



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Simultaneous Equations · 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.

Simultaneous Equations

Total marks available: 130

● Simultaneous Equations

✓ $x = 6, y = 19$

Q1 · ● Developing · 4 marks

METHOD

Rearrange the first equation: $y = 4x - 5$

Substitute: $4x + 3(4x - 5) = 81$

$16x - 15 = 81$, so $x = 6$

$y = 4 \times 6 - 5 = 19$

M1 · M1 · A1 · A1

✓ (a) $-1, 8; 4, 2$; (b) lines drawn (see below);
(c) $x = 1, y = 2$

Q2 · ● Developing · 6 marks

METHOD

(a) $y = 3x - 1$: $x = 0$ gives $y = -1$, $x = 3$ gives $y = 8$

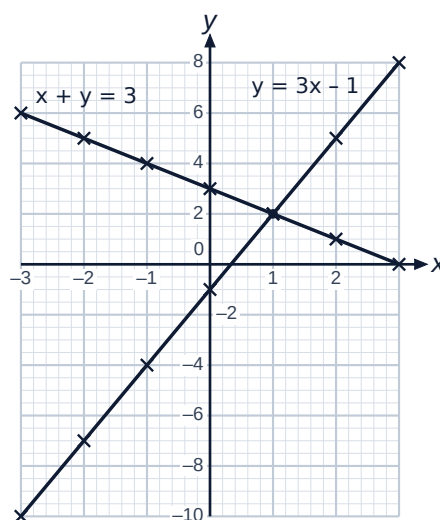
$x + y = 3$: $x = -1$ gives $y = 4$, $x = 1$ gives $y = 2$

B2 all correct (B1 for at least two)

(b) Plot each table and join the points with a ruled straight line · B1 each line

(c) The lines cross at $(1, 2)$, so $x = 1, y = 2$ · B1

x	-3	-2	-1	0	1	2	3
$y = 3x - 1$	-10	-7	-4	-1	2	5	8
$x + y = 3$	6	5	4	3	2	1	0



✓ (a) 12, 6; 16, 4; (b) lines drawn (see below);
(c) $x = 1, y = 4$

Q3 · ● Developing · 6 marks

METHOD

(a) $y = -2x + 6$: $x = -3$ gives $y = 12$, $x = 0$ gives $y = 6$

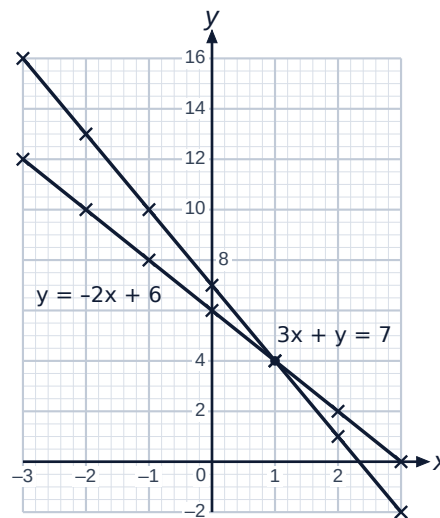
$3x + y = 7$: $x = -3$ gives $y = 16$, $x = 1$ gives $y = 4$

B2 all correct (B1 for at least two)

(b) Plot each table and join the points with a ruled straight line · B1 each line

(c) The lines cross at (1, 4), so $x = 1, y = 4$ · B1

x	-3	-2	-1	0	1	2	3
$y = -2x + 6$	12	10	8	6	4	2	0
$3x + y = 7$	16	13	10	7	4	1	-2



✓ $a = -1, b = 5$

Q4 · ● Developing · 4 marks

METHOD

Rearrange the first equation: $b = 3a + 8$

Substitute: $2a + 3(3a + 8) = 13$

$11a + 24 = 13$, so $a = -1$

$b = 3 \times (-1) + 8 = 5$

M1 · M1 · A1 · A1

✓ $x = 0, y = 8$

Q5 · ● Developing · 4 marks

METHOD

Rearrange the first equation: $y = 4x + 8$

Substitute: $2x + 3(4x + 8) = 24$

$14x + 24 = 24$, so $x = 0$

$y = 4 \times 0 + 8 = 8$

M1 · M1 · A1 · A1

✓ $x = -3, y = 1$

Q6 · ● Developing · 4 marks

METHOD

× 5: $15x + 25y = -20$

× 3: $15x + 9y = -36$

Subtract: $16y = 16$, so $y = 1$

Substitute: $3x + 5 = -4$, so $x = -3$

M1 scale · M1 eliminate · A1 · A1

✓ (a) $-7, 1; 2, 1$; (b) lines drawn (see below);
 (c) $x = 0, y = -1$

Q7 · ● Developing · 6 marks

METHOD

(a) $y = 2x - 1$: $x = -3$ gives $y = -7$, $x = 1$ gives $y = 1$

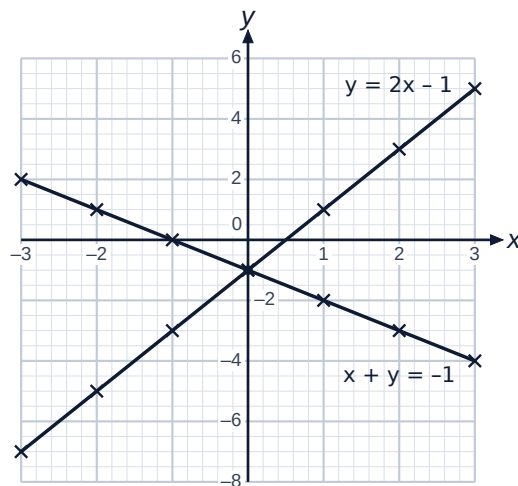
$x + y = -1$: $x = -3$ gives $y = 2$, $x = -2$ gives $y = 1$

B2 all correct (B1 for at least two)

(b) Plot each table and join the points with a ruled straight line · B1 each line

(c) The lines cross at $(0, -1)$, so $x = 0, y = -1$ · B1

x	-3	-2	-1	0	1	2	3
$y = 2x - 1$	-7	-5	-3	-1	1	3	5
$x + y = -1$	2	1	0	-1	-2	-3	-4



✓ (a) -3, 1; 8, 7; (b) lines drawn (see below);
(c) $x = 3, y = 3$

Q8 · ● Developing · 6 marks

METHOD

(a) $y = x$: $x = -3$ gives $y = -3$, $x = 1$ gives $y = 1$

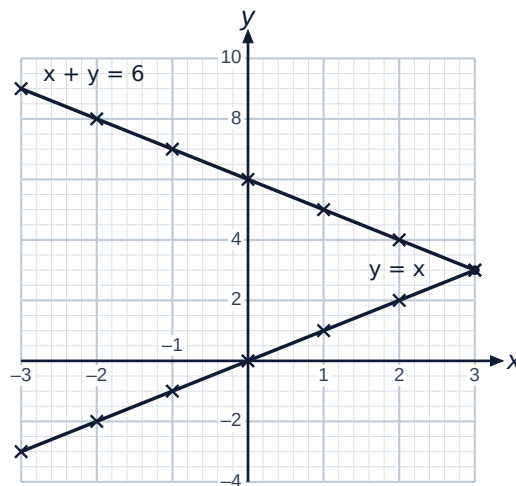
$x + y = 6$: $x = -2$ gives $y = 8$, $x = -1$ gives $y = 7$

B2 all correct (B1 for at least two)

(b) Plot each table and join the points with a ruled straight line · B1 each line

(c) The lines cross at (3, 3), so $x = 3, y = 3$ · B1

x	-3	-2	-1	0	1	2	3
$y = x$	-3	-2	-1	0	1	2	3
$x + y = 6$	9	8	7	6	5	4	3



✓ $p = -6, q = 7$

Q9 · ● Developing · 4 marks

METHOD

× 5: $20p - 10q = -190$

× 4: $20p - 20q = -260$

Subtract: $10q = 70$, so $q = 7$

Substitute: $4p - 14 = -38$, so $p = -6$

M1 scale · M1 eliminate · A1 · A1

✓ $p = -6, q = -7$

Q10 · ● Developing · 4 marks

METHOD

× 5: $10p - 10q = 10$

× 2: $10p - 4q = -32$

Subtract: $-6q = 42$, so $q = -7$

Substitute: $2p + 14 = 2$, so $p = -6$

M1 scale · M1 eliminate · A1 · A1

✓ $x = -3, y = 1$ or $x = 1, y = 5$

Q11 · ● Secure · 5 marks

METHOD

$x^2 + 3x + 1 = x + 4$

$x^2 + 2x - 3 = 0$

$(x - 1)(x + 3) = 0$

$x = 1$ or $x = -3$

When $x = 1, y = 5$; when $x = -3, y = 1$

M1 equate · M1 factorise · A1 · A1 A1

✓ $x = 4, y = 2$ or $x = 5, y = 3$

Q12 · ● Secure · 5 marks

METHOD

$x^2 - 8x + 18 = x - 2$

$x^2 - 9x + 20 = 0$

$(x - 4)(x - 5) = 0$

$x = 4$ or $x = 5$

When $x = 4, y = 2$; when $x = 5, y = 3$

M1 equate · M1 factorise · A1 · A1 A1

✓ $x = -3, y = -2$ or $x = -2, y = 0$

Q13 · ● Secure · 5 marks

METHOD

$x^2 + 7x + 10 = 2x + 4$

$x^2 + 5x + 6 = 0$

$(x + 2)(x + 3) = 0$

$x = -2$ or $x = -3$

When $x = -2, y = 0$; when $x = -3, y = -2$

M1 equate · M1 factorise · A1 · A1 A1

✓ $x = -4, y = -15$ or $x = 5, y = 12$

Q14 · ● Secure · 5 marks

METHOD

$$x^2 + 2x - 23 = 3x - 3$$

$$x^2 - x - 20 = 0$$

$$(x + 4)(x - 5) = 0$$

$$x = -4 \text{ or } x = 5$$

When $x = -4, y = -15$; when $x = 5, y = 12$

M1 equate · M1 factorise · A1 · A1 A1

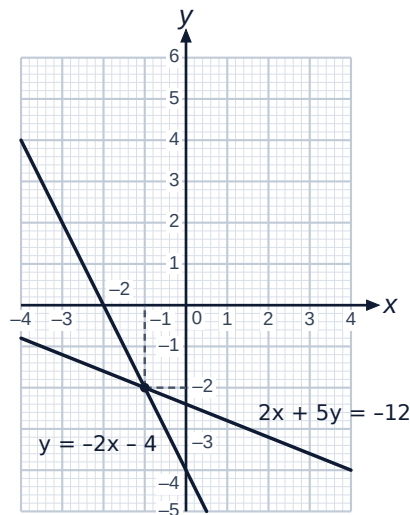
✓ $x = -1, y = -2$

Q15 · ● Secure · 2 marks

METHOD

The lines cross at $(-1, -2)$, so $x = -1, y = -2$

Check in $2x + 5y = -12$: $2 \times (-1) + 5 \times (-2) = -12$ · B1 B1



✓ $x = -2, y = 2$ or $x = 6, y = 10$

Q16 · ● Secure · 5 marks

METHOD

$$x^2 - 3x - 8 = x + 4$$

$$x^2 - 4x - 12 = 0$$

$$(x - 6)(x + 2) = 0$$

$$x = 6 \text{ or } x = -2$$

When $x = 6, y = 10$; when $x = -2, y = 2$

M1 equate · M1 factorise · A1 · A1 A1

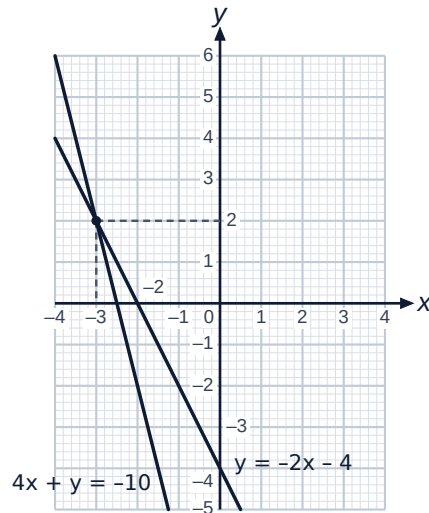
✓ $x = -3, y = 2$

Q17 · ● Secure · 2 marks

METHOD

The lines cross at $(-3, 2)$, so $x = -3, y = 2$

Check in $4x + y = -10$: $4 \times (-3) + 2 = -10$. B1 B1



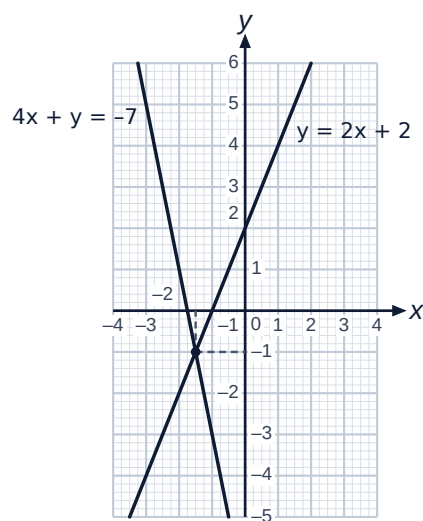
✓ $x = -1.5, y = -1$

Q18 · ● Secure · 2 marks

METHOD

The lines cross at $(-1.5, -1)$, so $x = -1.5, y = -1$

Check in $4x + y = -7$: $4 \times (-1.5) + (-1) = -7$. B1 B1



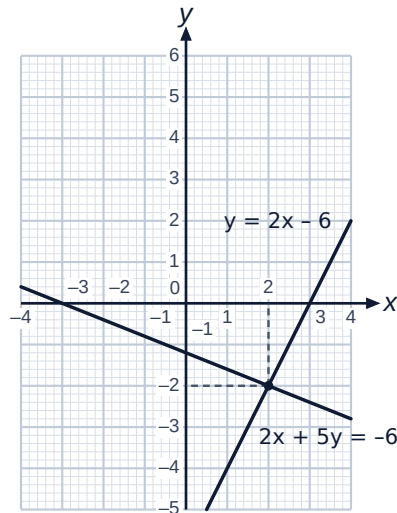
✓ $x = 2, y = -2$

Q19 · ● Secure · 2 marks

METHOD

The lines cross at $(2, -2)$, so $x = 2, y = -2$

Check in $2x + 5y = -6$: $2 \times 2 + 5 \times (-2) = -6$ · B1 B1



✓ $x = -4, y = 6$ or $x = 0, y = -2$

Q20 · ● Secure · 5 marks

METHOD

$$x^2 + 2x - 2 = -2x - 2$$

$$x^2 + 4x = 0$$

$$(x + 4)x = 0$$

$$x = -4 \text{ or } x = 0$$

When $x = -4, y = 6$; when $x = 0, y = -2$

M1 equate · M1 factorise · A1 · A1 A1

✓ $x = 5, y = 1$ or $x = 6, y = 0$

Q21 · ● Greater Depth · 5 marks

METHOD

$$2x^2 - 23x + 66 = -x + 6$$

$$2x^2 - 22x + 60 = 0$$

$$2(x - 6)(x - 5) = 0$$

$$x = 6 \text{ or } x = 5$$

When $x = 6, y = 0$; when $x = 5, y = 1$

M1 equate · M1 factorise · A1 · A1 A1

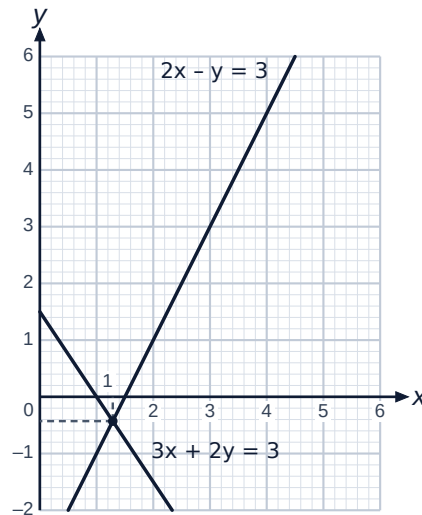
✓ (a) $x = 1.3, y = -0.4$; (b) the lines do not cross on a grid line

Q22 · ● Greater Depth · 3 marks

METHOD

(a) Read the point where the lines cross: $x = 1.3$ (accept 1.2 to 1.4), $y = -0.4$ (accept -0.5 to -0.3)
· B1 B1

(b) The crossing point is not on a grid line, so it can only be read approximately (exact solution $x = \frac{9}{7}, y = -\frac{3}{7}$) · B1



✓ $x = -5, y = -10$ or $x = 5, y = 10$

Q23 · ● Greater Depth · 5 marks

METHOD

$$3x^2 + 2x - 75 = 2x$$

$$3x^2 - 75 = 0$$

$$3(x - 5)(x + 5) = 0$$

$$x = 5 \text{ or } x = -5$$

When $x = 5, y = 10$; when $x = -5, y = -10$

M1 equate · M1 factorise · A1 · A1 A1

✓ $x = 3, y = 7$ or $x = 4, y = 9$

Q24 · ● Greater Depth · 5 marks

METHOD

$$2x^2 - 12x + 25 = 2x + 1$$

$$2x^2 - 14x + 24 = 0$$

$$2(x - 4)(x - 3) = 0$$

$$x = 4 \text{ or } x = 3$$

When $x = 4, y = 9$; when $x = 3, y = 7$

M1 equate · M1 factorise · A1 · A1 A1

✓ apple: 20p, banana: 15p

Q25 · ● Greater Depth · 5 marks

METHOD

Let x = cost of one apple and y = cost of one banana in pence

$$4x + 3y = 125$$

$$5x + y = 115$$

Solving simultaneously: $x = 20, y = 15$

M1 form both equations · M1 eliminate · A1 · A1

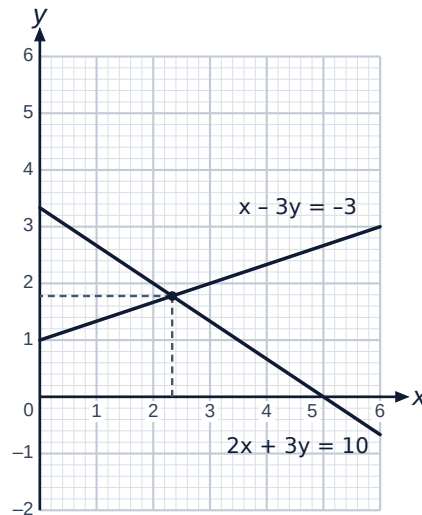
✓ (a) $x = 2.3$, $y = 1.8$; (b) the lines do not cross on a grid line

Q26 · ● Greater Depth · 3 marks

METHOD

(a) Read the point where the lines cross: $x = 2.3$ (accept 2.2 to 2.4), $y = 1.8$ (accept 1.7 to 1.9) · B1
B1

(b) The crossing point is not on a grid line, so it can only be read approximately (exact solution $x = \frac{7}{3}$, $y = \frac{16}{9}$) · B1



✓ burger: £6, drink: £2

Q27 · ● Greater Depth · 5 marks

METHOD

Let x = cost of one burger and y = cost of one drink

$$2x + 3y = 18$$

$$5x + 4y = 38$$

Solving simultaneously: $x = 6$, $y = 2$

M1 form both equations · M1 eliminate · A1 · A1

✓ $x = -3, y = 8$ or $x = 6, y = -19$

Q28 · ● Greater Depth · 5 marks

METHOD

$$3x^2 - 12x - 55 = -3x - 1$$

$$3x^2 - 9x - 54 = 0$$

$$3(x - 6)(x + 3) = 0$$

$$x = 6 \text{ or } x = -3$$

When $x = 6, y = -19$; when $x = -3, y = 8$

M1 equate · M1 factorise · A1 · A1 A1

✓ (a) $x = 2.6, y = 4.7$; (b) the lines do not cross on a grid line

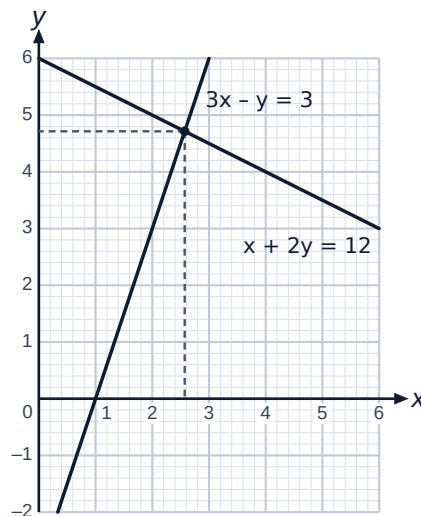
Q29 · ● Greater Depth · 3 marks

METHOD

(a) Read the point where the lines cross: $x = 2.6$ (accept 2.5 to 2.7), $y = 4.7$ (accept 4.6 to 4.8) ·

B1 B1

(b) The crossing point is not on a grid line, so it can only be read approximately (exact solution $x = \frac{18}{7}, y = \frac{33}{7}$) · B1



✓ burger: £6, drink: £3

Q30 · ● Greater Depth · 5 marks

METHOD

Let x = cost of one burger and y = cost of one drink

$$2x + y = 15$$

$$5x + 2y = 36$$

Solving simultaneously: $x = 6$, $y = 3$

M1 form both equations · M1 eliminate · A1 · A1