

Parallel Perpendicular Lines

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Write down the gradient of a line perpendicular to $y = 3x + 2$.

Step 1 · Gradient of the line

3

Step 2 · Negative reciprocal

$-1/3$

Answer: $-1/3$

Check: $3 \times (-1/3) = -1$ ✓

2. Now try one with the steps

Find the equation of the line perpendicular to $y = \frac{1}{2}x - 4$ that passes through (2, 3).

Step 1 · Perpendicular gradient

Step 2 · Substitute (2, 3) into $y = -2x + c$

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Write down the gradient of a line perpendicular to $y = 4x - 1$. [1]

2. Write down the gradient of a line perpendicular to $y = -(2/3)x + 5$. [1]

3. A line has gradient -5 . What is the gradient of a line perpendicular to it? [1]

4. Are $y = 3x + 1$ and $y = -(1/3)x + 4$ perpendicular? Give a reason. [2]

5. Are $y = 2x$ and $y = -2x + 1$ perpendicular? Give a reason. [2]

6. Find the equation of the line perpendicular to $y = 2x + 5$ that passes through $(0, 3)$. [2]

7. Find the equation of the line perpendicular to $y = -3x + 1$ that passes through $(6, 4)$. [3]

8. Find the equation of the line perpendicular to $2x + y = 4$ that passes through $(4, 1)$. [3]

9. Find the equation of the line perpendicular to $y = \frac{1}{4}x$ that passes through $(-1, 5)$. [3]

10. A line passes through $(1, 1)$ and $(3, 7)$. Find its gradient and the gradient of any line perpendicular to it. [2]

11. Find the equation of the perpendicular bisector of $(0, 0)$ and $(4, 2)$. [4]

12. Line L passes through $(2, -1)$ and is perpendicular to $y = x + 3$. Find where L crosses the x-axis. [3]

13. A is $(-2, 1)$, B is $(2, 3)$ and C is $(4, -1)$. Show that angle ABC is a right angle. [3]

14. The line $y = kx + 2$ is perpendicular to $y = 5x - 3$. Find k . [2]

15. Find the equation of the tangent to the circle $x^2 + y^2 = 25$ at the point $(3, 4)$. [4]

4. Before you hand it in

Perpendicular to gradient 3 → gradient 1/3

$3 \times 1/3 = 1$, not -1 . The perpendicular gradient is $-1/3$.

Perpendicular to gradient 3 → gradient -3

$3 \times (-3) = -9$. Flip AND change sign: $-1/3$.

Perpendicular to $2x + y = 4$ → gradient $-1/2$

Rearrange first: $y = -2x + 4$ has gradient -2 , so the perpendicular gradient is $1/2$.

Perpendicular bisector of A(1, 2) and B(5, 6) through A

A bisector cuts AB in half, so it passes through the midpoint $(3, 4)$.