

From the first equation,  $y = 10-2x$ . Substitute:  $3x-(10-2x)=5$ .

$$5x-10=5, \text{ so } x=3. \text{ Then } y=10-6=4.$$

(3,4)

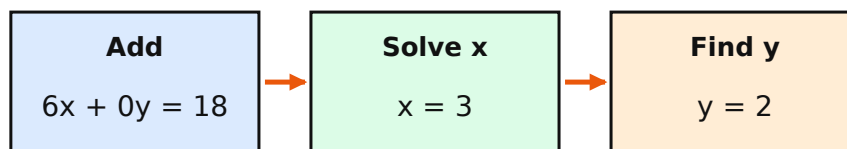
### Exercise 10 - Elimination by adding

Add the equations:  $2x=20$ , so  $x=10$ .

$$\text{Substitute: } 10+y=14, \text{ so } y=4.$$

(10,4)

### Exercise 11 - Elimination with opposites



Adding cancels y.

$$\text{Add: } 6x=18, \text{ so } x=3.$$

$$\text{Substitute: } 2(3)+3y=12, \text{ so } 3y=6 \text{ and } y=2.$$

(3,2)

### Exercise 12 - Elimination by subtracting

Subtract the second equation from the first:  $2x=8$ , so  $x=4$ .

Substitute:  $4+2y=8$ , so  $y=2$ .

$(4,2)$

### Exercise 13 - Multiply one equation

Multiply the first equation by 2 and the second by 3:  $4x+6y=26$  and  $15x-6y=12$ .

Add:  $19x=38$ , so  $x=2$ . Then  $2(2)+3y=13$  gives  $y=3$ .

$(2,3)$

### Exercise 14 - Multiply both equations

Multiply the first by 3 and the second by 4:  $9x-12y=3$  and  $8x+12y=48$ .

Add:  $17x=51$ , so  $x=3$ . Then  $3(3)-4y=1$  gives  $y=2$ .

$(3,2)$

### Exercise 15 - Elimination gives no solution

Multiply the second equation by  $-2$ :  $-2x-4y=-20$ .

Add to the first:  $0=-12$ , which is false.

**No solution**

### Exercise 16 - Movie tickets

8 tickets

4 adults

4 students

Split of the 8 tickets.

$a+s=8$  and  $9a+6s=60$ .

Substitute  $s=8-a$ :  $9a+6(8-a)=60$ , so  $3a+48=60$  and  $a=4$ .

**4 adult tickets and 4 student tickets**

### Exercise 17 - Coins

$d + q = 18$  and  $10d + 25q = 300$  (in cents).

Substitute  $d = 18 - q$ :  $10(18 - q) + 25q = 300$ , so  $180 + 15q = 300$  and  $q = 8$ .

$d = 18 - 8 = 10$ .

**10 dimes and 8 quarters**

### Exercise 18 - Two gyms

Gym A:  $y = 20m + 30$ . Gym B:  $y = 35m$ .

Set equal:  $20m + 30 = 35m$ , so  $30 = 15m$  and  $m = 2$ .

Cost:  $35(2) = 70$ .

**After 2 months, both cost \$70**

### Exercise 19 - Bake sale

$c + m = 40$  and  $1.5c + 2.5m = 70$ .

Substitute  $c = 40 - m$ :  $1.5(40 - m) + 2.5m = 70$ , so  $60 + m = 70$  and  $m = 10$ .

$c = 30$ .

**30 cookies and 10 muffins**

### Exercise 20 - Boat and current

Downstream speed:  $b + c = \frac{24}{2} = 12$ . Upstream speed:  $b - c = \frac{24}{3} = 8$ .

Add:  $2b = 20$ , so  $b = 10$ . Then  $c = 12 - 10 = 2$ .

**Boat 10 mph, current 2 mph**

### Exercise 21 - Number problem

Let the numbers be  $x$  and  $y$ :  $x+y=42$  and  $x=2y+6$ .

Substitute:  $2y+6+y=42$ , so  $3y=36$  and  $y=12$ .

$$x=2(12)+6=30.$$

**30 and 12**