Simultaneous Equations: Special Cases

ANSWERS

1

Show that $6x - 4y = 5$ and $y = 1.5x + 2$ have no solution.

(1): $y = 1.5x - 1.25$

gradient 1.5 both, intercepts −1.25 and 2

Reason parallel: no solution

2

Line L goes through (1, 4) and (3, 10).
Line M goes through (0, 2) and (2, 8).
Do L and M meet? Show how you know.

L: $y = 3x + 1$

M: $y = 3x + 2$: parallel

Answer No, never

3

At a café, Ana pays £7.50 for 3 teas and 2 cakes. Ben says he paid £14 for 6 teas and 4 cakes at the same prices.
Explain why Ben must be wrong.

$3t + 2c = 7.5$ and $6t + 4c = 14$

doubling the first: $6t + 4c = 15$, not 14

Reason 6 teas and 4 cakes cost £15

4

The lines $y = 2x + 1$, $4x - 2y = 6$ and $x + y = 7$ are drawn on one grid.
Find every point where two of the lines meet. Give exact values.

the first two are parallel

$y = 2x - 3$ and $x + y = 7$: $3x = 10$

Answer (2, 5) and $(\frac{10}{3}, \frac{11}{3})$

5

$2x + 3y = 24$ and $6x + 9y = 72$ have infinitely many solutions. Find all the solutions where x and y are both positive integers.

(2) is 3 × (1): one line

$2x = 24 - 3y$, so y is even

Answer (3, 6), (6, 4), (9, 2)

6

The lines $kx + y = 5$, $2x + 3y = 1$ and $x - y = 3$.
(a) Find k so that all three lines pass through one point.
(b) Find k so that the first and the last have no solution.

(a) they meet at (2, −1): $2k - 1 = 5$

(b) gradient $-k = 1$

Answer (a) $k = 3$ (b) $k = -1$

7

$kx + 2y = 3$ and $8x + ky = 6$.
Find the value of k for which there is
(a) no solution, (b) infinitely many solutions.

parallel when $k^2 = 16$, $k = \pm 4$

$k = 4$: (2) = 2 × (1); $k = -4$: $6 \neq -6$

Answer (a) $k = -4$ (b) $k = 4$

8

$px + qy = r$ and $2px + 2qy = 3r$, where p and q are not both 0.
(a) Show that there is no solution when $r \neq 0$.
(b) What happens when $r = 0$?

2 × (1): $2px + 2qy = 2r$

subtract: $0 = r$

Reason (a) $0 = r \neq 0$ (b) infinitely many