



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Straight-Line Graphs · Practice Booklet

NAME: _____

CLASS: _____

DATE: _____

☐ Developing

☒ Secure

☐ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Straight-Line Graphs

Total marks available: 93

● Straight-Line Graphs

✓ $y = -3x - 6$

Q1 · ● Developing · 3 marks

METHOD

Gradient = $(15 - 9) \div (-7 - (-5)) = 6 \div (-2) = -3$

$9 = -3 \times (-5) + c$, so $c = -6$

$y = -3x - 6$

✓ (a) 15, 6, 3; (b) line drawn (see below)

Q2 · ● Developing · 4 marks

METHOD

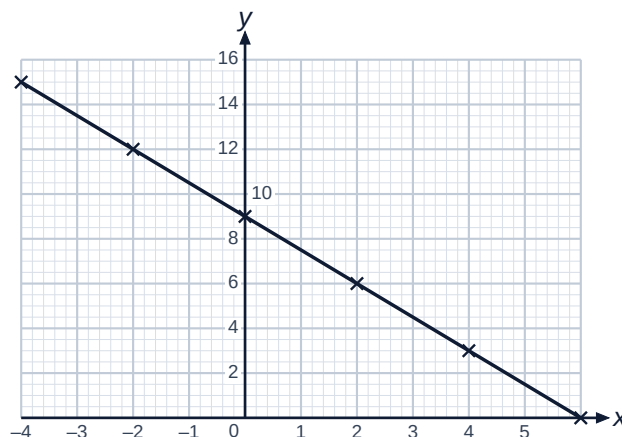
Substitute each x-value into $3x + 2y = 18$: $x = -4$: $y = 15$; $x = 2$: $y = 6$; $x = 4$: $y = 3$

B2 all three correct (B1 for one or two)

Plot the points and join them with a ruled straight line.

B1 points plotted · B1 correct line

x	-4	-2	0	2	4	6
y	15	12	9	6	3	0



✓ $-\frac{1}{2}$

Q3 · ● Developing · 2 marks

METHOD

Gradient of $L = 2$

Perpendicular gradients multiply to -1 , so the perpendicular gradient is $-1 \div 2 = -\frac{1}{2}$

B1 (negative reciprocal)

✓ (a) 9, 6, 0; (b) line drawn (see below)

Q4 · ● Developing · 4 marks

METHOD

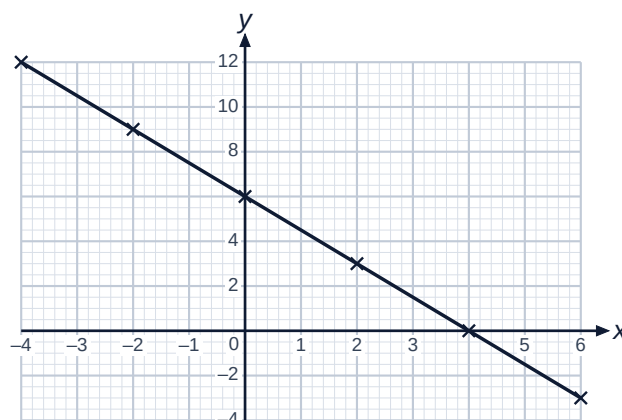
Substitute each x-value into $3x + 2y = 12$: $x = -2$: $y = 9$; $x = 0$: $y = 6$; $x = 4$: $y = 0$

B2 all three correct (B1 for one or two)

Plot the points and join them with a ruled straight line.

B1 points plotted · B1 correct line

x	-4	-2	0	2	4	6
y	12	9	6	3	0	-3



✓ (a) 10, 6, 4; (b) line drawn (see below)

Q5 · ● Developing · 4 marks

METHOD

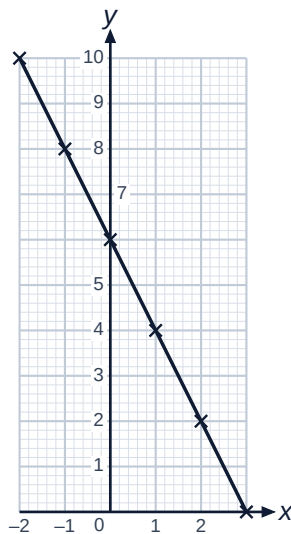
Substitute each x-value into $y = 6 - 2x$: $x = -2$: $y = 10$; $x = 0$: $y = 6$; $x = 1$: $y = 4$

B2 all three correct (B1 for one or two)

Plot the points and join them with a ruled straight line.

B1 points plotted · B1 correct line

x	-2	-1	0	1	2	3
y	10	8	6	4	2	0



✓ $-\frac{3}{4}$

Q6 · ● Developing · 2 marks

METHOD

Gradient of $L = \frac{4}{3}$

Perpendicular gradients multiply to -1 , so the perpendicular gradient is $-1 \div \frac{4}{3} = -\frac{3}{4}$

B1 (negative reciprocal)

✓ (a) 7, 3, -3; (b) line drawn (see below)

Q7 · ● Developing · 4 marks

METHOD

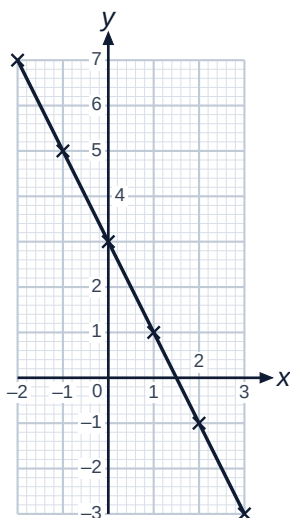
Substitute each x-value into $y = 3 - 2x$: $x = -2$: $y = 7$; $x = 0$: $y = 3$; $x = 3$: $y = -3$

B2 all three correct (B1 for one or two)

Plot the points and join them with a ruled straight line.

B1 points plotted · B1 correct line

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



✓ -2

Q8 · ● Developing · 2 marks

METHOD

Gradient of $L = \frac{1}{2}$

Perpendicular gradients multiply to -1, so the perpendicular gradient is $-1 \div \frac{1}{2} = -2$

B1 (negative reciprocal)

✓ $y = 2x - 2$

Q9 · ● Developing · 3 marks

METHOD

Gradient = $(-16 - (-6)) \div (-7 - (-2)) = -10 \div (-5) = 2$

$-6 = 2 \times (-2) + c$, so $c = -2$

$y = 2x - 2$

$$\checkmark y = -2x - 10$$

Q10 · ● Developing · 3 marks

METHOD

$$\text{Gradient} = (-30 - (-22)) \div (10 - 6) = -8 \div 4 = -2$$

$$-22 = -2 \times 6 + c, \text{ so } c = -10$$

$$y = -2x - 10$$

$$\checkmark 10$$

Q11 · ● Secure · 3 marks

METHOD

Horizontal distance = 6, vertical distance = 8

$$\text{Length} = \sqrt{6^2 + 8^2} = \sqrt{100} = 10$$

M1 Pythagoras · A1

$$\checkmark y = 2x + 10$$

Q12 · ● Secure · 3 marks

METHOD

Gradient of $L = -\frac{1}{2}$, so the perpendicular gradient = 2

$$10 = 2 \times 0 + c, \text{ so } c = 10$$

$$y = 2x + 10$$

B1 gradient · M1 · A1

$$\checkmark y = 3x + 6$$

Q13 · ● Secure · 3 marks

METHOD

Gradient of $L = -\frac{1}{3}$, so the perpendicular gradient = 3

$$3 = 3 \times (-1) + c, \text{ so } c = 6$$

$$y = 3x + 6$$

B1 gradient · M1 · A1

$$\checkmark y = 4x - 24$$

Q14 · ● Secure · 3 marks

METHOD

Gradient of $L = -\frac{1}{4}$, so the perpendicular gradient = 4

$$-8 = 4 \times 4 + c, \text{ so } c = -24$$

$$y = 4x - 24$$

B1 gradient · M1 · A1

$$\checkmark y = -\frac{1}{3}x + 3$$

Q15 · ● Secure · 3 marks

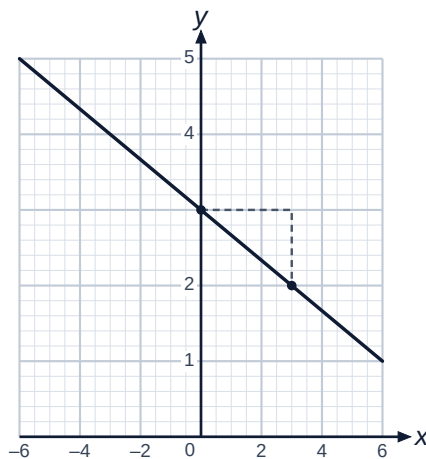
METHOD

y-intercept $c = 3$ (the line passes through $(0, 3)$)

From $(0, 3)$ to $(3, 2)$: down 1 for 3 across, so $m = -\frac{1}{3}$

$$y = -\frac{1}{3}x + 3$$

B1 intercept · M1 gradient as change in $y \div$ change in x · A1



✓ $y = -\frac{3}{4}x - 3$

Q16 · ● Secure · 3 marks

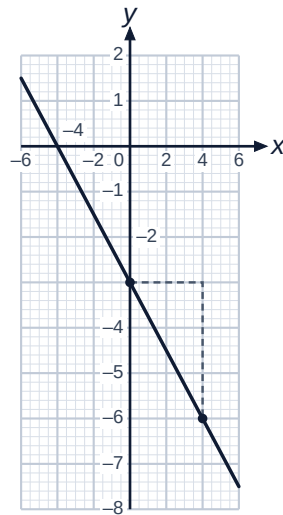
METHOD

y-intercept $c = -3$ (the line passes through $(0, -3)$)

From $(0, -3)$ to $(4, -6)$: down 3 for 4 across, so $m = -\frac{3}{4}$

$y = -\frac{3}{4}x - 3$

B1 intercept · M1 gradient as change in $y \div$ change in x · A1



✓10

Q17 · ● Secure · 3 marks

METHOD

Horizontal distance = 6, vertical distance = 8

Length = $\sqrt{6^2 + 8^2} = \sqrt{100} = 10$

M1 Pythagoras · A1

$$\checkmark y = -\frac{1}{3}x + 2$$

Q18 · ● Secure · 3 marks

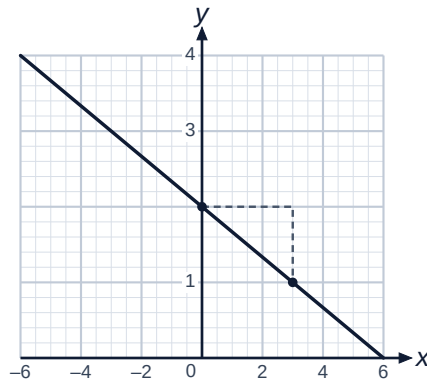
METHOD

y-intercept $c = 2$ (the line passes through $(0, 2)$)

From $(0, 2)$ to $(3, 1)$: down 1 for 3 across, so $m = -\frac{1}{3}$

$$y = -\frac{1}{3}x + 2$$

B1 intercept · M1 gradient as change in $y \div$ change in x · A1



$$\checkmark y = \frac{1}{2}x + 4$$

Q19 · ● Secure · 3 marks

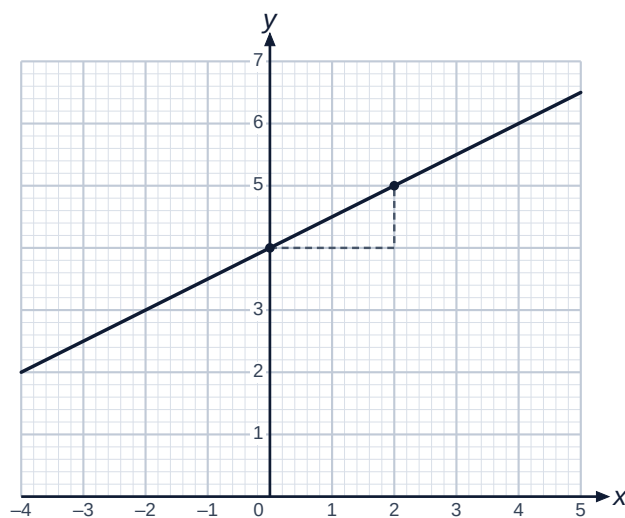
METHOD

y-intercept $c = 4$ (the line passes through $(0, 4)$)

From $(0, 4)$ to $(2, 5)$: up 1 for 2 across, so $m = \frac{1}{2}$

$$y = \frac{1}{2}x + 4$$

B1 intercept · M1 gradient as change in $y \div$ change in x · A1



✓5

Q20 · ● Secure · 3 marks

METHOD

Horizontal distance = 3, vertical distance = 4

$$\text{Length} = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$$

M1 Pythagoras · A1

$$y = \frac{1}{2}x - 3$$

Q21 · ● Greater Depth · 4 marks

METHOD

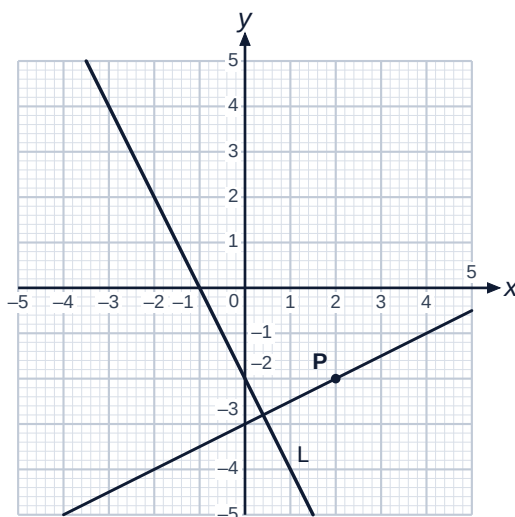
From the graph, the gradient of L is -2 and P is (2, -2)

$$\text{Perpendicular gradient} = -1 \div -2 = \frac{1}{2}$$

$$-2 = \frac{1}{2} \times 2 + c, \text{ so } c = -3$$

$$y = \frac{1}{2}x - 3$$

B1 gradient of L · M1 perpendicular gradient · M1 substitute P · A1



✓ $y = 2x + 5$

Q22 • Greater Depth • 4 marks

METHOD

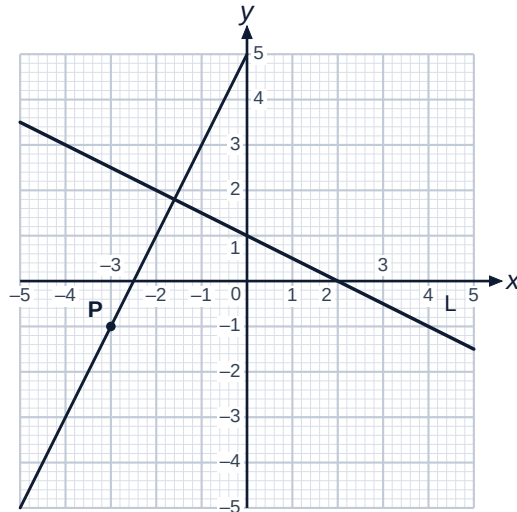
From the graph, the gradient of L is $-\frac{1}{2}$ and P is $(-3, -1)$

Perpendicular gradient = $-1 \div -\frac{1}{2} = 2$

$-1 = 2 \times (-3) + c$, so $c = 5$

$y = 2x + 5$

B1 gradient of L • M1 perpendicular gradient • M1 substitute P • A1



✓ $(6, 1)$

Q23 • Greater Depth • 3 marks

METHOD

$-2x + 13 = -x + 7$

$-x = -6$, so $x = 6$

$y = -2 \times 6 + 13 = 1$

M1 equate • A1 x • A1 y

✓ $y = 2x + 10$

Q24 · ● Greater Depth · 4 marks

METHOD

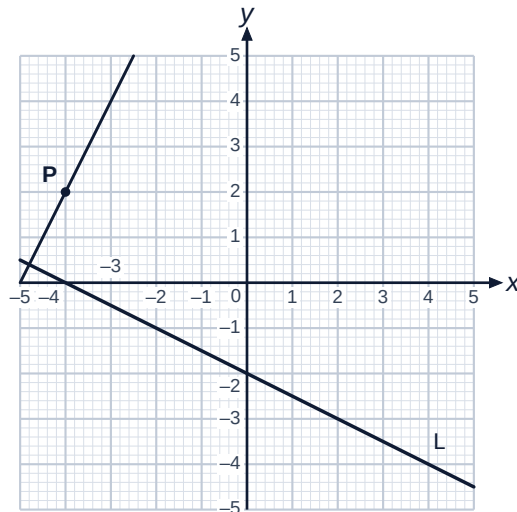
From the graph, the gradient of L is $-\frac{1}{2}$ and P is $(-4, 2)$

Perpendicular gradient = $-1 \div -\frac{1}{2} = 2$

$2 = 2 \times (-4) + c$, so $c = 10$

$$y = 2x + 10$$

B1 gradient of L · M1 perpendicular gradient · M1 substitute P · A1



✓ $x = 4.7, y = 1.3$

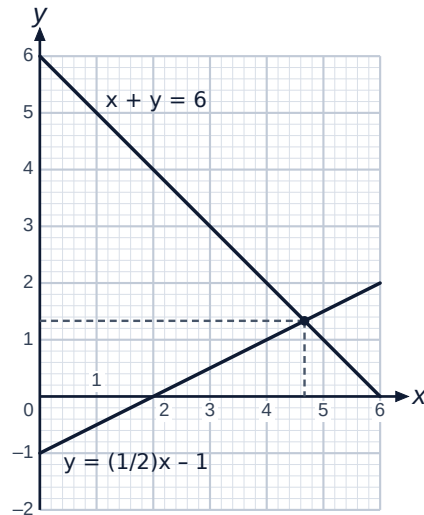
Q25 · ● Greater Depth · 2 marks

METHOD

The solution is the point where the lines cross.

$x = 4.7$ (accept 4.6 to 4.8), $y = 1.3$ (accept 1.2 to 1.4)

B1 x · B1 y (exact: $x = \frac{14}{3}, y = \frac{4}{3}$)



✓ $y = 3x - 4$

Q26 · ● Greater Depth · 4 marks

METHOD

Midpoint of AB = (1, -1)

Gradient of AB = $-\frac{1}{3}$, so the perpendicular gradient = 3

$-1 = 3 \times 1 + c$, so $c = -4$

$y = 3x - 4$

B1 midpoint · B1 gradient · M1 · A1

✓ $x = 4.7, y = 0.3$

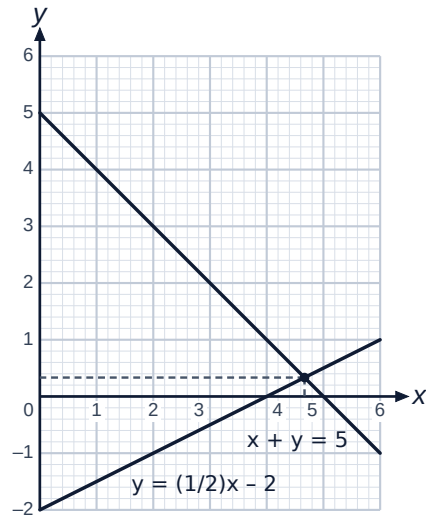
Q27 · ● Greater Depth · 2 marks

METHOD

The solution is the point where the lines cross.

$x = 4.7$ (accept 4.6 to 4.8), $y = 0.3$ (accept 0.2 to 0.4)

B1 x · B1 y (exact: $x = \frac{14}{3}, y = \frac{1}{3}$)



✓ $x = 2.6, y = 2.3$

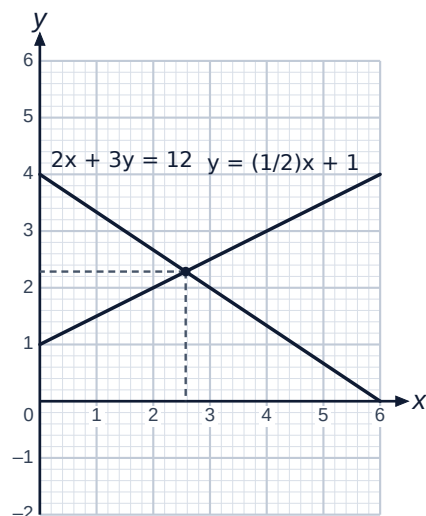
Q28 · ● Greater Depth · 2 marks

METHOD

The solution is the point where the lines cross.

$x = 2.6$ (accept 2.5 to 2.7), $y = 2.3$ (accept 2.2 to 2.4)

B1 x · B1 y (exact: $x = \frac{18}{7}, y = \frac{16}{7}$)



✓(3, 8)

Q29 · ● Greater Depth · 3 marks

METHOD

$$-4x + 20 = 3x - 1$$

$$-7x = -21, \text{ so } x = 3$$

$$y = -4 \times 3 + 20 = 8$$

M1 equate · A1 x · A1 y

✓ $y = -2x$

Q30 · ● Greater Depth · 4 marks

METHOD

$$\text{Midpoint of AB} = (-1, 2)$$

$$\text{Gradient of AB} = \frac{1}{2}, \text{ so the perpendicular gradient} = -2$$

$$2 = -2 \times (-1) + c, \text{ so } c = 0$$

$$y = -2x$$

B1 midpoint · B1 gradient · M1 · A1