

Plotting Straight-Line Graphs

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • 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 $y = 3x + 1$

x	-2	-1	0	1	2	3
y	-5	-2	1	4	7	10

Substitute each value of x into $y = 3x + 1$.

$$x = -2: y = 3 \times (-2) + 1 = -6 + 1 = -5$$

$$x = 0: y = 3 \times 0 + 1 = 1$$

$$x = 1: y = 3 \times 1 + 1 = 4$$

$$x = 3: y = 3 \times 3 + 1 = 10$$

Check: the y -values go up by 3 each time ✓

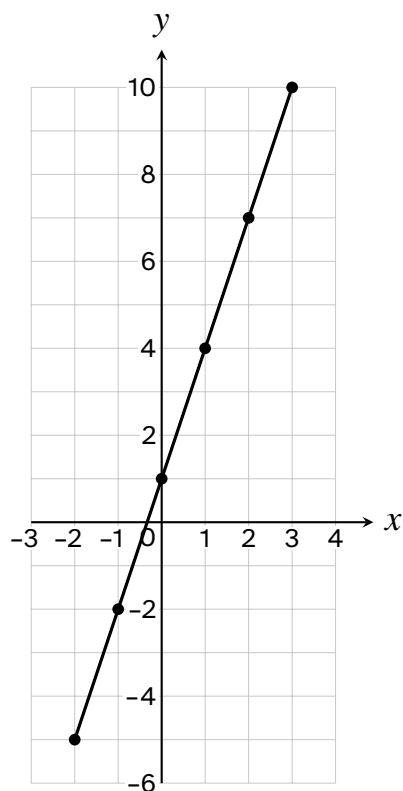
Answer: -5, 1, 4, 10

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

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

Plot the points from the table.

Join them with one straight line, using a ruler, from $x = -2$ to $x = 3$.



Tip: Always join the points with a ruled straight line. If one point is not in line with the others, go back and check it in your table.

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

2 (4 marks)

(a) Complete the table of values for $y = 4 - 2x$

x	-1	0	1	2	3	4
y	6	4	2	0	-2	-4

Substitute each value of x into $y = 4 - 2x$.

$$x = -1: y = 4 - 2 \times (-1) = 4 + 2 = 6$$

$$x = 1: y = 4 - 2 \times 1 = 2$$

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

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

Check: the y -values go down by 2 each time ✓

Answer: 6, 2, -2, -4

Tip: Take care with negative x : $-2 \times (-1) = +2$, so when $x = -1$, $y = 4 + 2 = 6$.

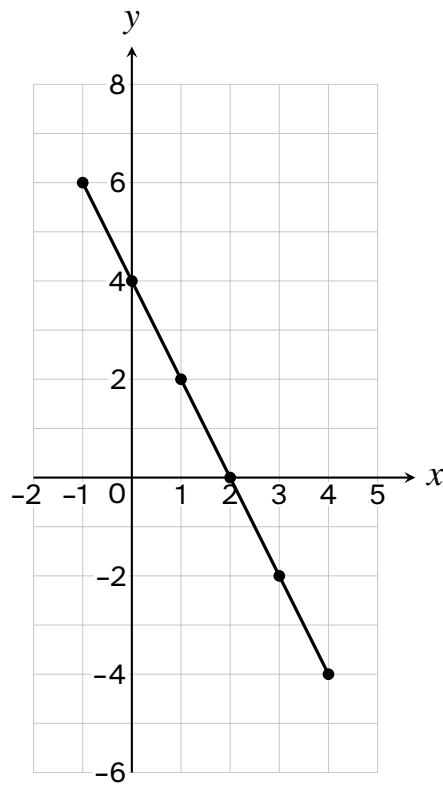
Marks: 2 marks for all four correct. 1 mark for two or three correct.

- (b) On the grid, draw the graph of $y = 4 - 2x$ for values of x from -1 to 4

Plot the points from the table.

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

The line slopes **down**, because y gets smaller as x gets bigger.



Marks: 1 mark for at least 4 points plotted correctly. 1 mark for the correct line.

3 (3 marks)

On the grid, draw the graph of $y = \frac{1}{2}x + 2$ for values of x from -4 to 4

Make a table of values. Even values of x give whole-number y -values.

$$x = -4: y = \frac{1}{2} \times (-4) + 2 = -2 + 2 = 0$$

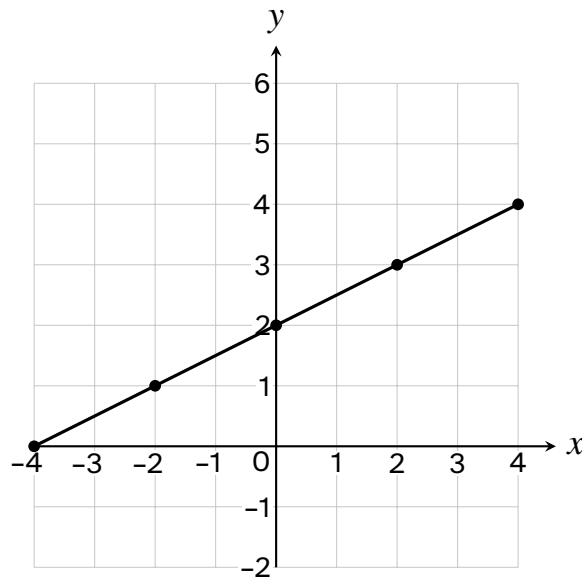
$$x = -2: y = -1 + 2 = 1$$

$$x = 0: y = 0 + 2 = 2$$

$$x = 2: y = 1 + 2 = 3$$

$$x = 4: y = 2 + 2 = 4$$

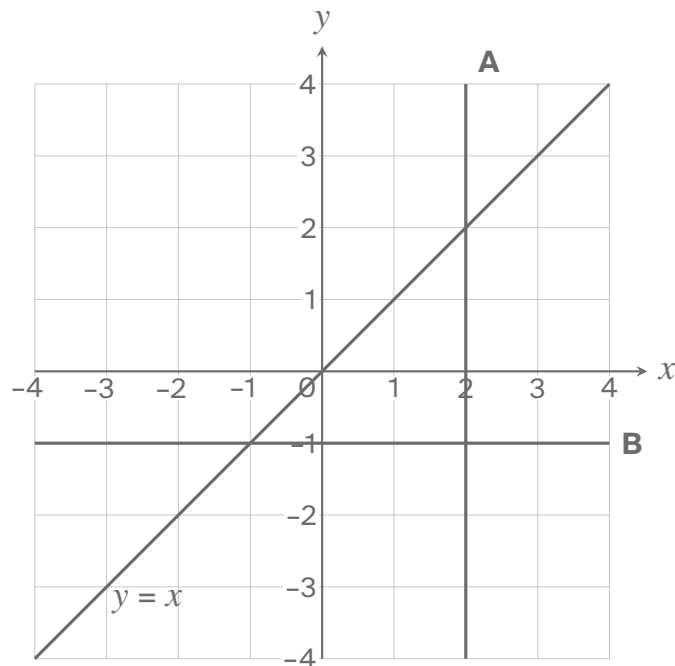
Plot the points and join them with a ruler, from $x = -4$ to $x = 4$.



Marks: 3 marks for a correct line from $x = -4$ 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)

Lines **A** and **B** are drawn on the grid. The line $y = x$ has been added for part (c).



- (a) Write down the equation of line **A**.

Line **A** is vertical.

Every point on it has x -coordinate 2, e.g. (2, 0), (2, 3).

Answer: $x = 2$

Tip: A vertical line has equation $x = \dots$ and a horizontal line has equation $y = \dots$. Students often mix these up.

- (b) Write down the equation of line **B**.

Line **B** is horizontal.

Every point on it has y -coordinate -1 .

Answer: $y = -1$

- (c) On the grid, draw the line with equation $y = x$

On $y = x$ the two coordinates are equal.

Draw a straight line through $(0, 0)$, $(1, 1)$, $(2, 2)$, $(-1, -1)$, ... (shown on the grid above).

5 (2 marks)

Does the point $(-3, -7)$ lie on the line $y = 2x - 1$?
You must show how you get your answer.

Substitute $x = -3$ into $y = 2x - 1$.

$$y = 2 \times (-3) - 1 = -6 - 1 = -7$$

This matches the y -coordinate of the point.

So yes, $(-3, -7)$ lies on the line.

Answer: Yes

Marks: 1 mark for substituting $x = -3$. 1 mark for Yes with -7 shown.

6 (2 marks)

Find the coordinates of the point where the line $y = 5x - 10$ crosses the x -axis.

On the x -axis, $y = 0$.

So $5x - 10 = 0$

Add 10: $5x = 10$

Divide by 5: $x = 2$

The point is $(2, 0)$.

Answer: $(2, 0)$

Tip: Don't give $(0, -10)$. That is where the line crosses the y -axis. On the x -axis, $y = 0$.

Marks: 1 mark for $5x - 10 = 0$. 1 mark for $(2, 0)$.

7 (3 marks)

On the grid, draw the graph of $2x + y = 6$ for values of x from -1 to 4

Find some points on the line.

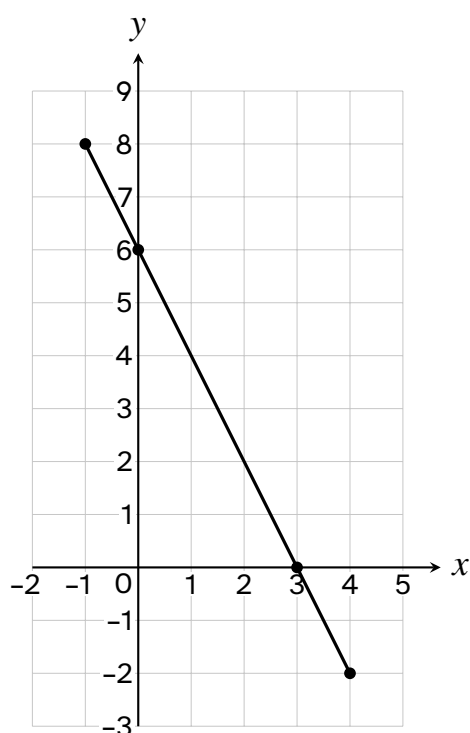
$$x = 0: 0 + y = 6, \text{ so } y = 6$$

$$y = 0: 2x = 6, \text{ so } x = 3$$

$$x = -1: -2 + y = 6, \text{ so } y = 8$$

$$x = 4: 8 + y = 6, \text{ so } y = -2$$

Plot the points and join them with a ruler, from $x = -1$ to $x = 4$.



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

8 (3 marks)

On the grid below, draw the graph of $y = 4x - 3$ for values of x from -1 to 3

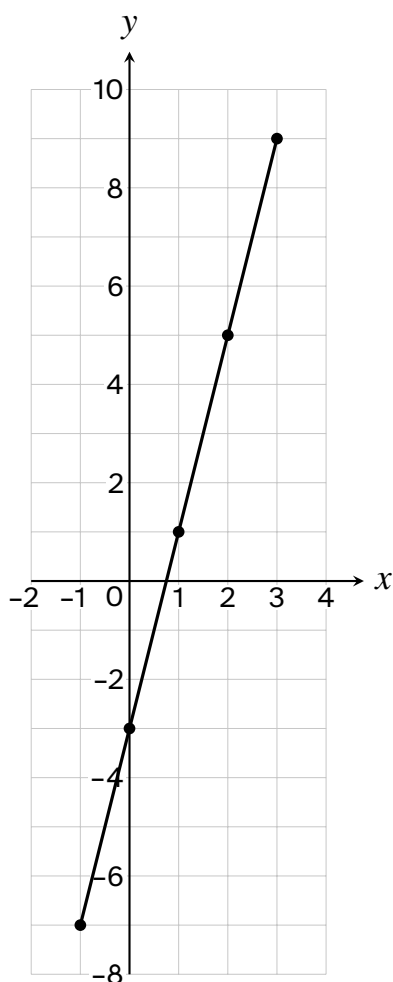
Make a table of values.

$$x = -1: y = 4 \times (-1) - 3 = -7$$

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

$$x = 2: y = 5 \quad x = 3: y = 9$$

Plot the points and join them with a ruler, from $x = -1$ to $x = 3$.



Tip: Check the scale: each square on the y-axis is 1 unit, but the labels go up in 2s. Odd values like -7 and 5 go between the labels.

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