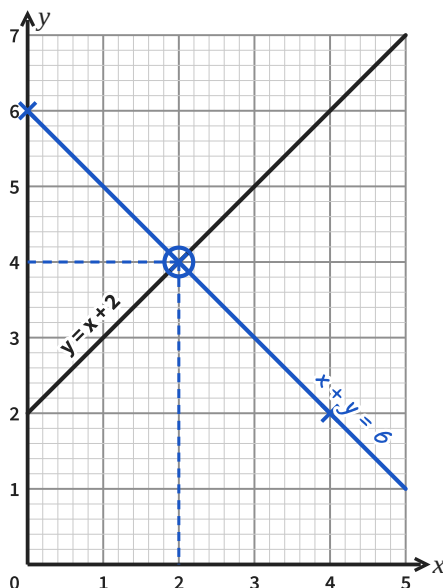


Simultaneous Equations: Solving with Graphs

ANSWERS

1

The line $y = x + 2$ is drawn. Draw the line $x + y = 6$. Solve the simultaneous equations.



$$x + y = 6$$

x	y
0	6
2	4
4	2

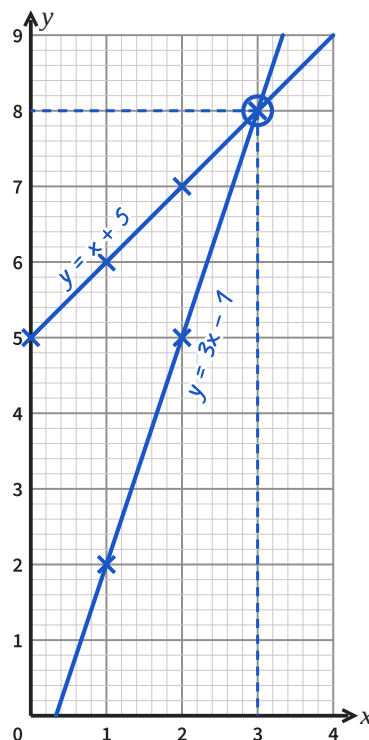
$$x = \underline{\quad 2 \quad} \quad y = \underline{\quad 4 \quad}$$

Check in both equations

$$4 = 2 + 2 \quad \checkmark \quad 2 + 4 = 6 \quad \checkmark$$

2

Draw the lines $y = 3x - 1$ and $y = x + 5$. Solve the simultaneous equations.



$$y = 3x - 1$$

x	y
1	2
2	5
3	8

$$y = x + 5$$

x	y
0	5
1	6
2	7
3	8

$$x = \underline{\quad 3 \quad}$$

$$y = \underline{\quad 8 \quad}$$

Check in both equations

$$8 = 3 \times 3 - 1 \quad \checkmark$$

$$8 = 3 + 5 \quad \checkmark$$

3

Draw $x + 2y = 4$ from where it crosses the axes. Draw $y = x + 5$. Solve the simultaneous equations.

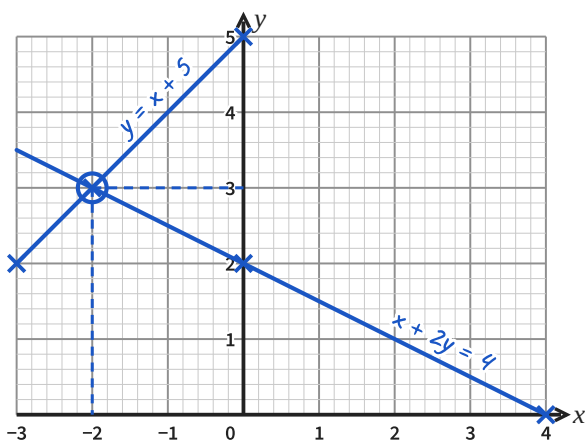
$$x + 2y = 4$$

crosses the y axis at (0, 2)

crosses the x axis at (4, 0)

$$y = x + 5$$

x	-3	-2	0
y	2	3	5



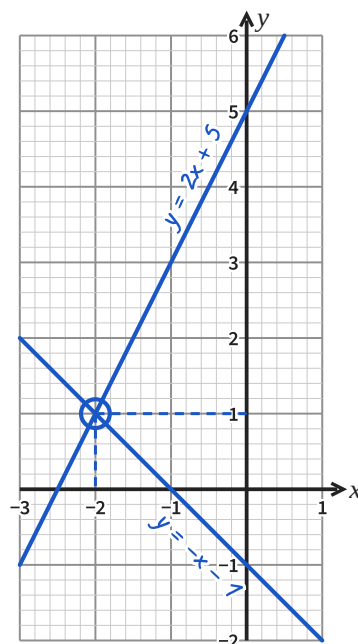
$$x = \underline{\quad -2 \quad} \quad y = \underline{\quad 3 \quad}$$

Check in both equations

$$(-2) + 2 \times 3 = 4 \quad \checkmark \quad 3 = (-2) + 5 \quad \checkmark$$

4

Draw the lines $y = -x - 1$ and $y = 2x + 5$. Solve the simultaneous equations.



$$x = \underline{\quad -2 \quad}$$

$$y = \underline{\quad 1 \quad}$$

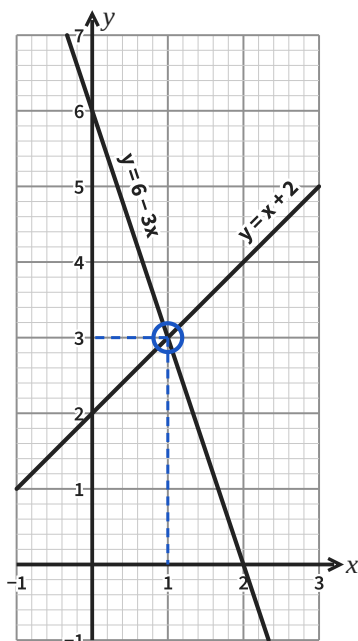
Check in both equations

$$1 = -(-2) - 1 \quad \checkmark$$

$$1 = 2 \times (-2) + 5 \quad \checkmark$$

5

The lines $y = x + 2$ and $y = 6 - 3x$ are drawn. Ali says the solution is $x = 3, y = 1$. What has Ali done wrong? Write the correct solution.



Ali has read the coordinates the wrong way round. The point $(1, 3)$ means $x = 1$ and $y = 3$.

$$x = 1$$

$$y = 3$$

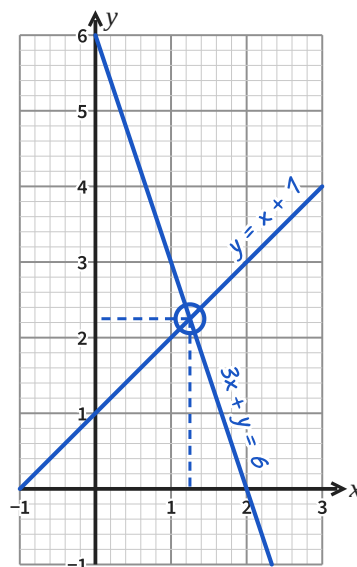
Check in both equations

$$3 = 1 + 2 \checkmark$$

$$3 = 6 - 3 \times 1 \checkmark$$

6

(a) Draw the lines $y = x + 1$ and $3x + y = 6$. Use your graph to estimate the solution. (b) Solve the simultaneous equations exactly.



(a)

$$x \approx 1.2 \text{ or } 1.3$$

$$y \approx 2.2 \text{ or } 2.3$$

(b)

$$x + 1 = 6 - 3x$$

$$4x = 5$$

$$x = \frac{5}{4}$$

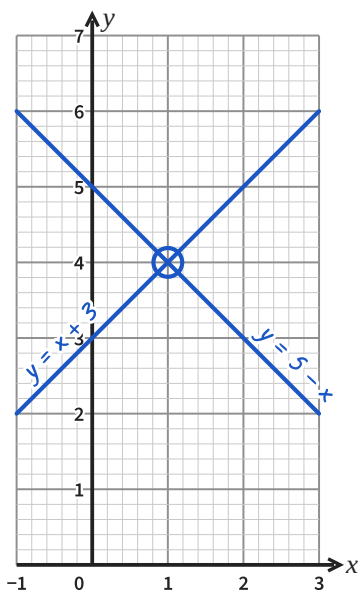
$$y = \frac{9}{4}$$

Check in both equations

$$9/4 = 5/4 + 1 \checkmark \quad 3 \times 5/4 + 9/4 = 6 \checkmark$$

7

Write a pair of simultaneous equations whose solution is $x = 1, y = 4$. Draw their lines to check.



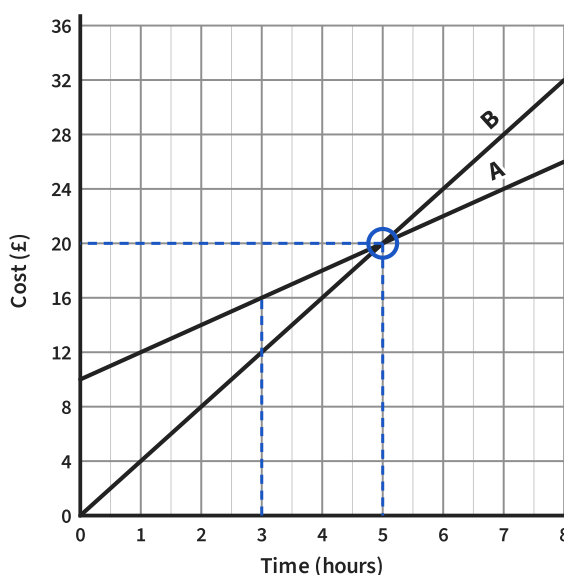
$$(1) \quad y = x + 3$$

$$(2) \quad y = 5 - x$$

or any two lines through $(1, 4)$

8

Shop A hires out bikes for £10 plus £2 an hour. Shop B charges £4 an hour. (a) After how many hours do they cost the same? (b) Which shop is cheaper for a 3 hour ride? Give both costs.



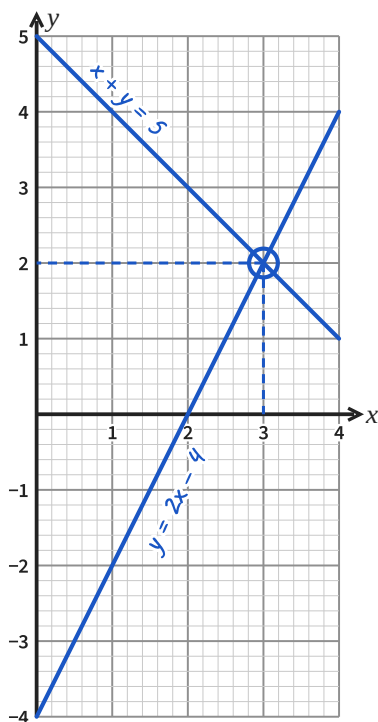
(a) 5 hours (both £20)

(b) shop B (£12, against £16 at A)

Simultaneous Equations: Solving with Graphs *further practice* **ANSWERS**

9

Solve the simultaneous equations $y = 2x - 4$ and $x + y = 5$ by drawing their lines.



$x = 3$

$y = 2$

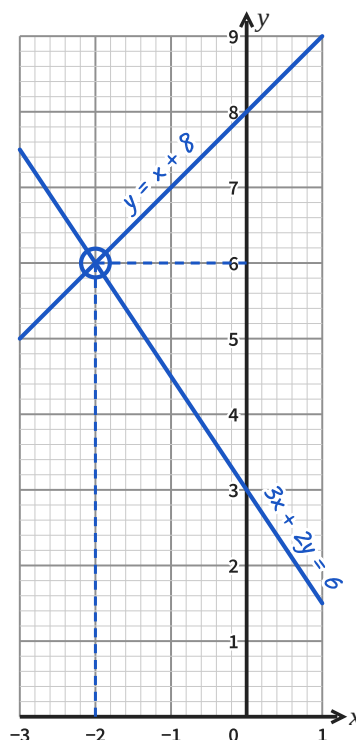
Check in both equations

$2 = 2 \times 3 - 4 \checkmark$

$3 + 2 = 5 \checkmark$

10

Solve the simultaneous equations $3x + 2y = 6$ and $y = x + 8$ by drawing their lines.



$x = -2$

$y = 6$

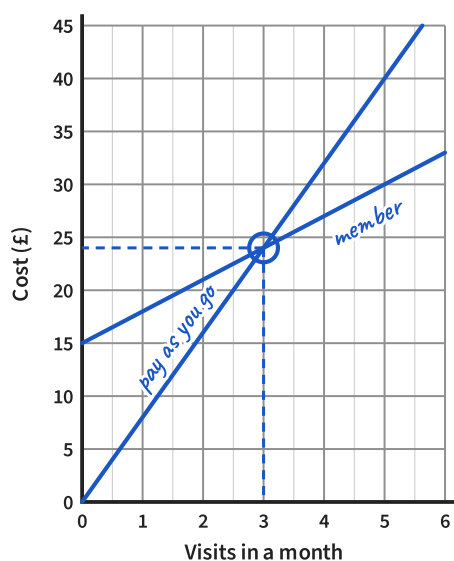
Check in both equations

$3 \times (-2) + 2 \times 6 = 6 \checkmark$

$6 = (-2) + 8 \checkmark$

11

A climbing wall charges £8 a visit, so $C = 8v$. Members pay £15 a month plus £3 a visit, so $C = 3v + 15$. Draw both lines. (a) For how many visits is the cost the same? (b) Which is cheaper for 5 visits?

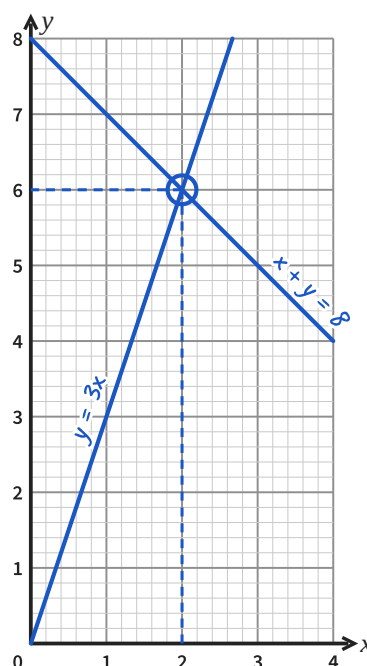


(a) 3 visits (both £24)

(b) members (£30, against £40)

12

Two numbers x and y add up to 8. y is three times x . Draw the lines $x + y = 8$ and $y = 3x$. Find the two numbers.



$x = 2$

$y = 6$

Check in both equations

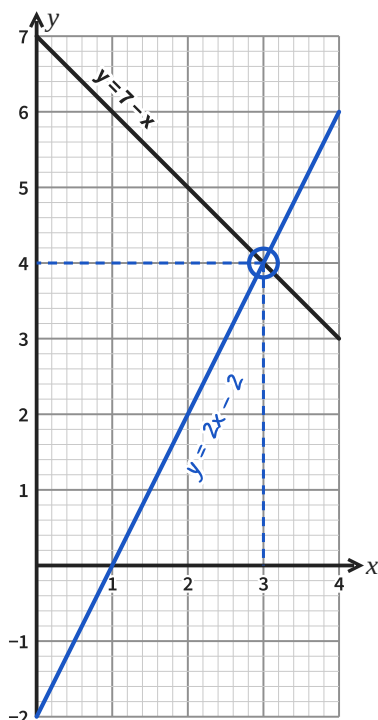
$2 + 6 = 8 \checkmark$

$6 = 3 \times 2 \checkmark$

Simultaneous Equations: Solving with Graphs *further practice* **ANSWERS**

13

The line $y = 7 - x$ is drawn. The line $y = 2x + c$ crosses it where $x = 3$. Find the value of c . Draw the second line.



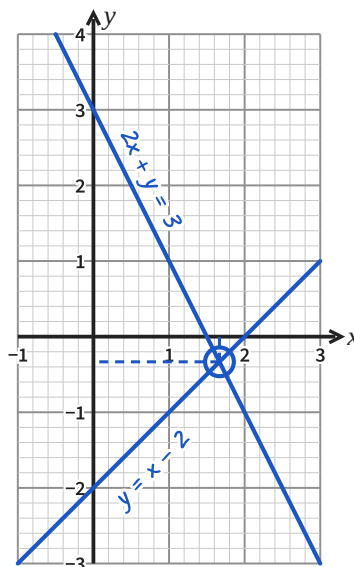
$$\begin{aligned} \text{At } x = 3, \\ y &= 7 - 3 = 4 \\ 4 &= 2 \times 3 + c \\ c &= 4 - 6 \end{aligned}$$

$$c = \underline{-2}$$

14

(a) Draw the lines $y = x - 2$ and $2x + y = 3$.

Use your graph to estimate the solution. (b) Solve the simultaneous equations exactly.



(a)

$$x \approx \underline{1.6 \text{ or } 1.7}$$

$$y \approx \underline{-0.3 \text{ or } -0.4}$$

(b)

$$2x + x - 2 = 3$$

$$3x = 5$$

$$x = \underline{\frac{5}{3}}$$

$$y = \underline{-\frac{1}{3}}$$

Check in both equations

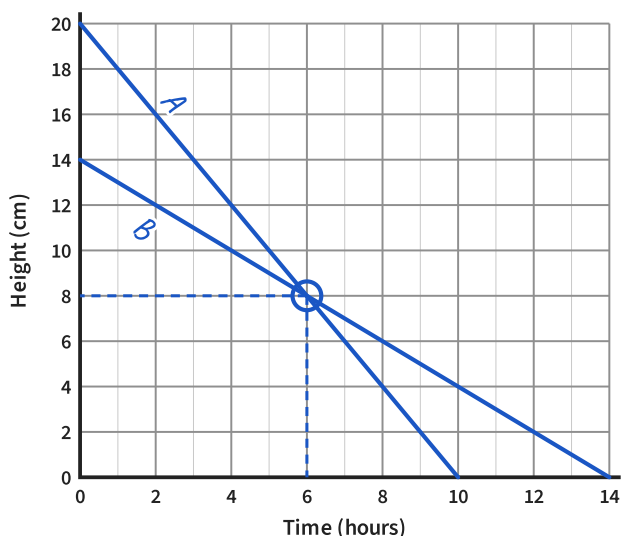
$$(-1/3) = 5/3 - 2 \quad \checkmark \quad 2 \times 5/3 + (-1/3) = 3 \quad \checkmark$$

15

Candle A is 20 cm tall and burns down 2 cm an hour, so $h = 20 - 2t$. Candle B is 14 cm tall and burns down 1 cm an hour, so $h = 14 - t$. They are lit together.

Draw both lines. (a) When are they the same height?

(b) Which candle burns out first?

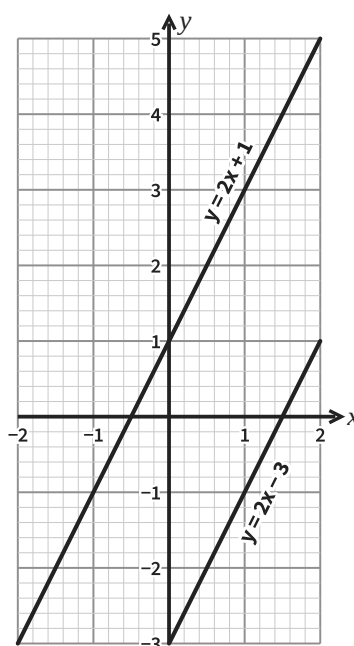


(a) after 6 hours (both 8 cm tall)

(b) candle A (after 10 hours)

16

Jay draws the lines $y = 2x + 1$ and $y = 2x - 3$ to solve them as simultaneous equations. Explain why he cannot find a solution.



Both lines have gradient 2, so they are parallel. They never cross, so no values of x and y make both equations true.