

WA8MNALP1

Linear and non-linear patterns and relationships

Core + Challenge

Gradient and y-Intercept

I can find the gradient from a graph or two points, read m and c from $y = mx + c$ and write the equation of a line.

Name: _____ Date: _____ Score: _____ / 58

Key idea

Gradient $m = \frac{\text{rise}}{\text{run}}$ = change in $y \div$ change in x . It measures steepness: **positive** (uphill), **negative** (downhill), **zero** (horizontal).

From two points $(1, 3)$ and $(4, 9)$: $m = \frac{9-3}{4-1} = \frac{6}{3} = 2$. Always subtract in the same order (second point – first point).

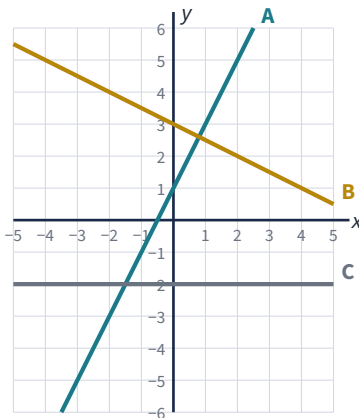
The **y-intercept** c is where the line crosses the y -axis ($x = 0$). In $y = mx + c$: $y = -3x + 5$ has $m = -3$ and $c = 5$.

Equation from a graph or table: read c at $x = 0$, find m from rise $\div$ run, write $y = mx + c$, then check with another point.

A Fluency *practise the skill*

/ 16 marks

Q10–14 use lines A, B and C on the grid. 1 mark each.



1. Gradient of $y = 4x - 7$ _____

9. Rise 6, run 4: $m =$ _____

2. y-intercept of $y = 4x - 7$ _____

10. Line A: gradient _____

3. Gradient of $y = 6 - 2x$ _____

11. Line A: y-intercept _____

4. Gradient of $y = \frac{x}{3} + 1$ _____

12. Line B: gradient _____

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5. m through $(0, 1)$ and $(2, 7)$ _____

13. Line C: gradient _____

6. m through $(1, 5)$ and $(3, 1)$ _____

14. Equation of line C _____

7. m through $(-2, 4)$ and $(2, 4)$ _____

15. $m = 5$, $c = -2$: equation _____

8. m through $(-1, -3)$ and $(3, 5)$ _____

16. Through $(0, 4)$ with $m = -1$ _____

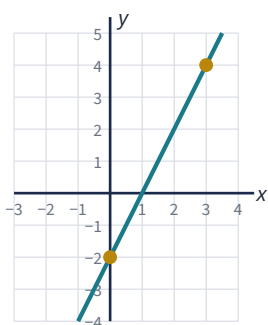
B

Core *apply the skill to problems*

/ 22 marks

1 Find the gradient and y-intercept of this line, then write its equation.

[3 marks]



Answer: _____

2 Find the gradient of the line through $(-2, 5)$ and $(4, -7)$.

[2 marks]

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Answer: _____

3 Without graphing, state whether each line goes uphill, downhill or is horizontal: $y = 3x - 4$, $y = -x + 2$, $y = 5$.

[2 marks]

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Answer: _____

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- 4 Write the equation of the line through the points in this table. [2 marks]

x	0	1	2	3	4
y	7	4	1	-2	-5

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Answer: _____

- 5 This table does not include $x = 0$. Find the gradient and the y-intercept, and write the equation. [3 marks]

x	2	4	6	8
y	3	4	5	6

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Answer: _____

- 6 A wheelchair ramp rises 0.6 m over a horizontal distance of 9 m. Find its gradient as a fraction. Australian standards allow a gradient of at most 1 in 14 ($\frac{1}{14}$). Does the ramp meet this? [2 marks]

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Answer: _____

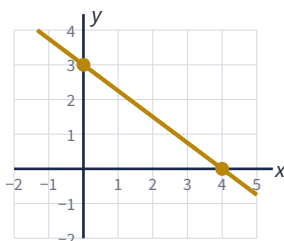
- 7 A water tank is emptied through a tap. Its volume is $V = 200 - 25t$ litres after t hours. State the gradient and V-intercept and explain what each means. [2 marks]

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Answer: _____

- 8 Write the equation of this line. [2 marks]



Answer: _____

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- 9 Write the equation of the line with gradient -4 that passes through $(2, 1)$. [2 marks]

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Answer:

- 10 Find the equation of the line through $(1, 2)$ and $(5, 14)$. [2 marks]

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Answer:

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Ella found the gradient between $(1, 4)$ and $(3, 10)$ as $\frac{3-1}{10-4} = \frac{1}{3}$. Explain her mistake and find the correct gradient. [2 marks]

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- 2 Explain why a horizontal line has gradient 0 , and why the gradient of a vertical line cannot be calculated. [3 marks]

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- 3 Two students use different pairs of points on the same straight line to find its gradient. Will they get the same answer? Explain. [2 marks]

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- 4 True or false: $y = 5 - 2x$ has gradient 5 . Explain. [2 marks]

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D**Challenge** *multi-step and problem-solving*

/ 11 marks

- 1 The points (2, k), (5, 11) and (7, 17) lie on the same straight line. Find k. [3 marks]

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Answer: _____

- 2 A line has gradient $\frac{2}{3}$ and passes through (-3, 1). Find where it crosses the y-axis and the x-axis. [3 marks]

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Answer: _____

- 3 A phone plan costs \$31 in a month when 4 GB is used and \$43 when 10 GB is used. The cost is linear. (a) Find the cost per GB and the fixed monthly fee. (b) Write a rule and find the cost for 15 GB. [3 marks]

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Answer: _____

- 4 A(0, 0), B(4, 2), C(5, 6) and D(1, 4) are the vertices of a quadrilateral. Use gradients to show that ABCD is a parallelogram. [2 marks]

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Answer: _____

How did I go?Fluency ____ / 16 Core ____ / 22 Reasoning ____ / 9 Challenge ____ / 11 **Total ____ / 58**

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