

Exercise walk-through

C3.6

Parallel lines

IGCSE Mathematics

You must be able to

- Recognise parallel lines by their gradients
- Find a parallel line through a stated point
- Distinguish coincident lines from distinct parallel lines

1

The method

Method — Key knowledge: Parallel lines

Parallel nonvertical straight lines have the same gradient. Their intercepts differ unless they are the same line. To find a parallel line through a point, copy the gradient into $y = mx + c$, substitute the point, and solve for c . Vertical lines $x = k$ are parallel to one another.

Exercises 2.1·2.3

2.1 Give the gradient of a line parallel to $y = -3x + 8$. [2]

2.2 Which is parallel to $y = 4x - 1$: $y = 4x + 7$ or $y = -4x + 7$? Explain. [2]

2.3 Find the line of gradient 5 through $(0, 2)$. [2]

Exercises 2.1·2.3

2.1 Give the gradient of a line parallel to $y = -3x + 8$. [2]

2.1

- Parallel gradients match: -3 .
-

2.2 Which is parallel to $y = 4x - 1$: $y = 4x + 7$ or $y = -4x + 7$? Explain. [2]

2.2

- $y = 4x + 7$, because its gradient is also 4.
-

2.3 Find the line of gradient 5 through $(0, 2)$. [2]

2.3

- The point is the intercept: $y = 5x + 2$.

Exercise 2.4

2.4 Find the line parallel to $y = x - 4$ through $(2, 7)$. [2]

3 Exam-style questions

Exercise 2.4

2.4 Find the line parallel to $y = x - 4$ through $(2, 7)$. [2]

3 Exam-style questions

2.4

- $7 = 2 + c$, so $c = 5$ and $y = x + 5$.

Exercise 3.1 (a)

3.1 Apply the parallel lines methods below. Show working and include units where appropriate.

(a) A line L has equation $y = -2x + 9$. State the gradient of a parallel line. [2]

Exercise 3.1 (a)

3.1 Apply the parallel lines methods below. Show working and include units where appropriate.

(a) A line L has equation $y = -2x + 9$. State the gradient of a parallel line. [2]

(a)

- $m = -2$.

Exercise 3.1 (b)

3.1 Apply the parallel lines methods below. Show working and include units where appropriate.

(b) Find the equation of the parallel line through $(4, -1)$.

[2]

Exercise 3.1 (b)

3.1 Apply the parallel lines methods below. Show working and include units where appropriate.

(b) Find the equation of the parallel line through $(4, -1)$. [2]

(b)

- $-1 = -2(4) + c$ gives $c = 7$, so $y = -2x + 7$.

Exercise 3.1 (c)

3.1 Apply the parallel lines methods below. Show working and include units where appropriate.

(c) Find where your line crosses the y -axis, and verify that $(4, -1)$ lies on it. [2]

Exercise 3.1 (c)

3.1 Apply the parallel lines methods below. Show working and include units where appropriate.

(c) Find where your line crosses the y -axis, and verify that $(4, -1)$ lies on it. [2]

(c)

- Crossing: $(0, 7)$. Substitution gives $y = -8 + 7 = -1$, as required.

Exercise 3.2 (a)

3.2 Line L is $y = 3x - 4$. Line M is parallel to L and passes through $(-2, 5)$.

(a) Find the equation of M, showing how you obtain its intercept.

[3]

Exercise 3.2 (a)

3.2 Line L is $y = 3x - 4$. Line M is parallel to L and passes through $(-2, 5)$.

(a) Find the equation of M, showing how you obtain its intercept.

[3]

(a)

- Parallel lines have equal gradient, so $m = 3$.
- In $y = 3x + c$, substitute $5 = 3(-2) + c$, giving $c = 11$ and $y = \mathbf{3x + 11}$.

Exercise 3.2 (b)

3.2 Line L is $y = 3x - 4$. Line M is parallel to L and passes through $(-2, 5)$.

(b) Line N is $2y = 6x - 8$. Decide whether N is a distinct parallel line or the same line as L. Explain, and give one example of a distinct parallel line. [3]

Exercise 3.2 (b)

3.2 Line L is $y = 3x - 4$. Line M is parallel to L and passes through $(-2, 5)$.

(b) Line N is $2y = 6x - 8$. Decide whether N is a distinct parallel line or the same line as L. Explain, and give one example of a distinct parallel line. [3]

(b)

- Divide N's equation by 2 to obtain $y = 3x - 4$, so N is **the same line** as L.
- An example of a distinct parallel line is **$y = 3x + 1$** , with a different intercept.