Simultaneous equations: special cases

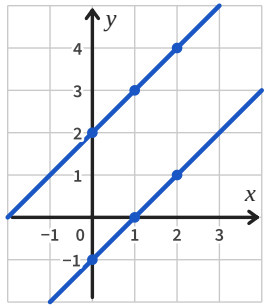
ANSWERS

1

Draw both lines. How many solutions do the simultaneous equations have?

(1) $y = x + 2$ (2) $y = x - 1$

x	y (1)	y (2)
0	2	−1
1	3	0
2	4	1



Answer no solution

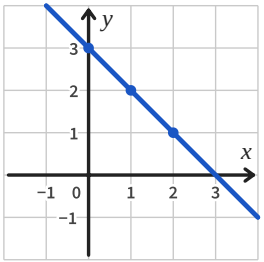
The lines are parallel

2

Draw both lines. How many solutions do the simultaneous equations have?

(1) $y = 3 - x$ (2) $x + y = 3$

x	y (1)	y (2)
0	3	3
1	2	2
2	1	1



Answer infinitely many solutions

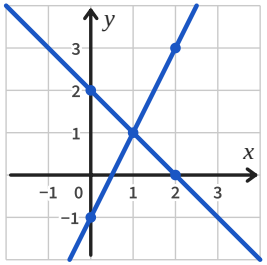
The lines are the same line

3

Draw both lines. How many solutions do the simultaneous equations have?

(1) $y = 2x - 1$ (2) $y = 2 - x$

x	y (1)	y (2)
0	−1	2
1	1	1
2	3	0



Answer x = 1, y = 1

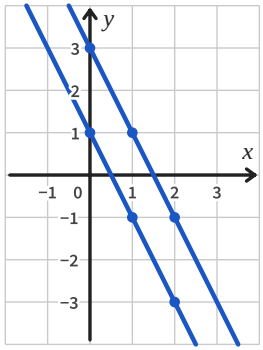
The lines cross at (1, 1)

4

Draw both lines. How many solutions do the simultaneous equations have?

(1) $y = 1 - 2x$ (2) $y = 3 - 2x$

x	y (1)	y (2)
0	1	3
1	−1	1
2	−3	−1



Answer no solution

The lines are parallel

5

How many solutions do the simultaneous equations have?

(1) $y = 5x + 1$ (2) $y = 5x - 3$

	(1)	(2)
Gradient	5	5
y intercept	1	−3

Answer no solution

The lines are parallel

6

How many solutions do the simultaneous equations have?

(1) $y = 2x + 4$ (2) $y = 4 - 2x$

	(1)	(2)
Gradient	2	−2
y intercept	4	4

Answer x = 0, y = 4

The lines cross at (0, 4)

7

How many solutions do the simultaneous equations have?

(1) $2y = 6x + 8$ (2) $y = 3x + 4$

(1) $y = 3x + 4$

	(1)	(2)
Gradient	3	3
y intercept	4	4

Answer infinitely many solutions

The lines are the same line

8

Sam says $y = 4x - 2$ and $3y = 12x - 6$ have no solution, because the equations are different. Explain why Sam is wrong.

(2) ÷ 3: y = 4x − 2

the same line as (1)

Answer infinitely many solutions

Simultaneous equations: special cases *further practice*

ANSWERS

9

How many solutions do $y = 6x - 2$ and $2y = 12x + 4$ have? Give a reason.

(2): $y = 6x + 2$

the same gradient: parallel

Answer no solution

10

Which pair of equations has infinitely many solutions?

A $y = 2x + 3$ and $y = 3x + 2$

B $y = 4 - x$ and $x + y = 4$

C $y = x$ and $y = x + 1$

$x + y = 4$ is $y = 4 - x$

the same line

Answer B

11

Write the equation of a line that gives no solution with $y = 5x - 2$.

gradient 5, any y intercept but −2

Answer e.g. $y = 5x + 1$

12

$y = kx + 3$ and $y = 2x - 4$ have no solution. Find k.

parallel: the same gradient

3 and −4 differ, so not the same line

Answer $k = 2$

13

Gym A costs £20 to join and then £15 a month. Gym B costs £35 to join and then £15 a month. Will the total cost of the two gyms ever be the same? Explain how you know.

$y = 15x + 20$ and $y = 15x + 35$

the same gradient: parallel lines

gym B always costs £15 more

Answer No, never

14

How many solutions do $6x + 3y = 9$ and $y = 2x + 3$ have? If there is one, find it.

(1): $y = 3 - 2x$

different gradients: they cross once

both cross the y axis at (0, 3)

Answer one: $x = 0$, $y = 3$

15

Ria solves $y = 3x + 4$ and $y = 3x - 1$ by writing $3x + 4 = 3x - 1$. She gets $4 = -1$. What does this tell you about the solutions and about the lines?

$4 = -1$ is never true

no x works in both

gradient 3 both, y intercepts 4 and −1

Answer no solution: parallel

16

Find values of a and b so that $y = ax + 2$ and $y = 3x + b$ have (a) no solution, (b) infinitely many solutions.

(a) the same gradient only

(b) the same line

Answer (a) $a = 3$, $b \neq 2$ (b) $a = 3$, $b = 2$