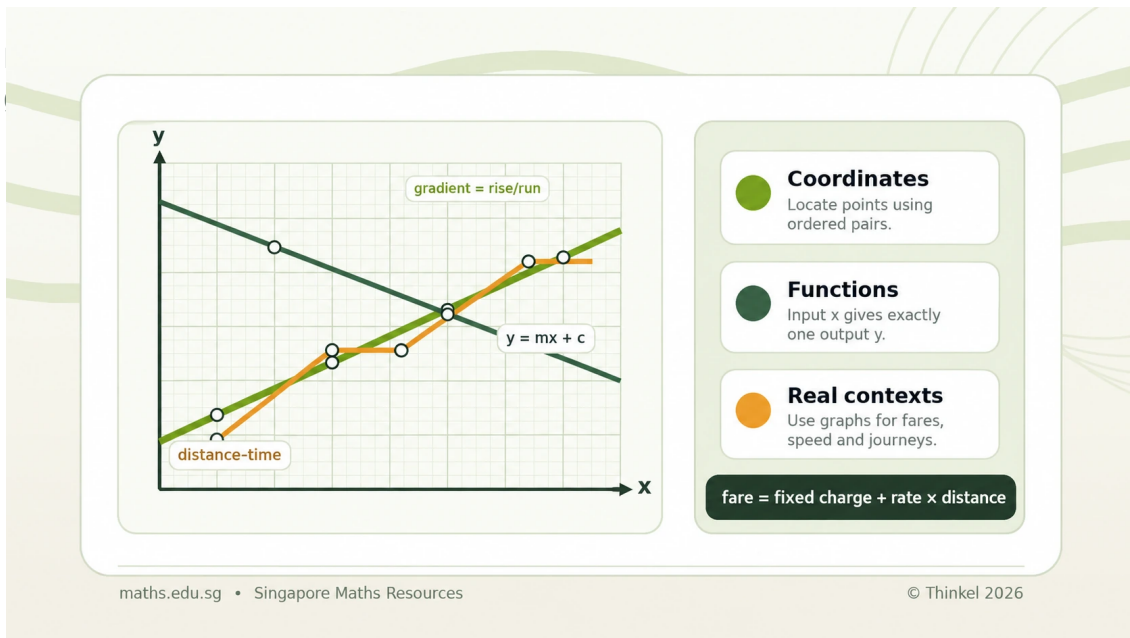


Linear Functions and Graphs



Important graph-paper rule

- ✓ Draw x-axis and y-axis on hard green lines.
- ✓ Keep the graph-paper grid as true squares.
- ✓ Mark plotted points with small crosses, not circles.
- ✓ Use thin graph lines so intersections stay readable.

Chapter 6 Practice Pack Overview

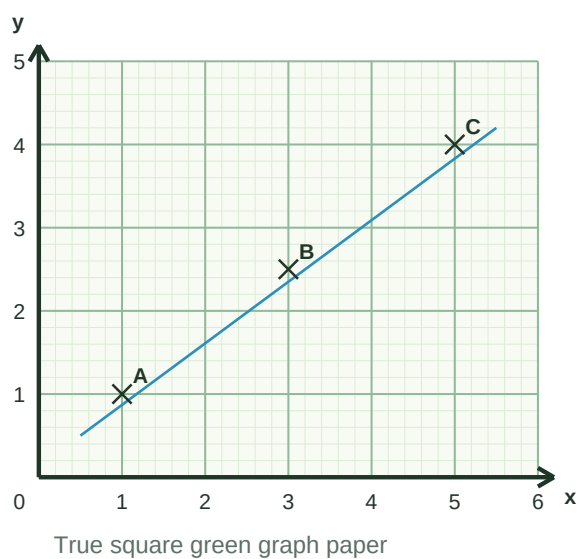
Learning goals

- Plot and read points on a Cartesian plane.
- Represent functions using equations, tables and graphs.
- Draw linear graphs and recognise $y = mx + c$.
- Find gradient using rise/run and state the y-intercept.
- Read real-world linear graphs such as petrol, taxi fare and distance-time graphs.

Correct graph style used from v3 onward

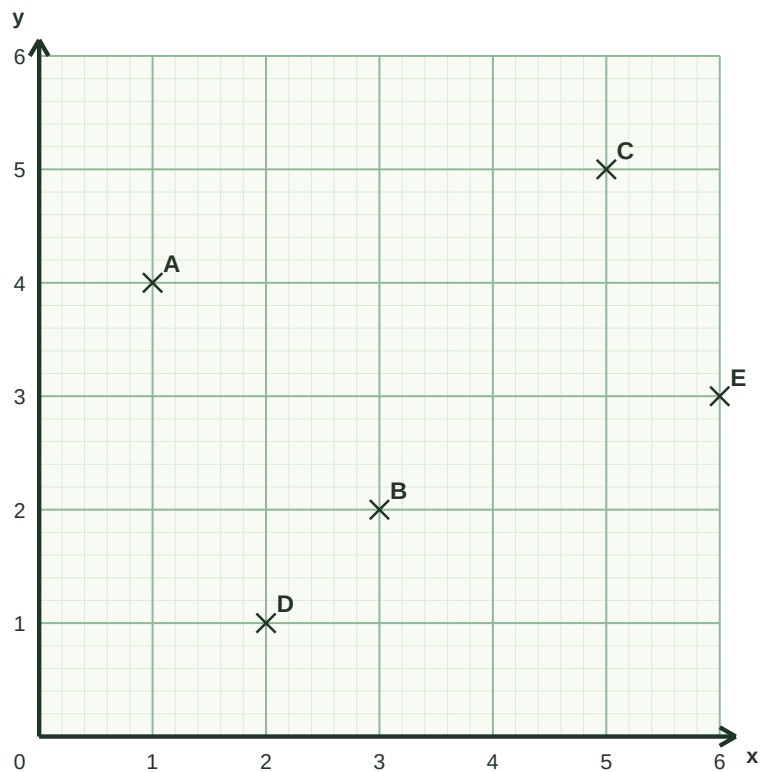
- Minor grid lines are light green; major grid lines are stronger green.
- Every major square is a real square, not a stretched rectangle.
- Axes are hard dark green and drawn exactly on grid lines.
- Point markers are compact crosses within about four small squares.

Mini sample



A. Cartesian Coordinates

Questions 1–10: Use the graph below. Read x first, then y. Points are shown with small crosses.

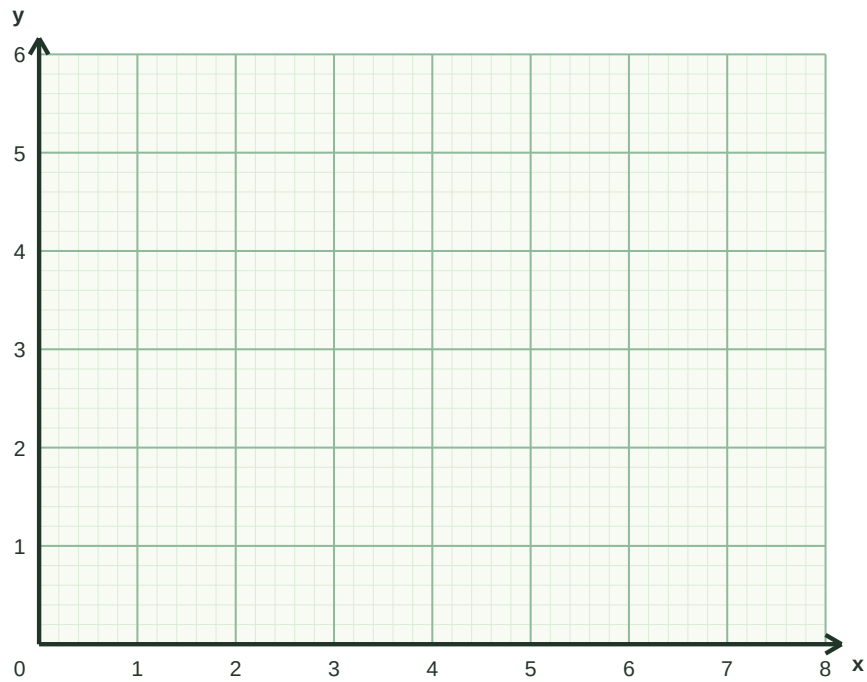


Questions 1–10: Use the graph above.

1. Write the coordinates of A.
2. Write the coordinates of B.
3. Write the coordinates of C.
4. Which point has coordinates (2, 1)?
5. Which point has coordinates (6, 3)?
6. Which point is furthest to the right?
7. Which point is highest?
8. Which point has x-coordinate 3?
9. Which point has y-coordinate 5?
10. Explain why (4, 1) and (1, 4) are different positions.

A. Cartesian Coordinates

Questions 11–20: Plot each point on the blank graph using a small cross. Label each point clearly.



- | | |
|-------------|-------------|
| 11. P(1, 2) | 16. U(6, 6) |
| 12. Q(4, 5) | 17. V(2, 5) |
| 13. R(7, 1) | 18. W(5, 3) |
| 14. S(0, 4) | 19. X(8, 2) |
| 15. T(3, 0) | 20. Y(1, 6) |

B. Functions

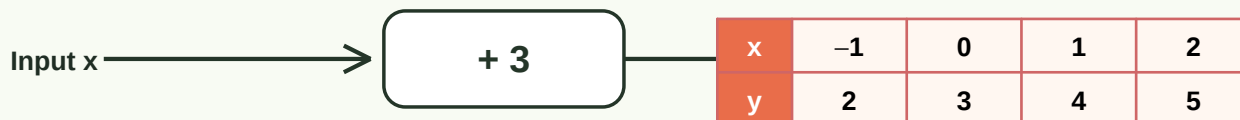
Functions: one input gives one output

A function gives exactly one output y for each input x . The textbook introduces this with a function machine. Here, the machine is clearly stated as $y = x + 3$ so students know which rule is being used.

Function machine

Function: $y = x + 3$

Rule: add 3 to the input x to get the output y .



Example table for $y = x + 3$

Questions 21–35

21. $y = x + 4$, for $x = 0, 1, 2, 3$.
22. $y = 2x + 1$, for $x = 0, 1, 2, 3$.
23. $y = 3x - 2$, for $x = 1, 2, 3, 4$.
24. $y = 10 - x$, for $x = 0, 2, 4, 6$.
25. $y = 5x$, for $x = 0, 1, 2, 3$.
26. $y = x/2 + 1$, for $x = 0, 2, 4, 6$.
27. $y = 12 - 2x$, for $x = 1, 2, 3, 4$.
28. $y = 4x + 3$, for $x = 0, 1, 2, 3$.
29. $y = -x + 6$, for $x = 0, 1, 4, 6$.
30. $y = 1.5x$, for $x = 0, 2, 4, 6$.
31. Is $x = 2$ giving $y = 5$ and $y = 7$ a function? Explain.
32. Does $y = 3x$ give exactly one output for each input?
33. State one input-output pair for $y = 2x - 1$.
34. A function is $y = x + 8$. Find y when $x = 12$.
35. A function is $y = 30 - 5x$. Find x when $y = 10$.

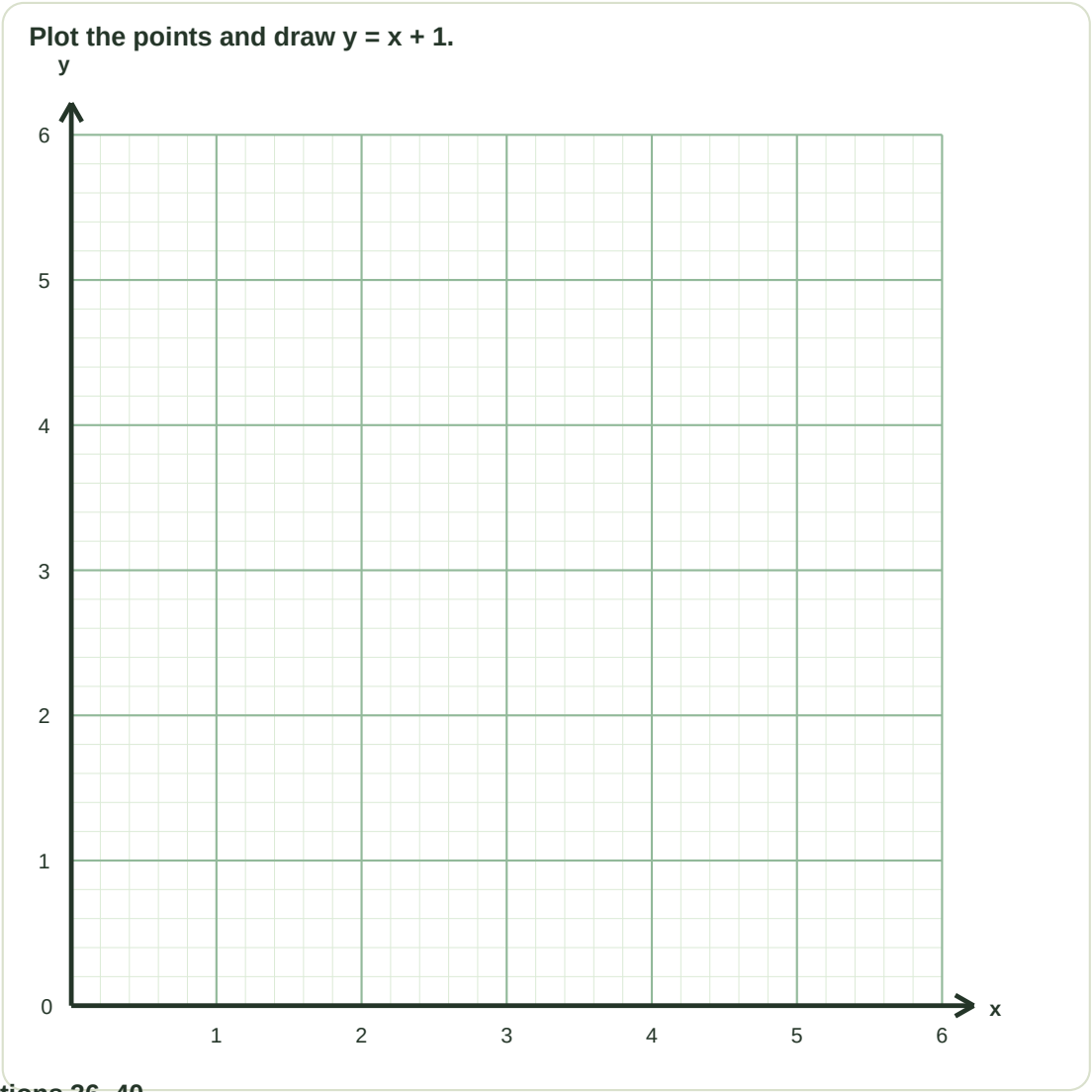
Practice B: Drawing a linear graph

Function: $y = x + 1$

Use the table first, then plot each point using small crosses.

Complete the table for $x = 0, 1, 2, 3$.

x	0	1	2	3
y				



Questions 36–40

- 36. Complete the table above.
- 37. Plot the points from Q36 using small crosses.
- 38. Draw the graph of $y = x + 1$ with a thin straight line.
- 39. What is the y-intercept?
- 40. Find y when $x = 5$ from the graph.

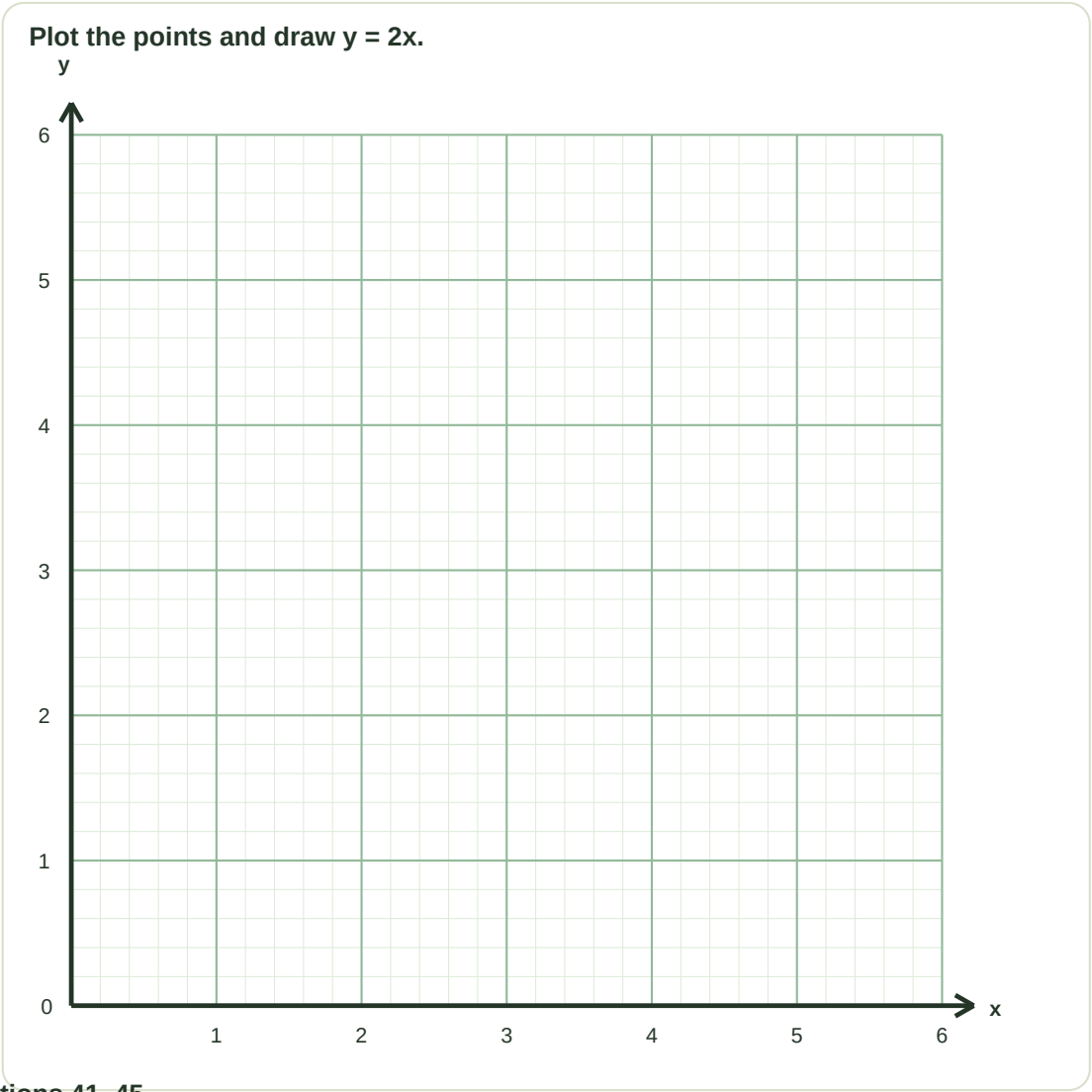
Practice C: Comparing two straight-line graphs

Function: $y = 2x$

Use the table first, then plot each point using small crosses.

Complete the table for $x = 0, 1, 2, 3$.

x	0	1	2	3
y				

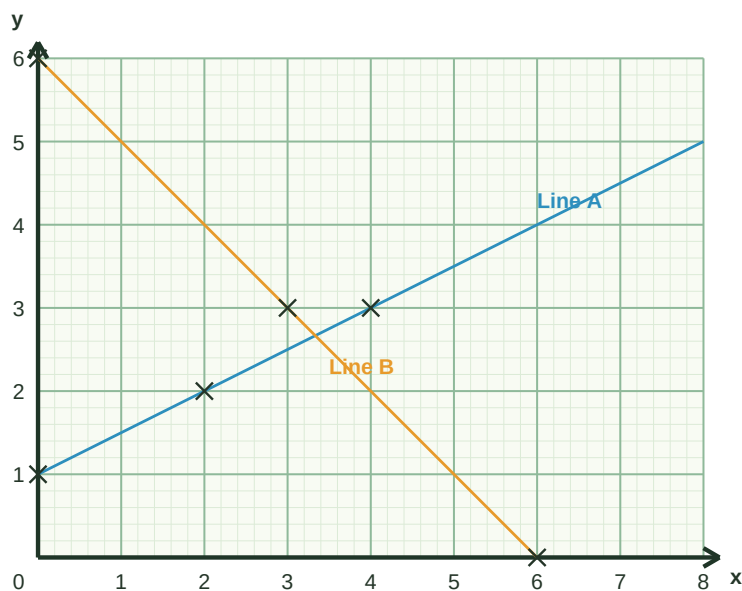


Questions 41–45

- 41. Complete the table above.
- 42. Plot the points from Q41 using small crosses.
- 43. Draw the graph of $y = 2x$ with a thin straight line.
- 44. Which graph is steeper: $y = x + 1$ or $y = 2x$?
- 45. Explain using gradient or rise/run.

C. Linear Functions in the Form $y = mx + c$

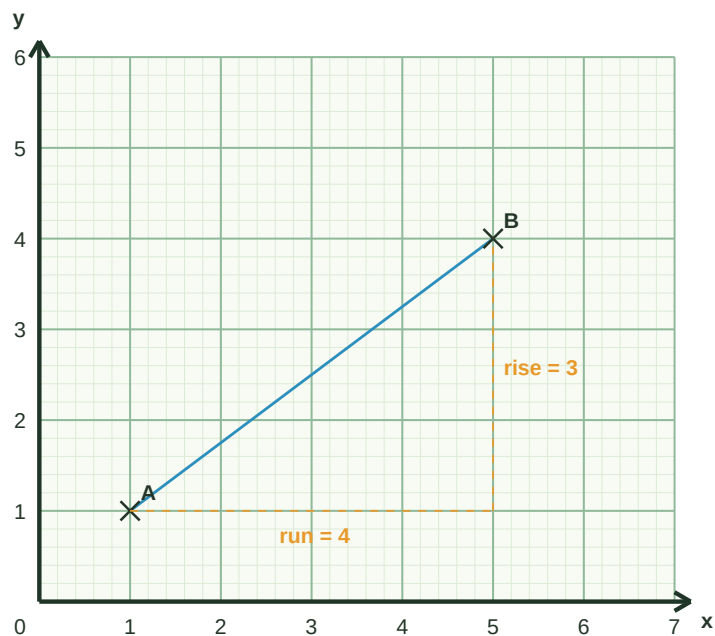
Questions 46–55: In $y = mx + c$, m is the gradient and c is the y-intercept.



46. State the y-intercept of Line A.
47. State the y-intercept of Line B.
48. Which line has positive gradient?
49. Which line has negative gradient?
50. Find the gradient of Line A.
51. Find the gradient of Line B.
52. Write the equation of Line A.
53. Write the equation of Line B.
54. For $y = 3x - 2$, state m and c .
55. For $y = -1/2x + 4$, state m and c .

D. Gradient of a Straight Line

Questions 56–65: Gradient = rise/run. Count the squares on the graph paper, not the physical length of the line.

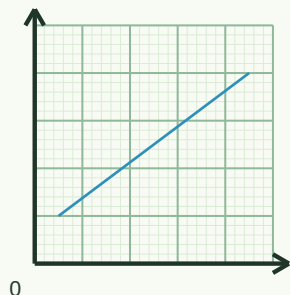


- | | |
|--|---|
| 56. Find the run from A to B. | 61. Find the gradient from (2, 5) to (6, 1). |
| 57. Find the rise from A to B. | 62. Find the gradient from (0, 3) to (4, 3). |
| 58. Find the gradient of AB. | 63. Find the gradient from (3, 0) to (3, 6). |
| 59. Is the gradient positive or negative? | 64. Why is the gradient of a vertical line undefined? |
| 60. Explain what a positive gradient looks like. | 65. Why is the gradient of a horizontal line zero? |

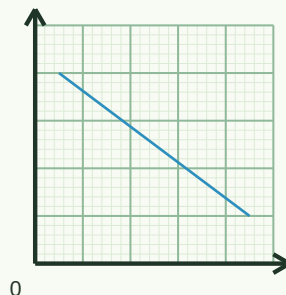
D. Positive, Negative, Zero and Undefined Gradient

Questions 66–75: Identify the gradient type and explain what each graph means.

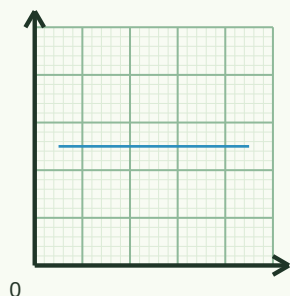
Positive



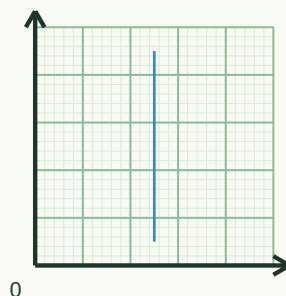
Negative



Zero



Undefined



66. Which card shows a line sloping upwards left to right?

67. Which card shows a line sloping downwards left to right?

68. Which card has gradient 0?

69. Which card has undefined gradient?

70. A road becomes steeper upwards. Which gradient type is this?

71. A distance-time graph is flat. What does this mean?

72. If a graph has gradient -2 , does it rise or fall left to right?

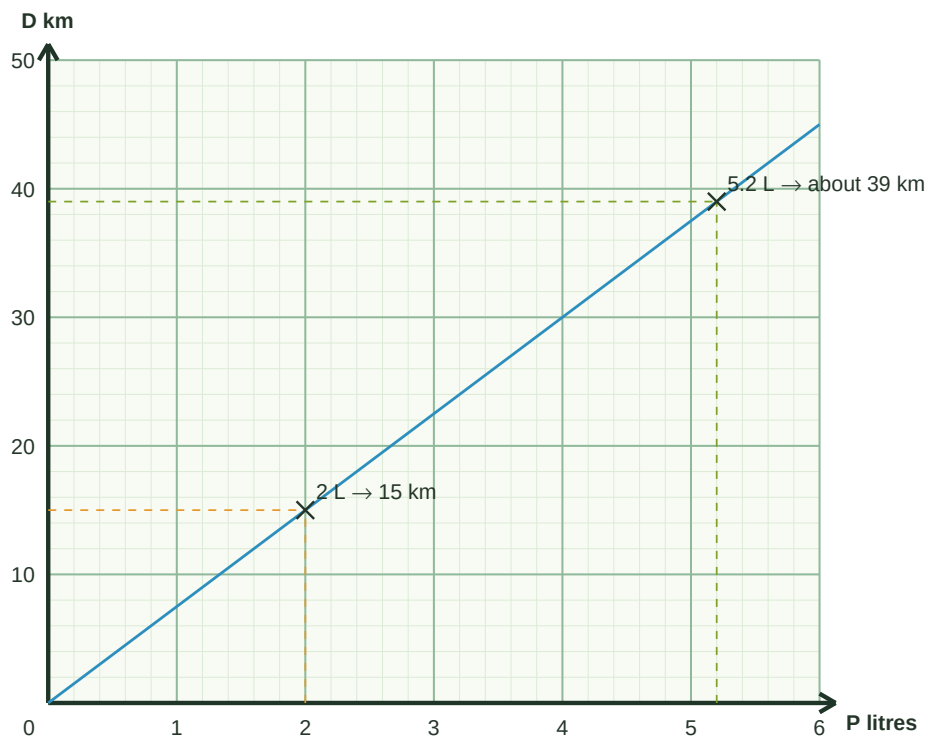
73. Can a vertical line be written as $y = mx + c$? Explain.

74. Which gradient type has run = 0?

75. Which gradient type has rise = 0?

E. Real-World Linear Graph: Petrol Used

Questions 76–85: The graph shows distance D km travelled against petrol used P litres. The grid uses true square graph paper.

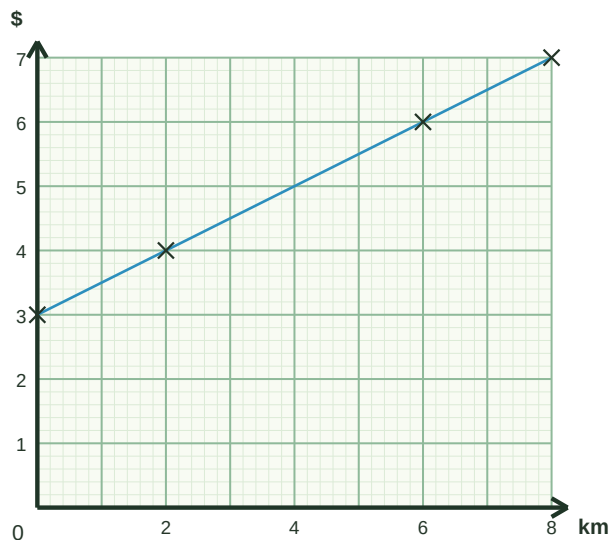


76. How far can the car travel with 2 litres of petrol?
77. How far can the car travel with 5.2 litres of petrol?
78. Estimate the petrol needed for 30 km.
79. If petrol costs \$1.40 per litre, estimate the cost for 30 km.
80. What does the gradient represent?
81. Is the relationship linear? Explain.
82. Does the graph pass through the origin? What does that mean?
83. Estimate the distance for 4 litres of petrol.
84. Estimate the petrol used for 45 km.
85. Write an approximate equation connecting D and P .

E. Real-World Linear Graphs

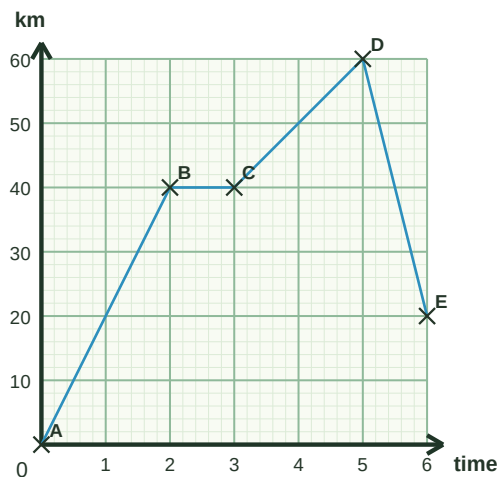
Questions 86–100: Read the real-world graphs. Keep interpretation connected to the context.

Taxi fare graph



86. What is the fixed taxi charge?
87. What is the fare for 2 km?
88. What is the fare for 6 km?
89. Write an equation for fare F in terms of distance d .
90. What does the y-intercept mean?
91. How far was the person after 2 hours?
92. During which section did the person stop?
93. Which section shows the fastest movement away?

Distance-time graph



94. What happened from 5 to 6 hours?
95. Find the speed from 0 to 2 hours.
96. Find the speed from 3 to 5 hours.
97. Find the gradient from 5 to 6 hours.
98. Why can a flat distance-time graph still take time?
99. Write one sentence describing the journey.
100. Compare the two real-world graphs: what does gradient mean in each?

Teacher Notes

Suggested lesson flow

- Start with the graph-paper rule: axes on hard green lines.
- Use coordinates to check x-before-y reading.
- Move from function machine to table to graph.
- Teach gradient using rise/run before $y = mx + c$.
- Use real-world graphs for interpretation and discussion.
- Assign PDF practice as classwork or homework.

Common mistakes to watch for

- Reversing coordinates.
- Marking points with large circles instead of small crosses.
- Drawing axes between grid lines.
- Using thick graph lines that hide intersections.
- Saying vertical gradient is 0 instead of undefined.
- Misreading flat distance-time sections as no time passing.

Answers and Short Explanations

Teacher check plotting questions visually: axes should sit on hard green lines, points should be small crosses, and graph lines should be thin.

- | | | |
|--|------------------------------------|--|
| 1. A=(1,4) | 35. 4 | 69. Undefined |
| 2. B=(3,2) | 36. Teacher check graph / working. | 70. Positive |
| 3. C=(5,5) | 37. Teacher check graph / working. | 71. Stopped |
| 4. D | 38. Teacher check graph / working. | 72. Falls |
| 5. E | 39. Teacher check graph / working. | 73. No; $x=\text{constant}$ |
| 6. E | 40. Teacher check graph / working. | 74. Undefined |
| 7. C | 41. Teacher check graph / working. | 75. Zero |
| 8. B | 42. Teacher check graph / working. | 76. 15 km |
| 9. C | 43. Teacher check graph / working. | 77. about 39 km |
| 10. They are different because the x- and y-values are reversed. | 44. Teacher check graph / working. | 78. 4 L |
| 11. Teacher check graph / working. | 45. Teacher check graph / working. | 79. \$5.60 |
| 12. Teacher check graph / working. | 46. 1 | 80. km per litre |
| 13. Teacher check graph / working. | 47. 6 | 81. Yes, straight line |
| 14. Teacher check graph / working. | 48. Line A | 82. Yes; 0 petrol gives 0 km |
| 15. Teacher check graph / working. | 49. Line B | 83. 30 km |
| 16. Teacher check graph / working. | 50. $\frac{1}{2}$ | 84. 6 L |
| 17. Teacher check graph / working. | 51. -1 | 85. $D \approx 7.5P$ |
| 18. Teacher check graph / working. | 52. $y = \frac{1}{2}x + 1$ | 86. \$3 |
| 19. Teacher check graph / working. | 53. $y = -x + 6$ | 87. \$4 |
| 20. Teacher check graph / working. | 54. $m=3, c=-2$ | 88. \$6 |
| 21. 4,5,6,7 | 55. $m=-\frac{1}{2}, c=4$ | 89. $F=3+0.5d$ |
| 22. 1,3,5,7 | 56. 4 | 90. Fixed charge |
| 23. 1,4,7,10 | 57. 3 | 91. 40 km |
| 24. 10,8,6,4 | 58. $\frac{3}{4}$ | 92. 2 to 3 hours |
| 25. 0,5,10,15 | 59. Positive | 93. 0 to 2 hours |
| 26. 1,2,3,4 | 60. Rises left to right | 94. Returned closer |
| 27. 10,8,6,4 | 61. -1 | 95. 20 km/h |
| 28. 3,7,11,15 | 62. 0 | 96. 10 km/h |
| 29. 6,5,2,0 | 63. undefined | 97. -40 km/h |
| 30. 0,3,6,9 | 64. $\text{run}=0$ | 98. The person is stationary while time passes |
| 31. No | 65. $\text{rise}=0$ | 99. Away, stopped, away, then returned |
| 32. Yes | 66. Positive | 100. Taxi: cost per km; distance-time: speed. |
| 33. Example: $x=2, y=3$ | 67. Negative | |
| 34. 20 | 68. Zero | |