Planner

Functions and graphs

- Finding the gradient of the graph of a linear function
- Describing a straight line using an equation
- Recognising that straight lines can be written in the form $y = mx + c$
- Interpreting the equation of a line
- Drawing lines of linear functions in the form $ry + sx = t$

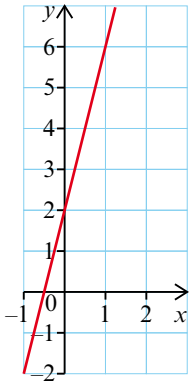
Keywords

You should know

explanation 1a explanation 1b

1 Each line represents a linear function. Find the gradient of each line.

a



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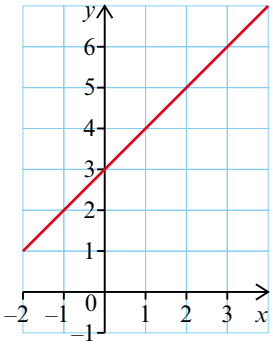

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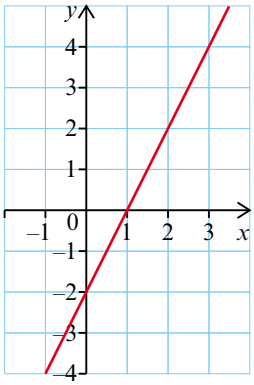

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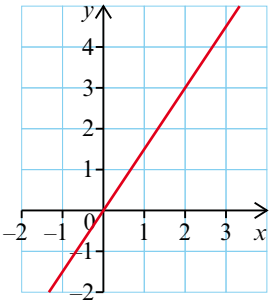

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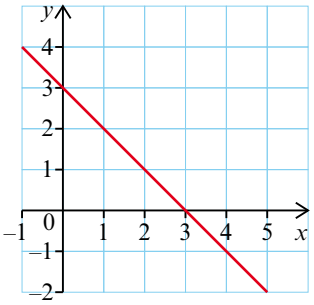

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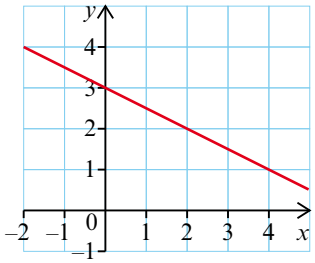


explanation 2 online

2 For each graph:

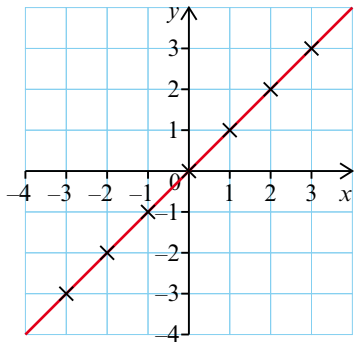
i Write the coordinates of each point marked with a cross. Write your answers in a table.

x						
y						

ii What is the gradient of the line?

iii Write the equation of the line.

a



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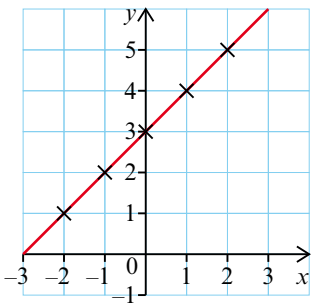

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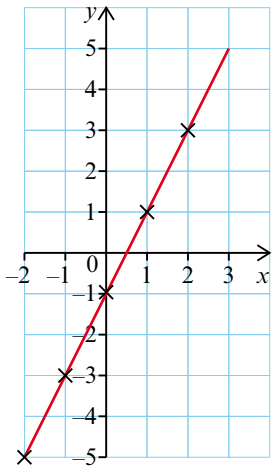

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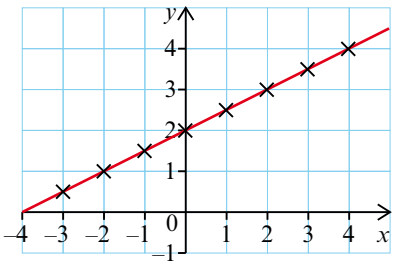

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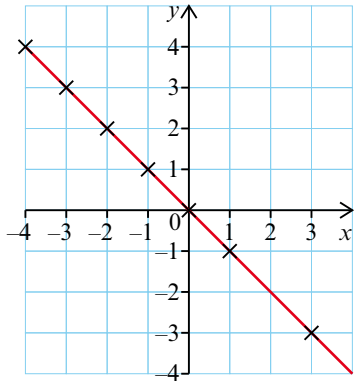

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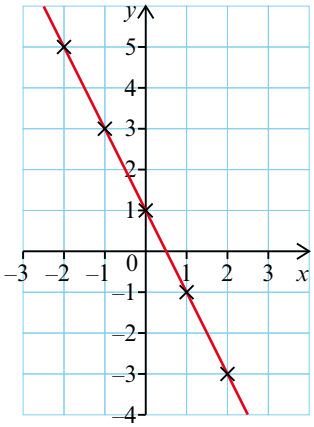
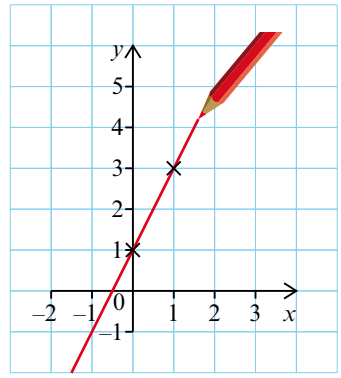


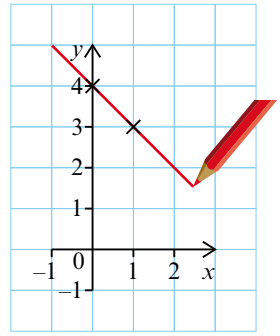
3 Charlotte draws a line that goes through (0, 1).



a The gradient of the line is 2. Explain why the line must also go through (1, 3).

b Write the equation of the line.

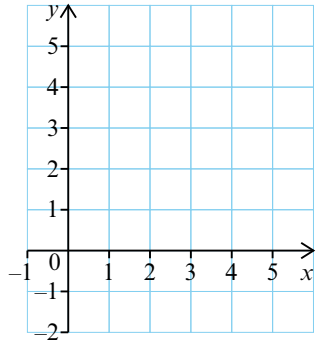
4 Steven draws a line through the point (0, 4).



a The gradient of the line is −1. Explain why the line goes through (1, 3).

b Write the equation of the line.

5 **a** Plot the points A (2, 1) and B (4, 0) on a copy of these axes.
Draw a straight line through both points.



b What is the gradient of the line?

c Moving from A to B, the value of the input x increases by 2.
What is the change in the output y?

d Find the change in y when x increases by

i 1 **ii** 5 **iii** n

e Describe a way to calculate the gradient of the line from the coordinates of points A and B.

f Find the equation of the line.

6 Find the equation of the straight line passing through each pair of points.

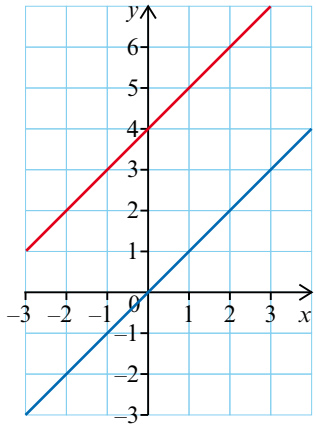
a (0, 0) and (1, 1) **b** (0, 1) and (1, 3) **c** (1, 2) and (3, 8)

d (2, 0) and (−2, −2) **e** (3, 1) and (7, 1) **f** (−1, 2) and (−5, −10)

explanation 3a | explanation 3b | online

7 Find the equation of the red line and the blue line in each diagram.

a



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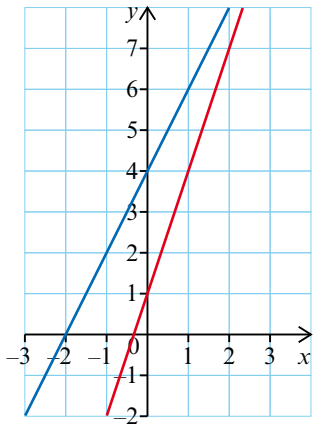

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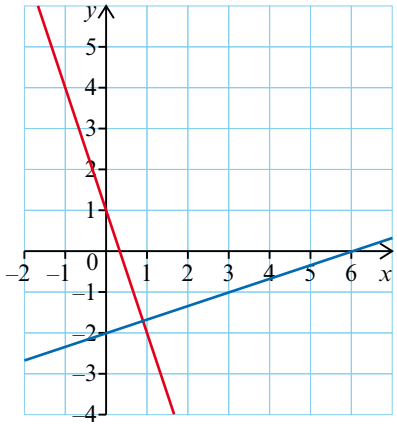

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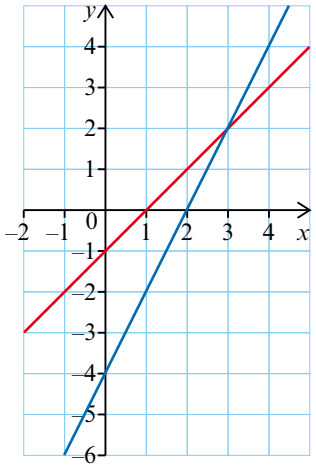

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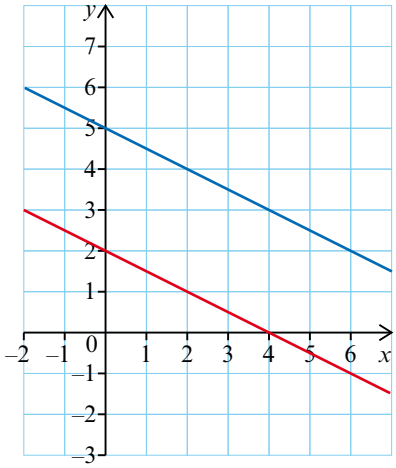

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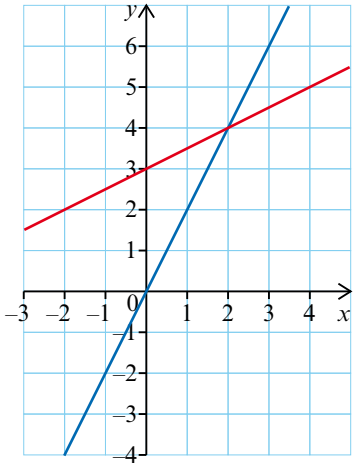

8 Look at your answers to question **7**. What do parallel lines have in common?

9 Which of these lines is the steepest and which are parallel?

$y = 2 - x$ $y = x - 1$ $y = 2x - 1$ $y = 4x - 10$ $y = 2x$

explanation 4a | explanation 4b | online

10 Draw each pair of lines on a set of axes, where each goes from −5 to 8. Write the coordinates of the point where they intersect.

a $y = 2x$, $y = 3 - x$

b $y = 3x - 2$, $y = 4$

c $y = x - 4$, $x = 4$

d $y + 2x = 4$, $y = x - 5$

e $2y + 3x = 6$, $y = -1.5$

f $2x + 7y = 14$, $y = 2$

g $x - 4y = 8$, $y = -1$

h $2y - 3x = 15$, $x = -3$

11 Draw these lines.

a $x + y = 0$ **b** $x - 2y = 0$ **c** $3x + 4y = 0$

12 Plot the graphs of $2x - 3y = 0$ and $x - 2y = 1$ on the same axes. Write the coordinates of the point where the two lines meet.

13 **a** Draw the lines $y = 7x + 3$ and $4x + 3y + 1 = 0$ on the same axes.

b Estimate the coordinates of the point where the lines intersect.

c Explain why the x-coordinate of the point of intersection satisfies

$4x + 3(7x + 3) + 1 = 0$

d Solve the equation to find the exact coordinates of the point of intersection.

14 Use a computer to plot these graphs or plot them yourself by completing a simple table. Explain why only two are the graphs of linear functions.

a $y = x^2 - 4$ **b** $y = 2x - 4$

c $2x + y = 10$ **d** $y = \frac{4}{x}$

15 Use your graphs from question **14** to explain why two of these equations can each have more than one solution. Which equations are they?

$x = x^2 - 4$ $x = 2x - 4$

$2x + x = 10$ $x = \frac{4}{x}$

Look at the points of intersection between the graphs in question **14** and the line $y = x$. You do not need to solve the equations!