

Exercise walk-through

E3.6

Parallel lines

IGCSE Mathematics

You must be able to

- write down the gradient of a line parallel to a given line
- find the equation of the line parallel to a given line through a given point
- decide whether two equations are parallel by rearranging both into $y = mx + c$

1

The method

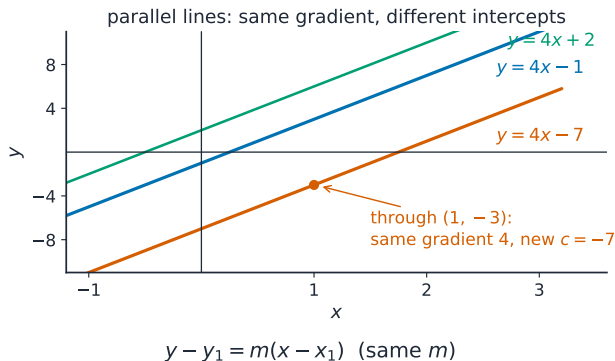
Method — Same gradient, different intercept

- **Rule:** parallel $\Rightarrow m_1 = m_2$. The y -intercepts must be **different**, or the two are the same line.
- **Rearrange before comparing.** $4y = 8x - 3$ is $y = 2x - 0.75$, so it IS parallel to $y = 2x + 1$.
- **Through a point:** keep m , then substitute the point to find the new c . Parallel to $y = 3x + 1$ through $(2, 9)$: $9 = 3(2) + c$, so $c = 3$ and $y = 3x + 3$.
- A question asking you to *show* two lines are parallel wants both gradients stated and compared.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): the rearranged equation, and the substitution that finds c , are the method marks.

Method — Same gradient, different intercept

Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): the rearranged...



A family of parallel lines with the same gradient

2

Practice

Practice 2.1 ■ 1 mark

Write down the gradient of any line parallel to $y = 5x - 2$.

Solution 2.1

Method: Same gradient, different intercept — p.4

Worked steps

- parallel lines share a gradient

$$= 5$$

B1

Practice 2.2 ■ 3 marks

Find the equation of the line parallel to $y = 3x + 1$ that passes through $(2, 9)$.

Solution 2.2

Method: Same gradient, different intercept — p.4

Worked steps

- the gradient is still 3, so $y = 3x + c$ (M1)
- substitute (2, 9): $9 = 6 + c$, so $c = 3$ (M1)

$$y = 3x + 3$$

(A1)

Practice 2.3 ■ 2 marks

Show that $y = 2x + 1$ and $4y = 8x - 3$ are parallel.

Solution 2.3

Method: Same gradient, different intercept — p.4

Worked steps

- divide the second equation by 4: $y = 2x - \frac{3}{4}$ **M1**
- both gradients are 2, and the intercepts differ, so the lines are parallel **A1**

3

Exam-style

Exam-style 3.1 ■ 5 marks

The line L has equation $3y = 12x - 9$.

Exam-style 3.1 (a) ■ 2 marks

Find the gradient of L .

Solution 3.1 (a)

Method: Same gradient, different intercept — p.4

Worked steps

■ divide by 3: $y = 4x - 3$ **M1**

$$m = 4$$

A1

Exam-style 3.1 (b) ■ 3 marks

Find the equation of the line parallel to L that passes through $(-1, 2)$.

Solution 3.1 (b)

Worked steps

- the parallel line is $y = 4x + c$ (M1)
- substitute $(-1, 2)$: $2 = -4 + c$, so $c = 6$ (M1)

$$y = 4x + 6$$

(A1)

Exam-style 3.2 ■ 3 marks

Find the equation of the line parallel to $y = -\frac{1}{2}x + 4$ that passes through $(6, 5)$.

Solution 3.2

Method: Same gradient, different intercept — p.4

Worked steps

- the gradient stays $-\frac{1}{2}$, so $y = -\frac{1}{2}x + c$ **M1**
- substitute $(6, 5)$: $5 = -3 + c$, so $c = 8$ **M1**

$$y = -\frac{1}{2}x + 8$$

A1