

Calculations with gradients

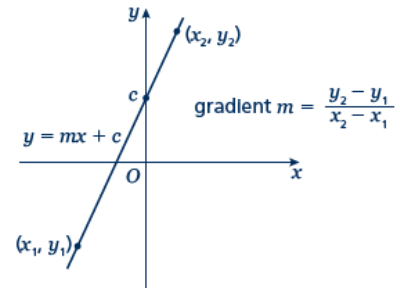
A LEVEL LINKS

Scheme of work: 2a. Straight-line graphs, parallel/perpendicular, length and area problems

Key points

- A straight line has the equation $y = mx + c$, where m is the gradient and c is the y -intercept (where $x = 0$).
- The equation of a straight line can be written in the form $ax + by + c = 0$, where a , b and c are integers.
- When given the coordinates (x_1, y_1) and (x_2, y_2) of two points on a line the gradient is calculated using the

$$\text{formula } m = \frac{y_2 - y_1}{x_2 - x_1}$$



Example 4 Find the equation of the line passing through the points with coordinates $(2, 4)$ and $(8, 7)$.

$x_1 = 2, x_2 = 8, y_1 = 4 \text{ and } y_2 = 7$ $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 4}{8 - 2} = \frac{3}{6} = \frac{1}{2}$ $y = \frac{1}{2}x + c$ $4 = \frac{1}{2} \times 2 + c$ $c = 3$ $y = \frac{1}{2}x + 3$	<ol style="list-style-type: none"> 1 Substitute the coordinates into the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$ to work out the gradient of the line. 2 Substitute the gradient into the equation of a straight line $y = mx + c$. 3 Substitute the coordinates of either point into the equation. 4 Simplify and solve the equation. 5 Substitute $c = 3$ into the equation $y = \frac{1}{2}x + c$
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Practice question

- 1 The line joining $(3, -7)$ to $(b, 5)$ had gradient 5. Work out the value of b .

Answer

1 $b = 6$