MATHEMATICS · GRADES 7-9

Finding Equations from Graphs

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you turn a drawn line back into a rule. A chart of hours and earnings shows a pay rate in the slope of the line, and reading it off gives you the rule behind the graph. Once you have the rule, you can work out any point on the line without measuring it. It turns a picture into a formula you can use.



Rule

Equation of a line: $y = mx + b$, where m is the slope and b is where the line crosses the y-axis.

Read b off the graph where the line crosses the y-axis, and read m as rise over run.

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Worked examples

EXAMPLE 1

Q **A line crosses the y-axis at 2 and rises 3 for each run of 1. Find its equation.**

SOLUTION

The y-intercept is 2, so b = 2

Rise over run is $\frac{3}{1}$, so m = 3

The equation is y = 3x + 2

EXAMPLE 2

Q **A line crosses the y-axis at -1 and falls 1 for each run of 2. Find its equation.**

SOLUTION

The y-intercept is -1, so b = -1

Fall 1 over run 2 is slope $-\frac{1}{2}$, so m = $-\frac{1}{2}$

The equation is y = $(-\frac{1}{2})$x - 1

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Practice questions

1 Find the equation of the line.



A y = 2x + 4

B y = 2x - 4

C y = 3x + 4

D y = x + 4

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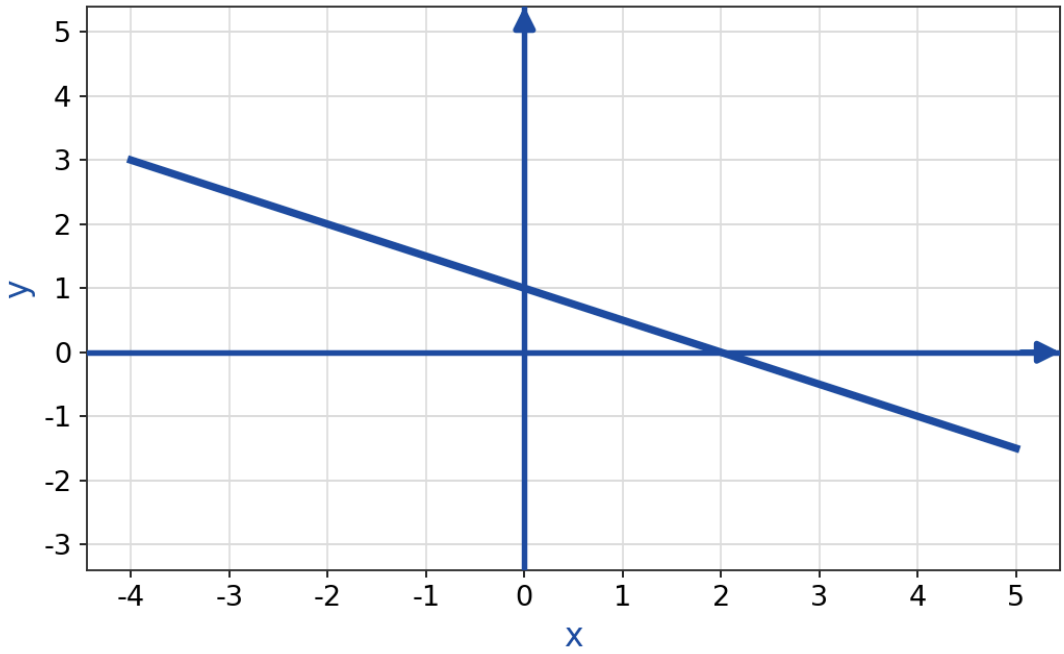
2 Find the equation of the line.



A $y = \frac{1}{2}x + 1$

B $y = -\frac{1}{2}x + 1$

C $y = -\frac{1}{2}x - 1$

D $y = -2x + 1$

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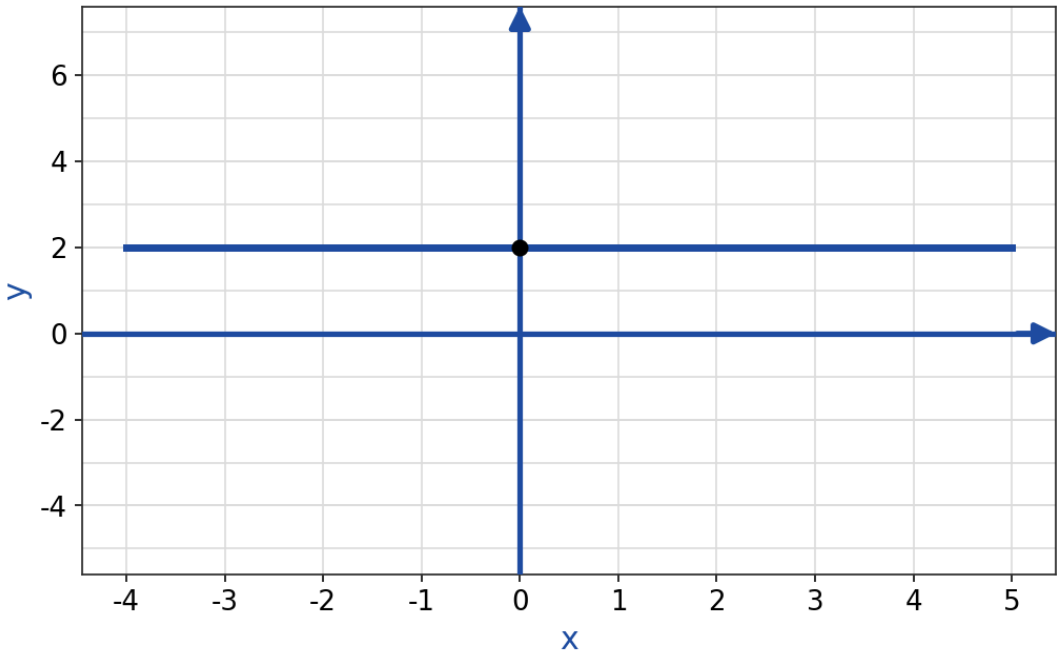
3 Find the equation of the line.



A y = 2x

B y = 2

C x = 2

D y = x + 2

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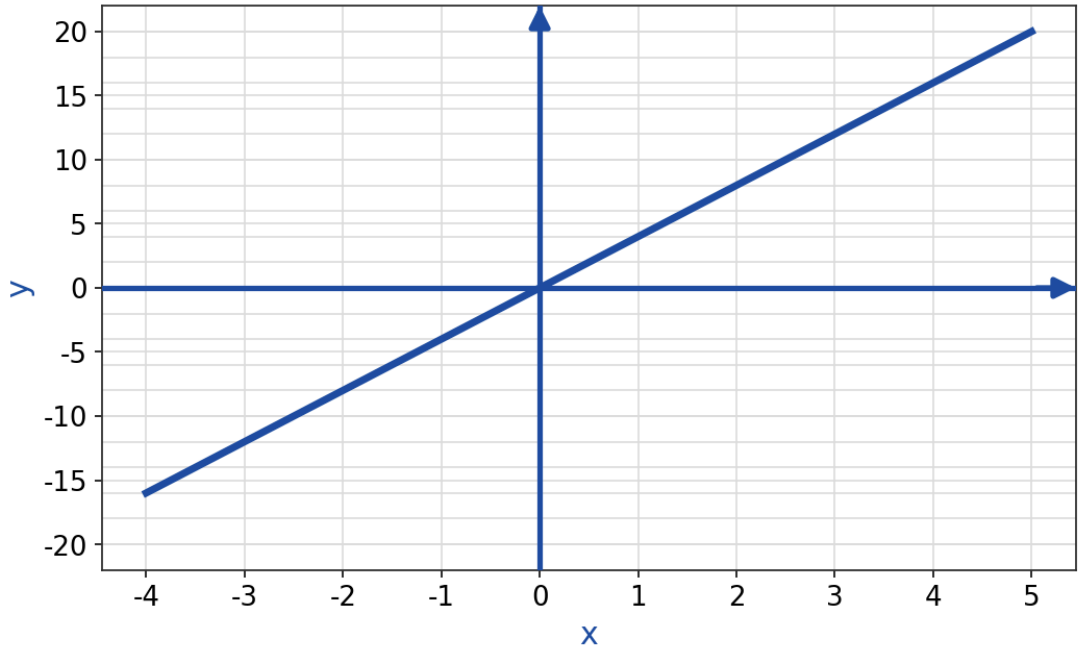
4 Find the equation of the line.



A y = 5x

B y = 3x

C y = -4x

D y = 4x

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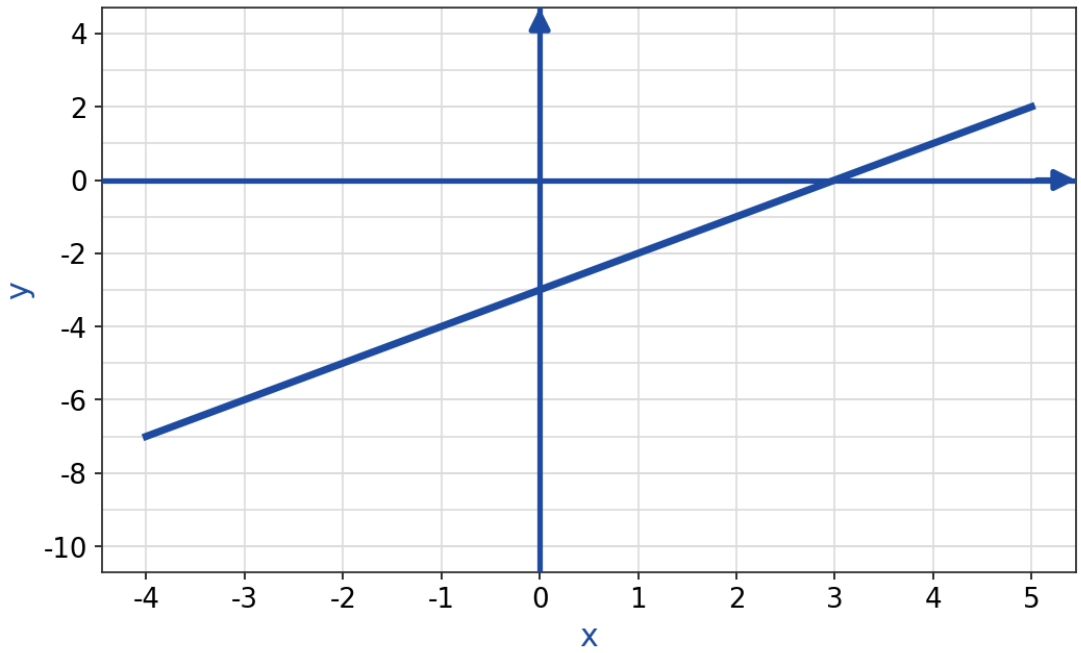
5 Find the equation of the line.



A y = x - 3

B y = x + 3

C y = 2x - 3

D y = -x - 3

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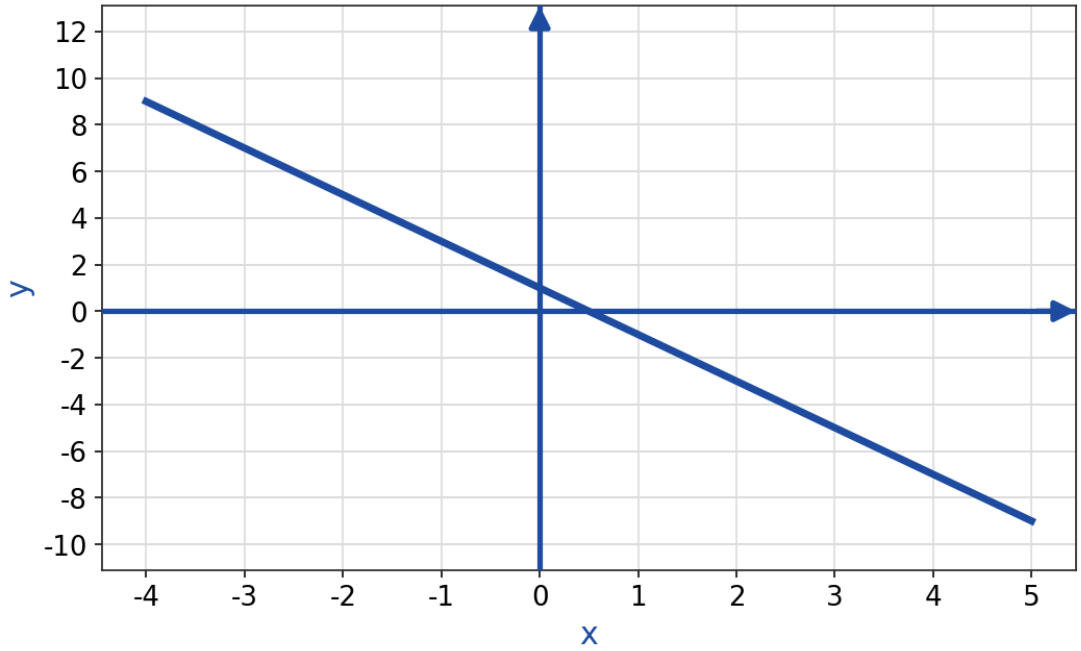
6 Find the equation of the line.



A y = -2x - 1

B y = -2x + 1

C y = -x + 1

D y = -3x + 1

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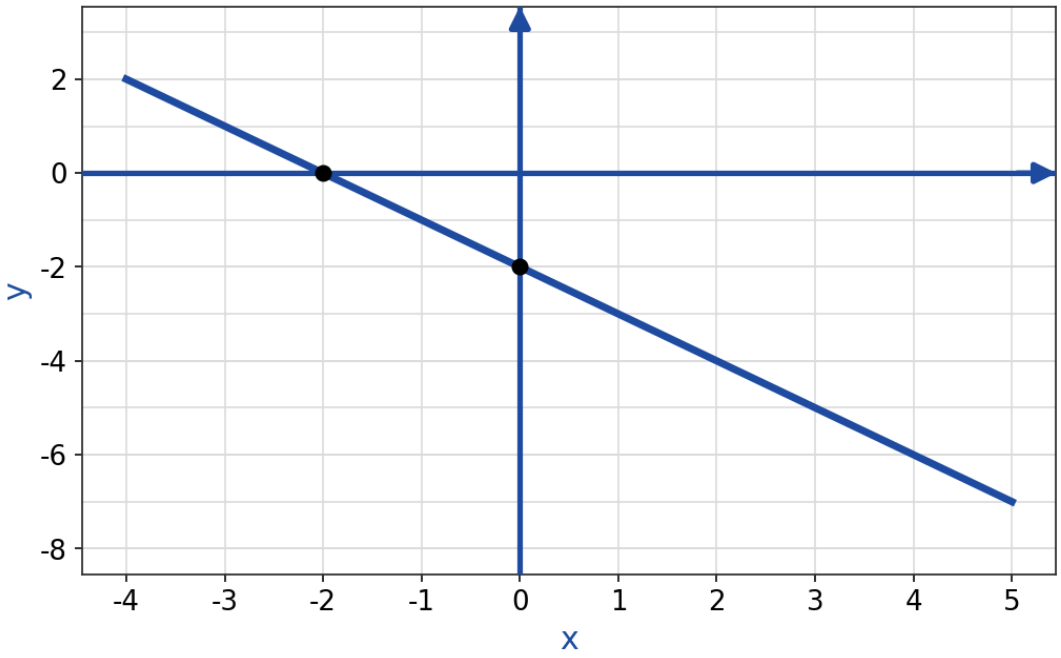
7 Find the equation of the line.



A y = -x - 2

B y = -x + 2

C y = x - 2

D y = -2x - 2

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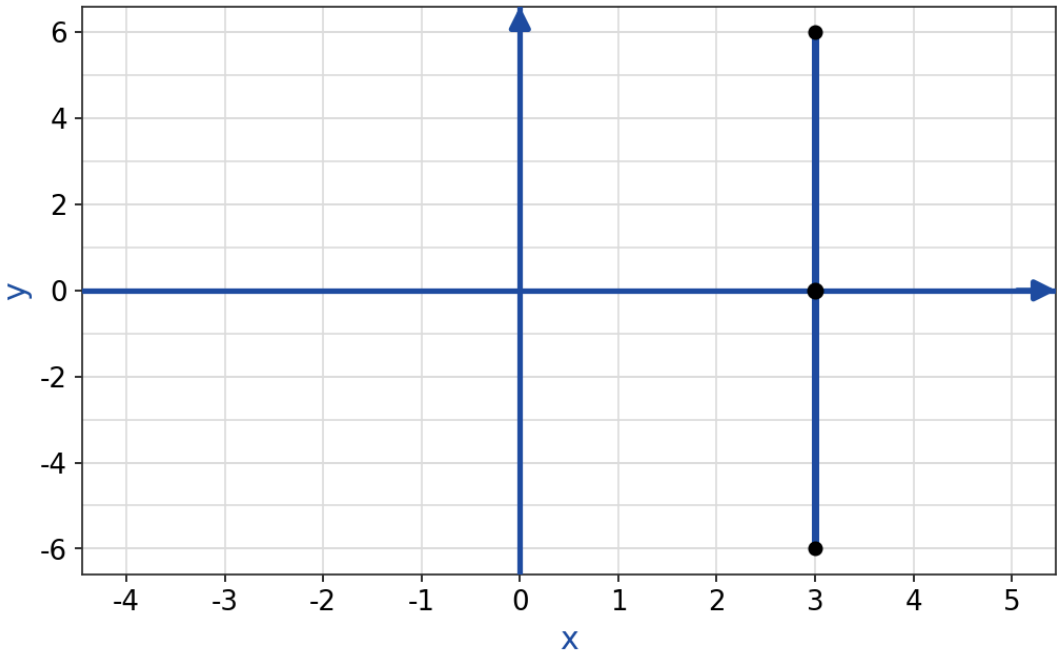
8 Find the equation of the line.



A y = 3

B y = 3x

C x = 3

D y = x + 3

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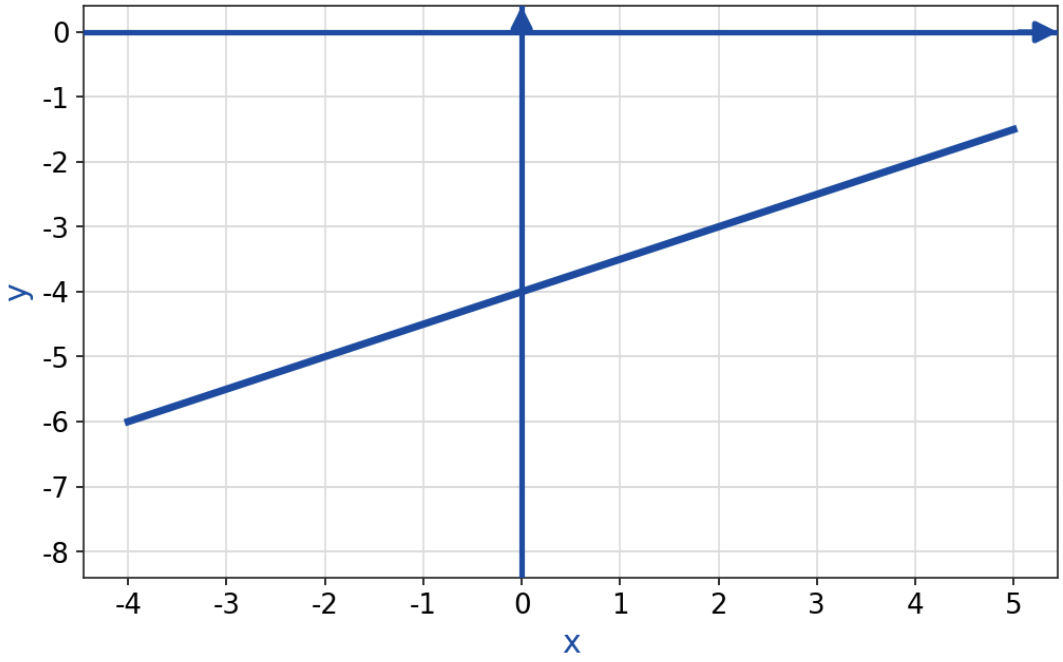
9

Find the equation of the line.



A $y = \frac{1}{2}x - 4$

B $y = -\frac{1}{2}x - 4$

C $y = \frac{1}{2}x + 4$

D $y = 2x - 4$

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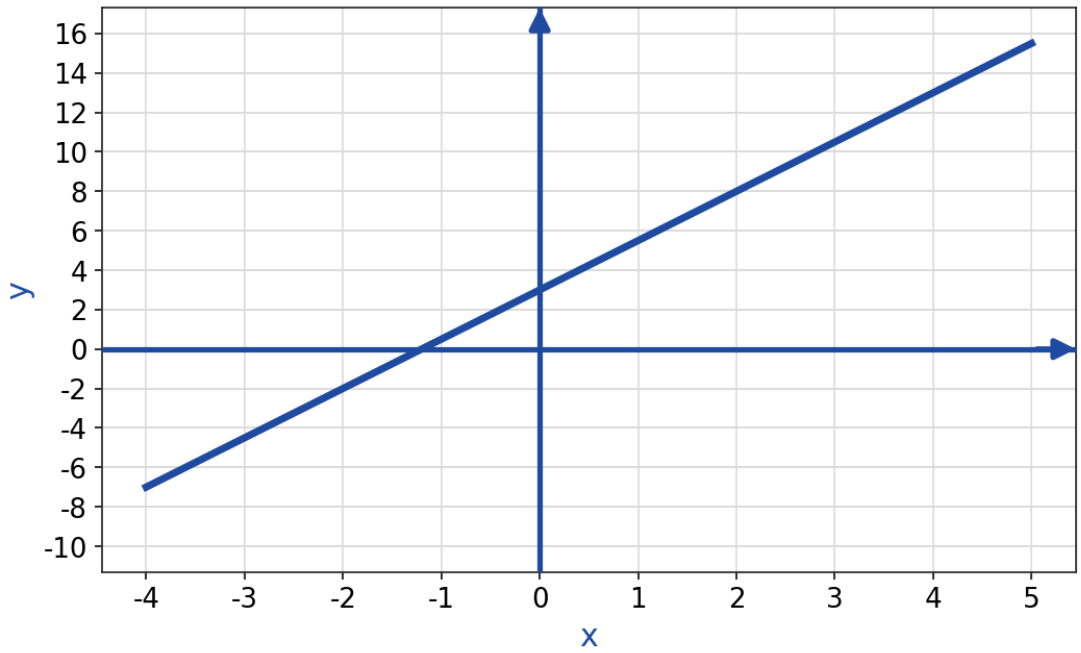
10 **Find the equation of the line.**



A $y = -\frac{5}{2}x + 3$

B $y = \frac{5}{2}x - 3$

C $y = \frac{2}{5}x + 3$

D $y = \frac{5}{2}x + 3$

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ANSWER KEY

1. $y = 2x + 4$

2. $y = -\frac{1}{2}x + 1$

3. $y = 2$

4. $y = 4x$

5. $y = x - 3$

6. $y = -2x + 1$

7. $y = -x - 2$

8. $x = 3$

9. $y = \frac{1}{2}x - 4$

10. $y = \frac{5}{2}x + 3$

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