

Algebra 1 - Linear Inequalities in Two Variables and Systems - Answer Key

Common Core A-REI.D.12, A-CED.A.3 · maths-pdf.fr/en/

Here are full solutions for the inequalities in two variables worksheet. Read each step, not just the bold answer, and compare it with your own method. Redo any problem you missed, and note which kind of mistake you made so you can avoid it on the test.

Algebra 1 · Common Core State Standards: **A-REI.D.12, A-CED.A.3**

Exercise 1 - Test a point

Substitute $x=2, y=1$: $1 < 2+2$, which is $1 < 4$.

Yes, it is a solution

Exercise 2 - Not a solution

Substitute: $-2 \geq 2(0)+3$, which is $-2 \geq 3$, false.

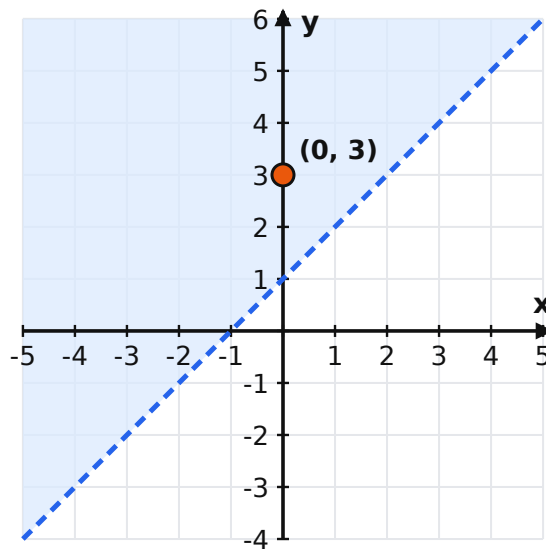
No, it is not a solution

Exercise 3 - Solid or dashed

Strict inequalities ($<$, $>$) use dashed lines. Inequalities with $\leq$ or $\geq$ use solid lines.

(a) solid; (b) dashed; (c) dashed

Exercise 4 - Graph $y > x + 1$

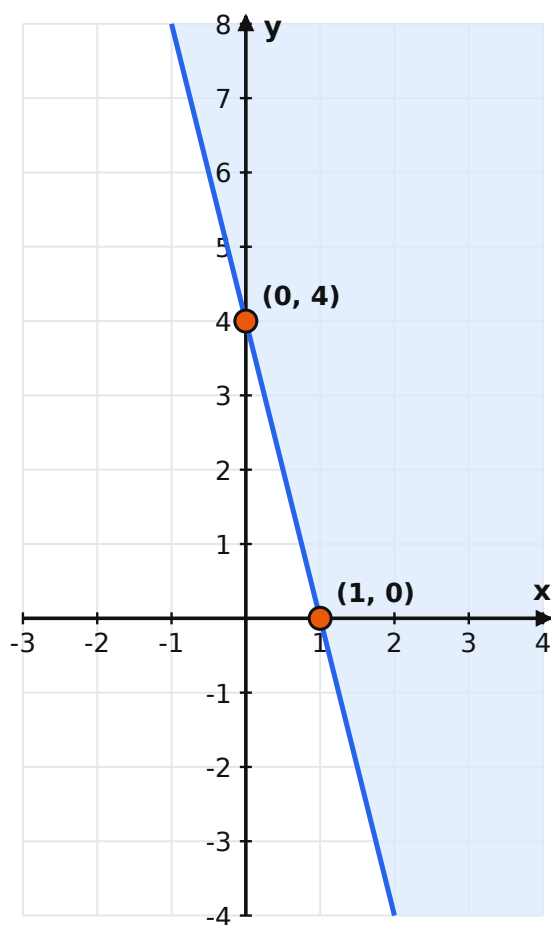


Dashed line, shade above.

Boundary $y = x + 1$ is dashed. Test $(0, 0)$: $0 > 1$ is false, so shade the side without the origin, above the line.

Dashed line through $(0, 1)$ with slope 1; shade above

Exercise 5 - Graph with a solid line



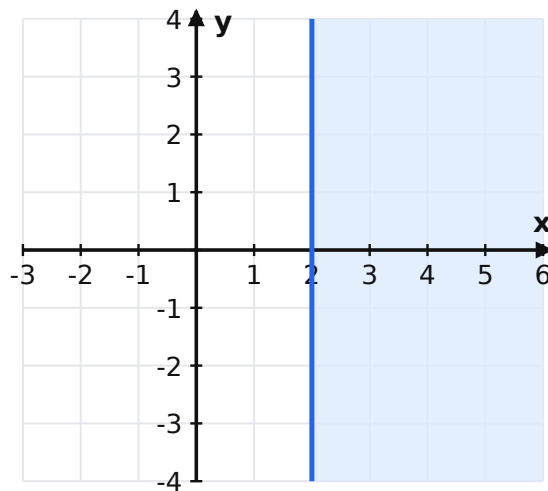
Solid line through the intercepts.

Intercepts: $(1,0)$ and $(0,4)$. The line is solid. Test $(0,0)$: $0 \geq 4$ is false.

So shade the side that does not contain the origin.

Solid line through $(1, 0)$ and $(0, 4)$; shade above the line, away from the origin

Exercise 6 - Vertical boundary

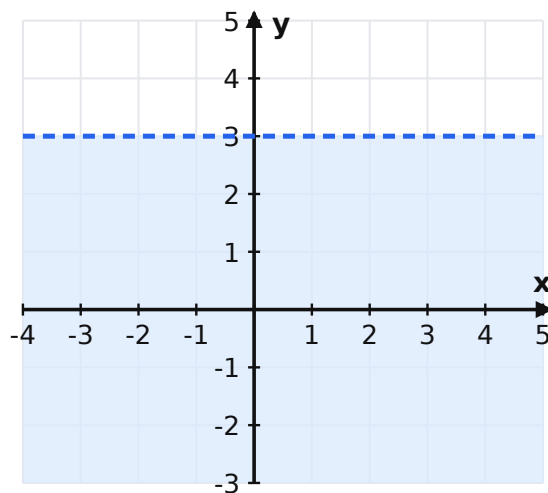


Shade right of the line.

The boundary is the vertical line $x = 2$, solid. Solutions have x at least 2, so shade to the right.

Solid vertical line at $x = 2$; shade right

Exercise 7 - Horizontal boundary



Shade below the dashed line.

The boundary $y = 3$ is dashed. Solutions have y less than 3, so shade below.

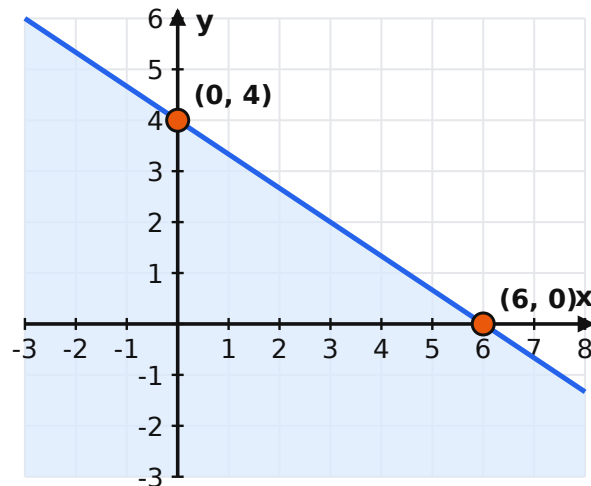
Dashed horizontal line at $y = 3$; shade below

Exercise 8 - Write from a graph

The boundary passes through $(0, -2)$ with slope 1, so it is $y = x - 2$. It is dashed, and the shading is above.

$$y > x - 2$$

Exercise 9 - Standard form inequality

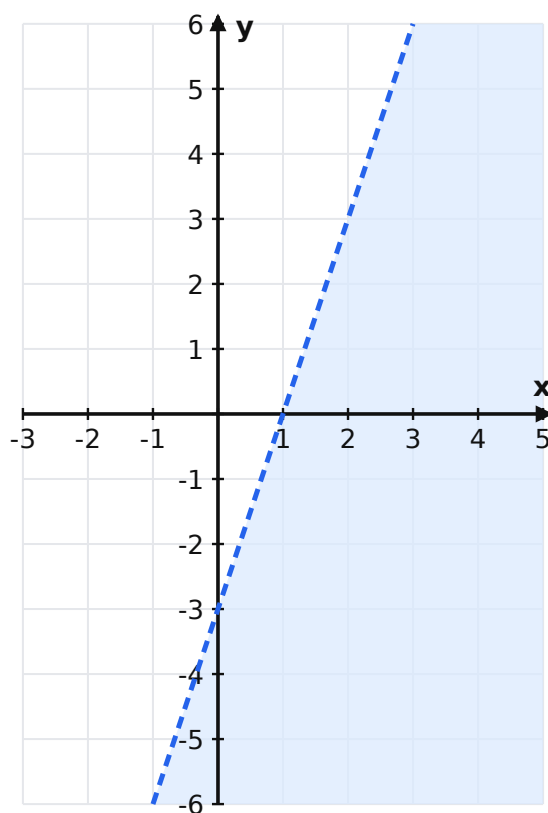


Solid line through the intercepts.

Intercepts: $(6, 0)$ and $(0, 4)$. Draw a solid line. Test $(0, 0)$: $0 \leq 12$ is true, so shade the side with the origin.

Solid line through $(6, 0)$ and $(0, 4)$; shade toward the origin

Exercise 10 - Negative coefficient



Dashed line, shade below.

Solve for y : $-y > -3x + 3$, so $y < 3x - 3$ (reverse the symbol).

Dashed line through $(0, -3)$ with slope 3. Shade below.

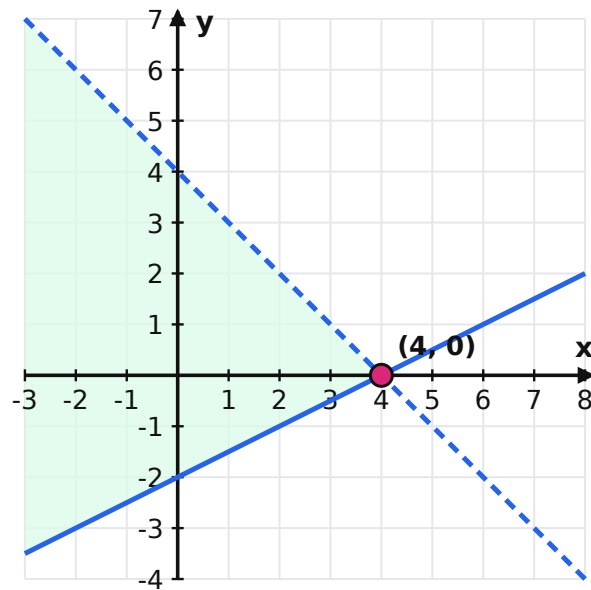
Dashed line $y = 3x - 3$; shade below

Exercise 11 - Which points work?

$(0,0): 0 \leq 4$ true. $(3,1): 3+2=5 \leq 4$ false. $(-2,5): -2+10=8 \leq 4$ false.

$(0,0)$ **only**

Exercise 12 - System of two inequalities



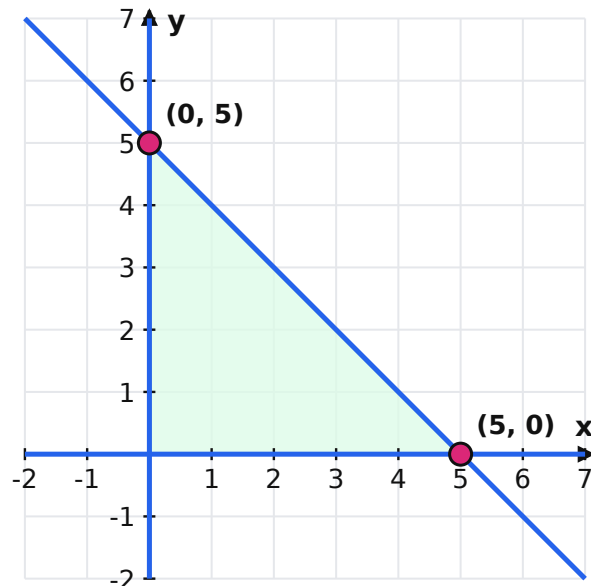
The overlap is the solution.

Graph the solid line $y = \frac{1}{2}x - 2$ and shade above. Graph the dashed line $y = -x + 4$ and shade below. The solution is the overlap.

The lines meet where $\frac{1}{2}x - 2 = -x + 4$, so $1.5x = 6$, at $x = 4$, $y = 0$.

Overlap region with corner (4, 0)

Exercise 13 - Triangular region



The triangle is the solution region.

The region is the triangle with corners $(0,0)$, $(5,0)$, $(0,5)$.

Check $(2,2)$: $2 \geq 0$, $2 \geq 0$, $2+2=4 \leq 5$, all true.

Triangle with corners $(0, 0)$, $(5, 0)$, $(0, 5)$; yes

Exercise 14 - Check a system

First: $2 > 3 - 2$, which is $2 > 1$, true. Second: $2 \leq 2(3)$, which is $2 \leq 6$, true.

Yes

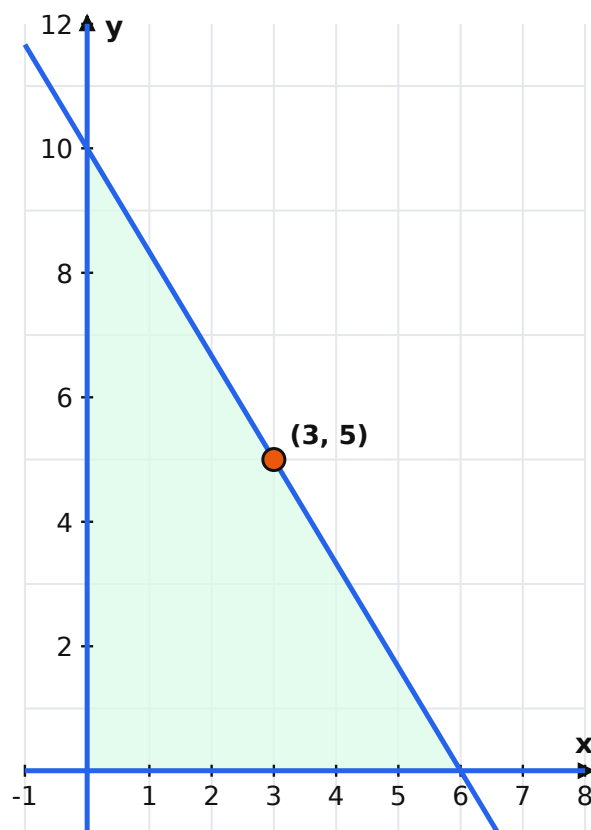
Exercise 15 - Write a system from a graph

The solid boundary through $(0,-3)$ with slope 1 has shading above: $y \geq x - 3$.

The dashed horizontal boundary has shading below: $y < 2$.

$y \geq x - 3$ **and** $y < 2$

Exercise 16 - Lunch budget



The point (3, 5) is on the boundary line.

Total cost: $5x + 3y \leq 30$.

For (3,5): $5(3) + 3(5) = 30 \leq 30$, which is true.

$5x + 3y \leq 30$; **yes, exactly \$30**

Exercise 17 - Two jobs

Hours: $x + y \leq 12$. Pay: $10x + 8y \geq 90$.

(6,5): $11 \leq 12$ and $60 + 40 = 100 \geq 90$, so yes.

(4,4): $40 + 32 = 72 \geq 90$ is false.

(6, 5) works; (4, 4) does not

Exercise 18 - Whole-number combinations

For each x from 0 to 6, count the whole numbers y with $3y \leq 12 - 2x$.

- $x=0$: $y=0,1,2,3,4$ gives 5
- $x=1$: $y \leq 3.33$ gives 4
- $x=2$: $y \leq 2.67$ gives 3
- $x=3$: $y \leq 2$ gives 3
- $x=4$: $y \leq 1.33$ gives 2
- $x=5$: $y \leq 0.67$ gives 1
- $x=6$: $y=0$ gives 1

Total: $5+4+3+3+2+1+1=19$.

19 pairs

Exercise 19 - Truck load

$$25x + 40y \leq 280.$$

$$(4,4): 100 + 160 = 260 \leq 280, \text{ yes.}$$

$$(6,4): 150 + 160 = 310 \leq 280 \text{ is false, no.}$$

(4, 4) yes; (6, 4) no

Exercise 20 - School store

$$(6,4): 6 + 4 = 10 \geq 10 \text{ true; } 6 + 12 = 18 \leq 24 \text{ true. Yes.}$$

$$(2,8): 2 + 8 = 10 \geq 10 \text{ true; } 2 + 24 = 26 \leq 24 \text{ false. No.}$$

(6, 4) yes; (2, 8) no

Exercise 21 - Corner of the region

Subtract the first equation from the second: $2n = 14$, so $n = 7$.

$$\text{Then } p = 10 - 7 = 3.$$

(3,7): 3 pencils and 7 notebooks