

Plotting Straight-Line Graphs

Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (4 marks)

(a) Complete the table of values for $y = 2x + 1$

x	-1	0	1	2	3
y	-1	1	3	5	7

Substitute each value of x into $y = 2x + 1$.

$$x = 0: y = 2 \times 0 + 1 = 1$$

$$x = 2: y = 2 \times 2 + 1 = 5$$

$$x = 3: y = 2 \times 3 + 1 = 7$$

Check: the y -values go up by 2 each time: -1, 1, 3, 5, 7 ✓

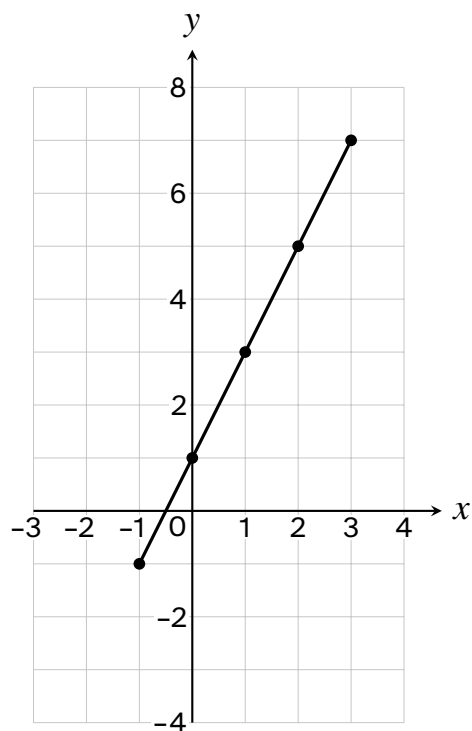
Answer: 1, 5, 7

Marks: 2 marks for all three correct. 1 mark for two correct.

(b) On the grid, draw the graph of $y = 2x + 1$ for values of x from -1 to 3

Plot the points from the table: (-1, -1), (0, 1), (1, 3), (2, 5), (3, 7).

Join them with a ruler, from $x = -1$ to $x = 3$.



Tip: Join the points with one straight ruled line that goes all the way from $x = -1$ to $x = 3$. Plotting the points without joining them loses a mark.

Marks: 2 marks for a correct straight line from $x = -1$ to $x = 3$. 1 mark for plotting at least 4 points correctly.

2 (4 marks)

(a) Complete the table of values for $y = 3x - 2$

x	-1	0	1	2	3
y	-5	-2	1	4	7

Substitute each value of x into $y = 3x - 2$.

$$x = -1: y = 3 \times (-1) - 2 = -3 - 2 = -5$$

$$x = 1: y = 3 \times 1 - 2 = 1$$

$$x = 2: y = 3 \times 2 - 2 = 4$$

Answer: -5, 1, 4

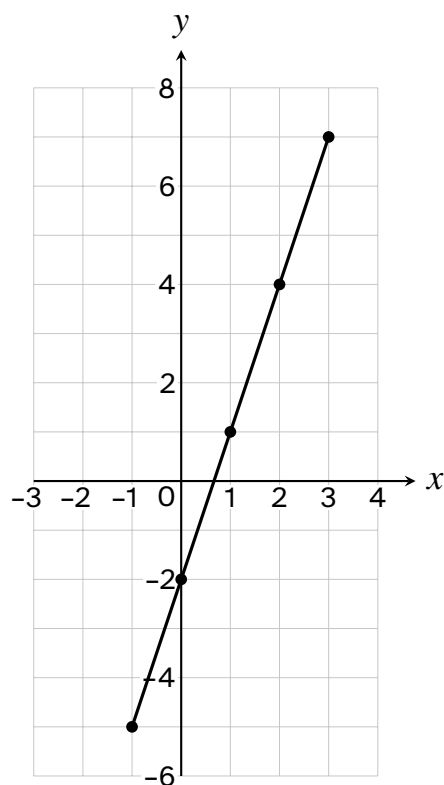
Tip: Take care with negative x : $3 \times (-1) = -3$, then $-3 - 2 = -5$ (not -1). The y -values should go up by 3 each time.

Marks: 2 marks for all three correct. 1 mark for two correct.

- (b) Draw the graph of $y = 3x - 2$ for values of x from -1 to 3

Plot the points from the table: $(-1, -5)$, $(0, -2)$, $(1, 1)$, $(2, 4)$, $(3, 7)$.

Join them with a ruler.



Marks: 2 marks for a correct straight line. 1 mark for at least 4 points plotted correctly.

3 (3 marks)

On the grid, draw the graph of $y = 3 - 2x$ for values of x from -2 to 4

Make a table of values first.

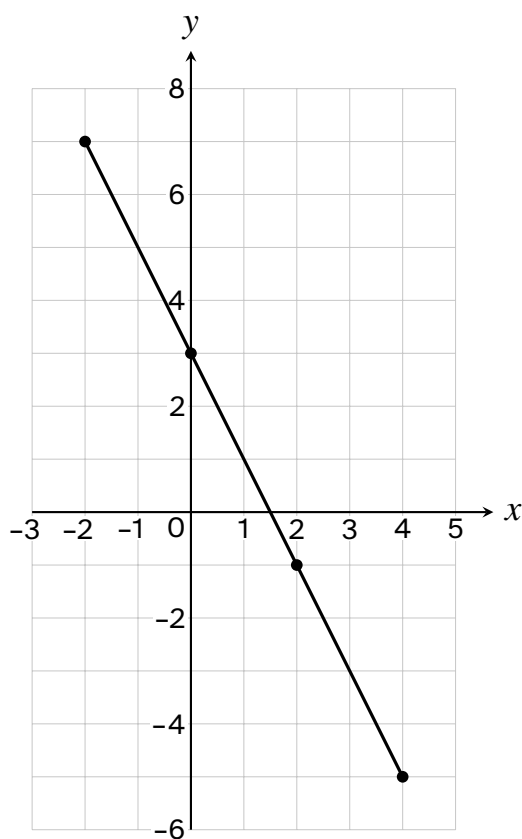
$$x = -2: y = 3 - 2 \times (-2) = 3 + 4 = 7$$

$$x = 0: y = 3 - 2 \times 0 = 3$$

$$x = 2: y = 3 - 2 \times 2 = -1$$

$$x = 4: y = 3 - 2 \times 4 = -5$$

Plot the points and join them with a ruler, from $x = -2$ to $x = 4$.

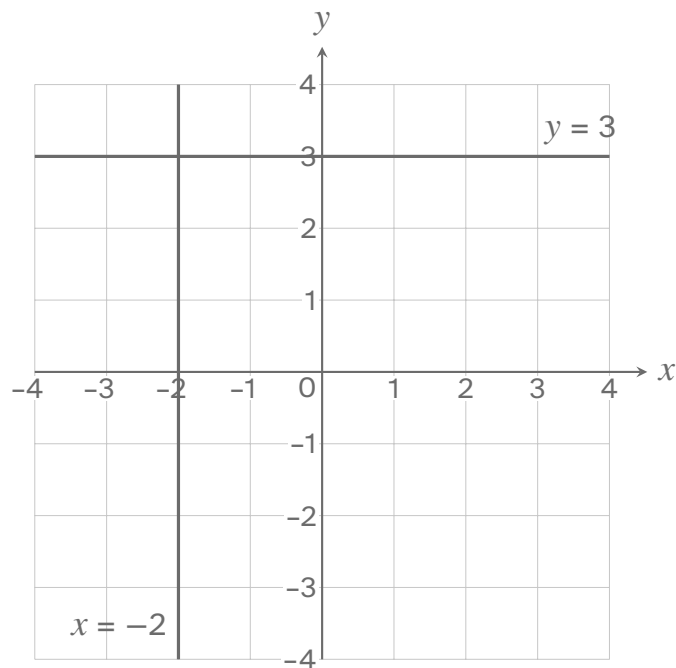


Tip: Take care with the negative: when $x = -2$, $-2x = +4$, so $y = 7$. The line slopes **down** from left to right because the x term is negative.

Marks: 3 marks for a correct line from $x = -2$ to $x = 4$. 2 marks for at least 3 correct points plotted. 1 mark for at least 2 correct points or a correct table.

4 (3 marks)

Here is the grid with both lines drawn.



- (a) Draw the line $y = 3$ on the grid.

Every point on the line $y = 3$ has y -coordinate 3, e.g. $(0, 3)$, $(1, 3)$, $(2, 3)$.

So it is a horizontal line through 3 on the y -axis.

- (b) Draw the line $x = -2$ on the grid.

Every point on the line $x = -2$ has x -coordinate -2 .

So it is a vertical line through -2 on the x -axis.

Tip: $x = \dots$ lines are vertical and $y = \dots$ lines are horizontal. Think: every point on $x = -2$ has x -coordinate -2 .

- (c) Write down the coordinates of the point where the two lines cross.

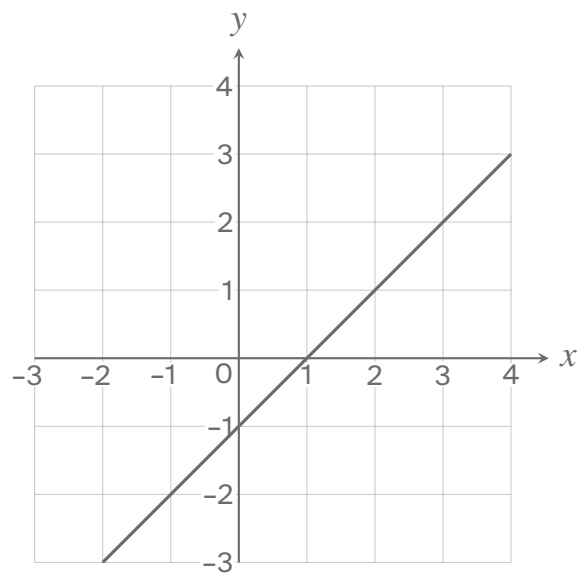
The crossing point is on both lines.

So it has $x = -2$ and $y = 3$.

Answer: $(-2, 3)$

5 (1 mark)

Circle the equation of this line.



Options: $y = x$, $y = x + 1$, $y = x - 1$, $y = -x$

Read some points on the line: $(0, -1)$, $(1, 0)$, $(2, 1)$.

Each y-coordinate is 1 less than the x-coordinate.

So $y = x - 1$.

Answer: $y = x - 1$

6 (1 mark)

Kofi wants to draw the graph of $y = 2x + 1$

He makes this table of values.

x	0	1	2	3
y	1	3	6	7

Which y-value in Kofi's table is wrong?

Give the correct value.

Work out each y-value with $y = 2x + 1$:

$$x = 0: y = 1 \quad \checkmark \quad x = 1: y = 3 \quad \checkmark$$

$$x = 2: y = 2 \times 2 + 1 = 5, \text{ not } 6.$$

$$x = 3: y = 7 \quad \checkmark$$

(The y -values should go up by 2 each time: 1, 3, 5, 7.)

Answer: When $x = 2$, y should be 5 (not 6)

Tip: For a straight line, the y -values in the table go up (or down) by the same amount each time. A value that breaks the pattern is a mistake.

7 (1 mark)

Does the point (4, 11) lie on the line $y = 3x - 1$?

Tick a box.

Show how you decide.

Substitute $x = 4$ into $y = 3x - 1$.

$$y = 3 \times 4 - 1 = 12 - 1 = 11$$

This matches the y -coordinate of the point, so it lies on the line.

Answer: Yes

Tip: To check if a point is on a line, substitute its x -coordinate into the equation and see if you get its y -coordinate.

8 (3 marks)

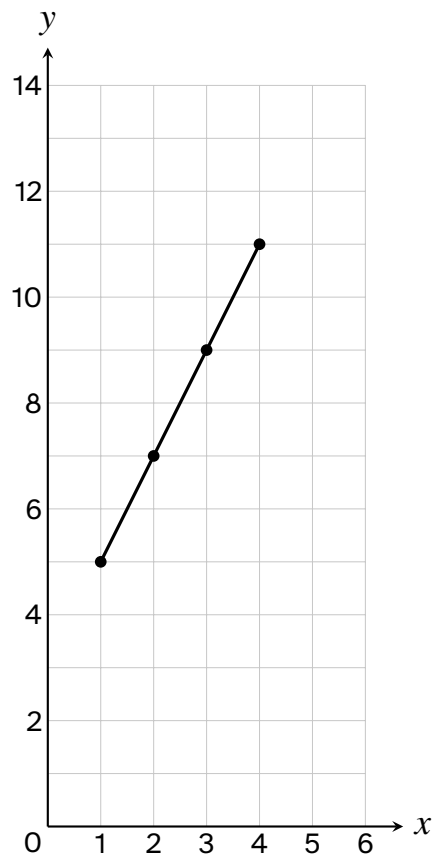
Here is a table of values for the equation $y = 2x + 3$

x	1	2	3	4
y	5	7	9	11

(a) Draw the graph of $y = 2x + 3$ for values of x from 1 to 4

Plot the points from the table: (1, 5), (2, 7), (3, 9), (4, 11).

Join them with a ruler, from $x = 1$ to $x = 4$ only.



Tip: Check the scale on the y-axis. Here each square is 1 unit, but the numbers go up in 2s.

Marks: 2 marks for a correct line from $x = 1$ to $x = 4$. 1 mark for at least 3 points plotted correctly.

- (b) Work out the value of y when $x = 2.5$

Substitute $x = 2.5$ into $y = 2x + 3$.

$$y = 2 \times 2.5 + 3 = 5 + 3 = 8$$

(Or go up from 2.5 on the x -axis to the line, then across to the y -axis.)

Answer: 8

9 (4 marks)

- (a) Complete the table of values for $x + 3y = 6$

x	-3	0	3	6	9
y	3	2	1	0	-1

Substitute each value of x and solve for y .

$x = -3$: $-3 + 3y = 6$, so $3y = 9$ and $y = 3$

$x = 3$: $3 + 3y = 6$, so $3y = 3$ and $y = 1$

$x = 9$: $9 + 3y = 6$, so $3y = -3$ and $y = -1$

Check: the y -values go down by 1 each time: 3, 2, 1, 0, -1 ✓

Answer: 3, 1, -1

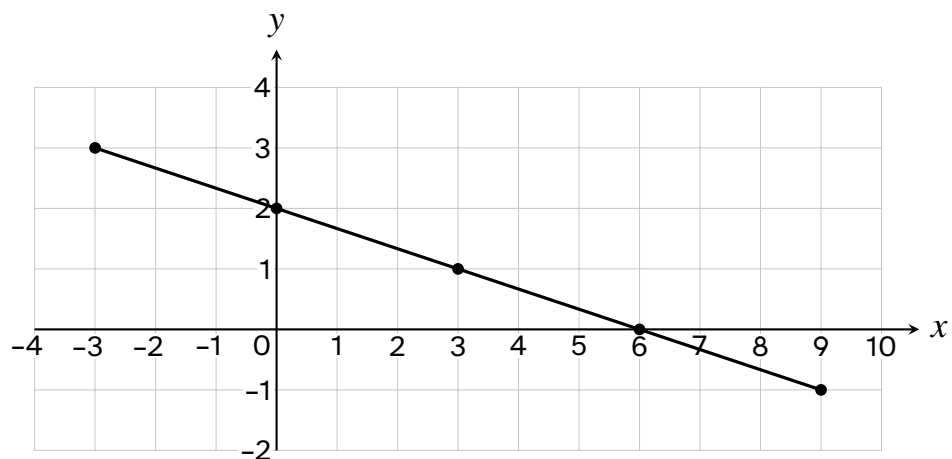
Tip: The equation is not in the form $y = \dots$, so put in the value of x and then solve to find y . Do not just add or multiply the numbers.

Marks: 2 marks for all three correct. 1 mark for two correct.

- (b) On the grid, draw the line $x + 3y = 6$ for values of x from -3 to 9

Plot the points from the table: (-3, 3), (0, 2), (3, 1), (6, 0), (9, -1).

Join them with a ruler, from $x = -3$ to $x = 9$.



Tip: Check the line crosses the y -axis at 2 and the x -axis at 6: these come from putting $x = 0$ and then $y = 0$ into $x + 3y = 6$.

Marks: 2 marks for a correct line from $x = -3$ to $x = 9$. 1 mark for at least 3 correct points plotted.