

Exercise walk-through

Drawing linear graphs ■ E3.2

eXercise

You must be able to

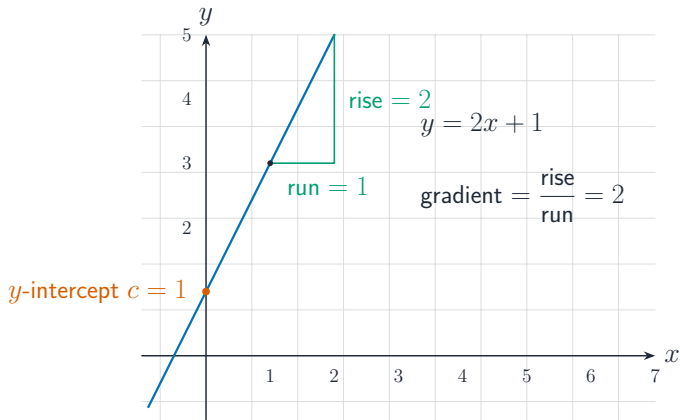
- find the gradient and y -intercept of a line
- find the equation of a line from its gradient and a point
- use the gradient rules for parallel and perpendicular lines

Method — Straight lines

- **Gradient** 斜率: $m = \frac{\text{change in } y}{\text{change in } x}$. Through $(1, 2)$ and $(4, 11)$: $m = \frac{9}{3} = 3$.
- **Equation:** gradient 3 through $(1, 2) \rightarrow 2 = 3(1) + c \rightarrow c = -1 \rightarrow y = 3x - 1$.
- **Parallel** 平行: same gradient. **Perpendicular** 垂直: $m_1 m_2 = -1$.

Answer shapes: **M1** a correct method, **A1** the correct answer.

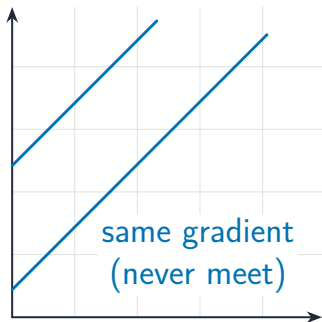
Method — Straight lines



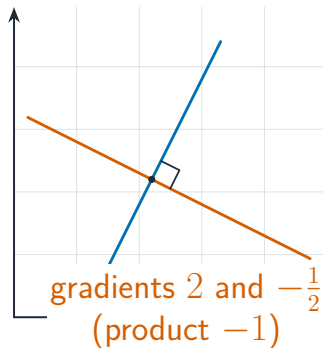
For $y=mx+c$ the line crosses the y-axis at c ; gradient is rise over run

Method — Straight lines

Parallel



Perpendicular



Gradients of parallel and perpendicular lines

Practice 2.1 ■ 2 marks

Write down the gradient and y -intercept of $y = 4x - 3$.

Solution 2.1

Method: Straight lines

Worked steps

gradient 4; y-intercept -3 **B1** **B1** $+$.

Practice 2.2 ■ 2 marks

Find the gradient of the line through $(2, 1)$ and $(5, 10)$.

Solution 2.2

Method: Straight lines

Worked steps

$$m = \frac{10-1}{5-2} = \frac{9}{3} = 3 \quad \text{M1} \quad \text{A1} \quad \text{for the gradient method; for 3.}$$

Practice 2.3 ■ 1 mark

Write down the gradient of a line parallel to $y = 2x + 7$.

Solution 2.3

Method: Straight lines

Worked steps

2 **B1**.

Exam-style 3.1 ■ 3 marks

Find the equation of the line with gradient 2 that passes through $(3, 1)$.

Solution 3.1

Method: Straight lines

Worked steps

$y = 2x + c$; substitute $(3, 1)$: $1 = 2(3) + c \rightarrow c = -5 \rightarrow y = 2x - 5$ **M1** **M1** **A1**
for $y = 2x + c$; for substituting; for $y = 2x - 5$.

Exam-style 3.2 ■ 2 marks

Rearrange $3x + 2y = 12$ into the form $y = mx + c$ and write down its gradient.

Solution 3.2

Method: Straight lines

Worked steps

$2y = -3x + 12 \rightarrow y = -\frac{3}{2}x + 6$; gradient $-\frac{3}{2}$ **M1** **A1** *for rearranging; for the gradient.*

Exam-style 3.3 ■ 1 mark

Find the gradient of a line perpendicular to $y = \frac{1}{2}x + 4$.

Solution 3.3

Method: Straight lines

Worked steps

the gradient is $\frac{1}{2}$, so the perpendicular gradient is -2 (flip and change sign) **B1**.