

WA8MNALP1

Linear and non-linear patterns and relationships

Core + Challenge

Comparing Lines and Solving Graphically

I can compare lines on the same axes, recognise parallel lines and use points of intersection to solve equations.

Name: _____ Date: _____ Score: _____ / 58

Key idea

Parallel lines have the **same gradient**: $y = 2x + 1$ and $y = 2x - 3$ never meet. Lines with the **same c** all pass through $(0, c)$.

The **point of intersection** of two lines is the one point that satisfies **both** equations: it solves $mx + c = nx + d$.

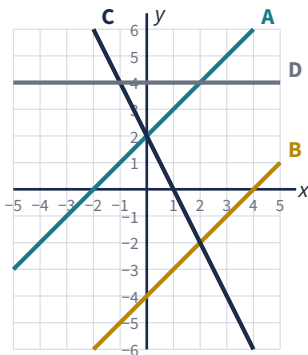
Solve graphically: for $2x + 1 = 7$, draw $y = 2x + 1$ and $y = 7$; they meet at $x = 3$. **Algebraically**: $2x = 6 \rightarrow x = 3$ ✓ (the methods agree).

Comparing plans: the lower line is cheaper. The cheaper option changes at the intersection, where both cost the same.

A Fluency *practise the skill*

/ 16 marks

Q1–8, Q11 and Q12 use lines A, B, C and D on the grid. 1 mark each.



1. Gradient of line A _____
2. Line parallel to A _____
3. Line with the same y-intercept as A _____
4. A and C meet at _____
5. A and D meet at _____
9. Parallel to $y = 3x - 1$ with $c = 5$ _____
10. Parallel? $y = 5x - 2$ and $y = 2x + 5$ _____
11. Solve $x + 2 = 4$ using A and D _____
12. Solve $-2x + 2 = 4$ using C and D _____
13. $y = 3x$ meets $y = 12$ at _____

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6. C and D meet at _____

14. $y = 2x + 1$ meets $y = -x + 7$ at _____

7. B and C meet at _____

15. Gradient -1 through $(0, 0)$ _____

8. Do A and B ever meet? _____

16. Steeper: $y = 3x$ or $y = -5x$? _____

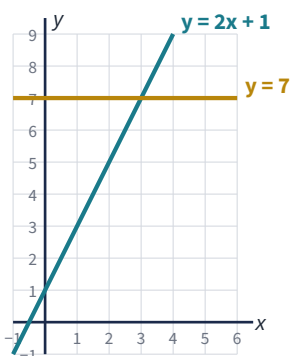
B

Core *apply the skill to problems*

/ 22 marks

1 Use the graph to solve $2x + 1 = 7$. Then check your answer algebraically.

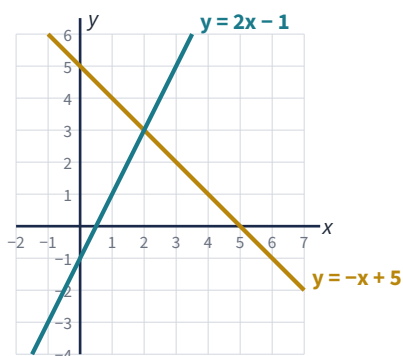
[2 marks]



Answer: _____

2 The graph shows $y = -x + 5$ and $y = 2x - 1$. Find their point of intersection and verify that it satisfies both equations.

[2 marks]

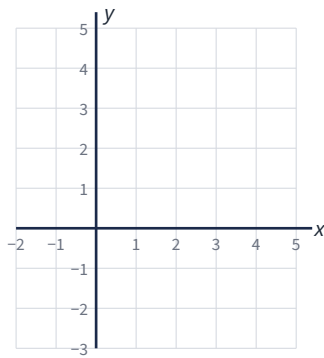


Answer: _____

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- 3 Draw the lines $y = 3 - x$ and $y = x - 1$ on the grid, and use them to solve $3 - x = x - 1$.

[3 marks]



Answer: _____

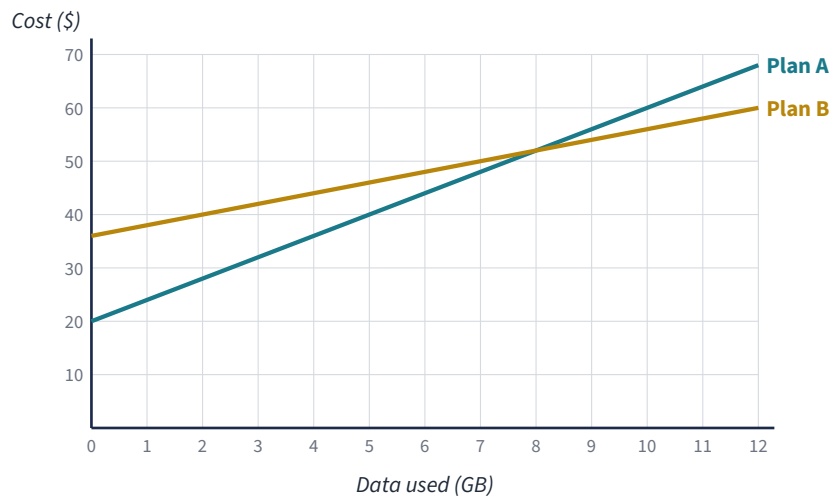
- 4 Consider $y = 2x + 3$, $y = 3x + 2$, $y = 2x - 5$, $y = -2x + 3$ and $y = 4 + 2x$. (a) Which lines are parallel? (b) Which two lines have the same y-intercept?

[2 marks]

Answer: _____

- 5 Plan A costs \$20 plus \$4 per GB. Plan B costs \$36 plus \$2 per GB. (a) For how many GB do the plans cost the same? (b) Which plan is cheaper for 5 GB, and by how much?

[3 marks]



Answer: _____

- 6 Write the equation of the line parallel to $y = -3x + 4$ that passes through $(0, -2)$.

[2 marks]

Answer: _____

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- 7 Solve $3x - 2 = -x + 6$ algebraically. What does your answer tell you about the graphs of $y = 3x - 2$ and $y = -x + 6$? [2 marks]

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Answer: _____

- 8 The line $y = 4x + c$ passes through $(1, 7)$. Find c . Is this line parallel to $y = 4x$? Explain. [2 marks]

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Answer: _____

- 9 Taxi A charges $C = 2d + 6$ and Taxi B charges $C = 3d + 2$ (C in dollars, d in km). For which trip lengths is Taxi B more expensive? [2 marks]

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Answer: _____

- 10 Kelly has \$50 and saves \$15 per week. Ahmed has \$120 and saves \$8 per week. Write an equation for each and find when they will have the same amount. [2 marks]

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Answer: _____

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Try to solve $3x + 1 = 3x - 2$. Use your result to explain why the lines $y = 3x + 1$ and $y = 3x - 2$ never meet. [3 marks]

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- 2 Mia says $y = 2x + 3$ and $y = 3x + 2$ are parallel because they use the same numbers. Is she right? Explain. [2 marks]

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- 3 Why can a graphical solution be less accurate than an algebraic one? Give an example. [2 marks]

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- 4 What do the lines $y = x + 4$, $y = -x + 4$ and $y = 3x + 4$ have in common, and how are they different? [2 marks]

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D Challenge *multi-step and problem-solving*

/ 11 marks

- 1 Find the area of the triangle enclosed by the lines $y = x + 1$, $y = -x + 7$ and $y = 1$. [3 marks]

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Answer:

- 2 Line L passes through (2, 5) and is parallel to $y = 3x - 4$. Find where L meets the line $y = -x + 3$. [3 marks]

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Answer:

- 3 A gym offers: Casual \$15 per visit; Flexi \$40 per month plus \$5 per visit; Unlimited \$90 per month. For which numbers of visits in a month is Flexi the cheapest option? [3 marks]

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Answer:

- 4 The lines $y = kx + 1$ and $y = 3x - 5$ are drawn on the same axes. (a) Find k if they meet at $x = 2$. [2 marks]
(b) For which value of k do they never meet?

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Answer:

How did I go?

Fluency ____ / 16 Core ____ / 22 Reasoning ____ / 9 Challenge ____ / 11 **Total ____ / 58**

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