Your notes

GCSE Maths: revision notes

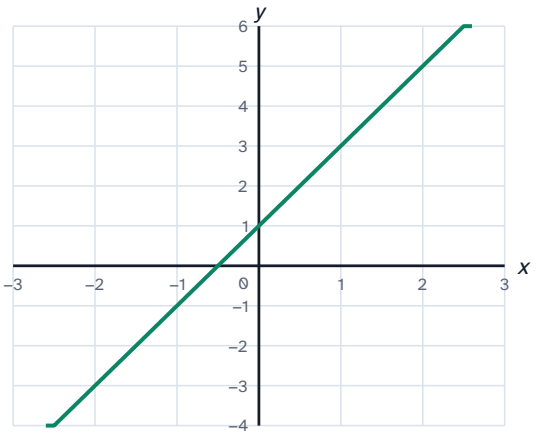
Straight-line graphs (y = mx + c)

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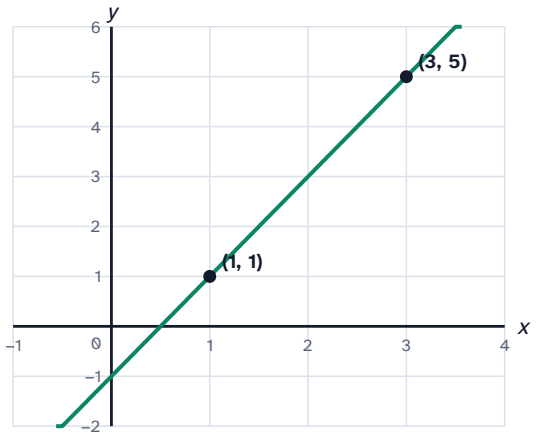
y = mx + c

- The equation of a straight line can be written y = mx + c, where m is the **gradient** and c is the **y-intercept** (where the line crosses the y-axis).
- y = 3x – 2 has **gradient** 3 and crosses the y-axis at (0, –2).
- Rearrange first if needed: 2y = 6x + 4 becomes y = 3x + 2.



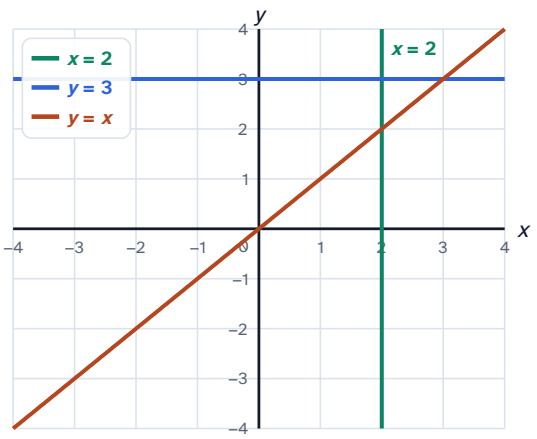
Gradient

- **Gradient** = change in y ÷ change in x. Through (1, 2) and (3, 8): (8 – 2) ÷ (3 – 1) = 3.
- A positive **gradient** slopes up to the right; a negative **gradient** slopes down.
- **Parallel** lines have the same **gradient**.
- (Higher) **Perpendicular** lines have **gradients** that multiply to –1: the **perpendicular** to a line with gradient 2 has gradient –1/2.



Special lines and points

- y = a is a horizontal line; x = a is a vertical line.
- The **x-intercept** is where y = 0: y = 2x – 6 crosses the x-axis at (3, 0).
- The **midpoint** of (2, 4) and (6, 10) is ((2 + 6)/2, (4 + 10)/2) = (4, 7).



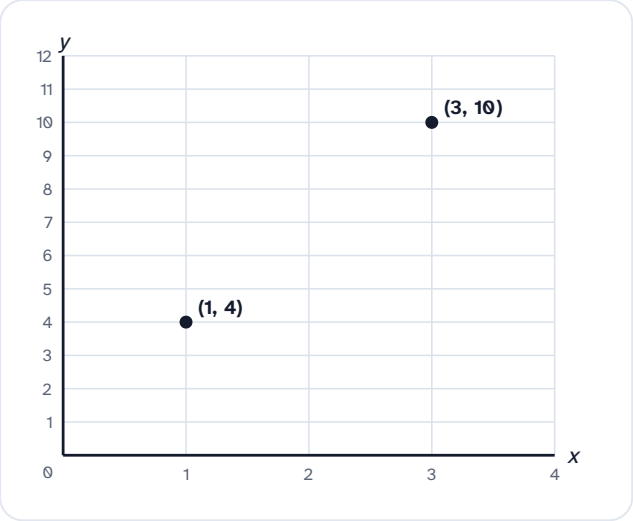
Finding the equation of a line

- Find the **gradient**, then substitute a point to find c: through (1, 5) and (3, 11), m = 3, and 5 = 3 × 1 + c gives c = 2, so y = 3x + 2.
- A point lies on a line if its coordinates make the equation true: (2, 7) is on y = 3x + 1 because 3 × 2 + 1 = 7.

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Worked examples

Find the equation of the line through (1, 4) and (3, 10)



Gradient = change in y ÷ change in x. **(10 – 4) ÷ (3 – 1) = 6 ÷ 2 = 3**

So the line is y = 3x + c. Put in the point (1, 4) to find c. **4 = 3 × 1 + c, so c = 1**

Answer: y = 3x + 1

Are the lines y = 2x + 5 and 2y – 4x = 7 parallel?

Rearrange the second line into y = mx + c: add 4x, then divide by 2. **2y = 4x + 7, so y = 2x + 3.5**

Compare the gradients: both are 2. **m = 2 and m = 2**

Answer: Yes: they have the same gradient, 2

Key terms

Gradient	The steepness of a line: change in y ÷ change in x.
y-intercept	The point where a line crosses the y-axis.
x-intercept	The point where a line crosses the x-axis.
Parallel	Lines with the same gradient, which never meet.
Perpendicular	At right angles; gradients multiply to –1.
Midpoint	The point exactly halfway between two points.

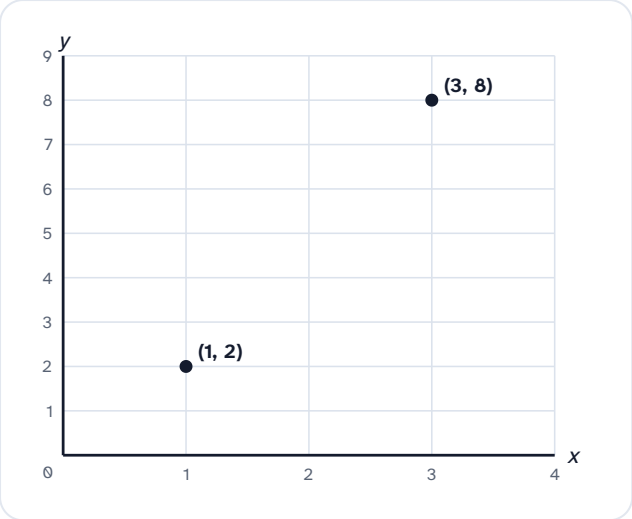
Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

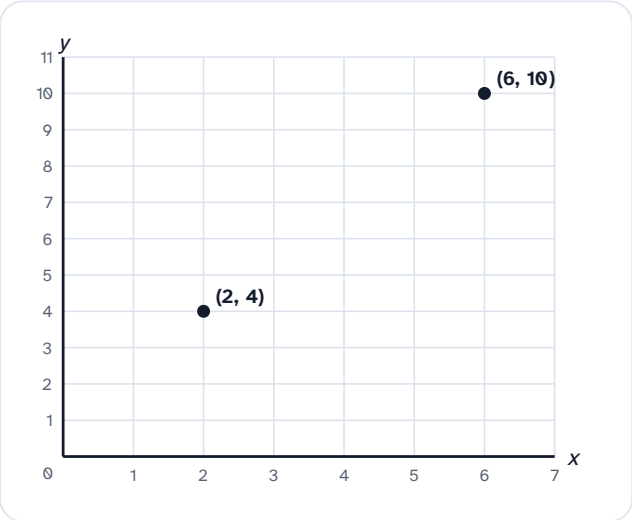
1. What is the gradient of y = 3x – 2?
2. What is the y-intercept of y = 5x + 4?

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3. What is the gradient of the line through (1, 2) and (3, 8)?



4. Which line is parallel to y = 2x + 1?
5. What is the equation of the line with gradient 4 through (0, –3)?
6. Where does y = 2x – 6 cross the x-axis?
7. What is the equation of the horizontal line through (2, 5)?
8. What is the midpoint of (2, 4) and (6, 10)?



Answers

1. 3
2. 4
3. 3
4. y = 2x – 5
5. y = 4x – 3
6. (3, 0)
7. y = 5
8. (4, 7)

What to do next

[Practise 12 questions on this topic]

[Try 7 exam questions, with mark schemes]

Your notes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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