



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Inequalities · 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.

Inequalities

Total marks available: 101

● Inequalities

$$\checkmark x > -5$$

Q1 · ● Developing · 3 marks

METHOD

Divide by -2 and reverse the sign: $x - 4 > -9$

Add 4 : $x > -5$ · M1 M1 A1

$$\checkmark x \leq -6$$

Q2 · ● Developing · 3 marks

METHOD

Collect x terms: $4x - 11 \leq -35$

$4x \leq -24$

Divide by 4 : $x \leq -6$ · M1 M1 A1

$$\checkmark \text{(a) } -2 \leq x < 2; \text{(b) see number line below}$$

Q3 · ● Developing · 4 marks

METHOD

Subtract 5 from all three parts: $-8 \leq 4x < 8$

Divide by 4 : $-2 \leq x < 2$

Number line: filled circle at -2 , open circle at 2 , joined by a line

M1 · A1 · B1 number line



$$\checkmark y > 4$$

Q4 · ● Developing · 3 marks

METHOD

Collect y terms: $14y - 12 > 44$

$14y > 56$

Divide by 14 : $y > 4$ · M1 M1 A1

✓ $y \leq 6$

Q5 · ● Developing · 3 marks

METHOD

Collect y terms: $8y - 9 \leq 39$

$8y \leq 48$

Divide by 8: $y \leq 6$ · M1 M1 A1

✓ (a) $-1 \leq x \leq 3$; (b) see number line below

Q6 · ● Developing · 4 marks

METHOD

Add 4 to all three parts: $-2 \leq 2x \leq 6$

Divide by 2: $-1 \leq x \leq 3$

Number line: filled circle at -1, filled circle at 3, joined by a line

M1 · A1 · B1 number line



✓ $n \geq 6$

Q7 · ● Developing · 3 marks

METHOD

Collect n terms: $-10n - 2 \leq -62$

$-10n \leq -60$

Divide by -10 (reverse the sign): $n \geq 6$ · M1 M1 A1

✓ (a) $-2 < x \leq 1$; (b) see number line below

Q8 · ● Developing · 4 marks

METHOD

All three parts: $-6 < 3x \leq 3$

Divide by 3: $-2 < x \leq 1$

Number line: open circle at -2, filled circle at 1, joined by a line

M1 · A1 · B1 number line



$$\checkmark y \geq -7$$

Q9 · ● Developing · 3 marks

METHOD

Divide by -4 and reverse the sign: $y + 6 \geq -1$

Subtract 6: $y \geq -7$ · M1 M1 A1

$$\checkmark y < -2$$

Q10 · ● Developing · 3 marks

METHOD

Divide by -3 and reverse the sign: $y - 3 < -5$

Add 3: $y < -2$ · M1 M1 A1

✓ (a) region R shaded (see below); (b) 1

Q11 · ● Secure · 5 marks

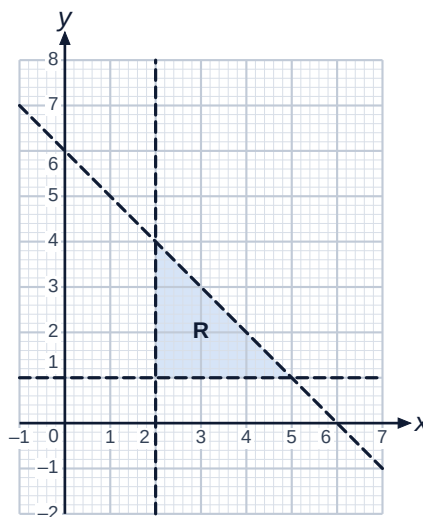
METHOD

(a) Boundary lines – $y > 1$: dashed line; $x > 2$: dashed line; $x + y < 6$: dashed line

R is the triangle with vertices (2, 4), (2, 1), (5, 1)

B1 each correct line · B1 correct region

(b) Count the grid points inside R, including points on solid lines only: 1 · B1



✓ $x < 0$

Q12 · ● Secure · 2 marks

METHOD

Subtract 8: $\frac{x}{3} < 0$

Multiply by 3: $x < 0$ · M1 A1

✓ $x > 30$

Q13 · ● Secure · 2 marks

METHOD

Add 7: $\frac{x}{6} > 5$

Multiply by 6: $x > 30$ · M1 A1

✓ $-7 < x < -4$

Q14 · ● Secure · 3 marks

METHOD

Subtract 10 from all three parts: $8 < -2x < 14$

Divide by -2 and reverse both signs: $-4 > x > -7$, i.e. $-7 < x < -4$ · M1 M1 A1

✓ (a) region R shaded (see below); (b) 3

Q15 · ● Secure · 5 marks

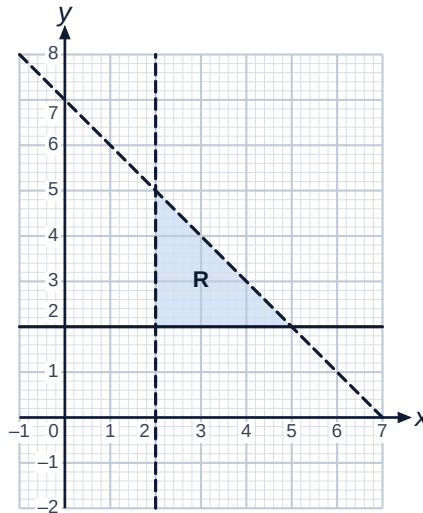
METHOD

(a) Boundary lines – $y \geq 2$: solid line; $x > 2$: dashed line; $x + y < 7$: dashed line

R is the triangle with vertices (2, 5), (2, 2), (5, 2)

B1 each correct line · B1 correct region

(b) Count the grid points inside R, including points on solid lines only: 3 · B1



✓ $1 < x < 7$

Q16 · ● Secure · 3 marks

METHOD

Subtract 1 from all three parts: $-28 < -4x < -4$

Divide by -4 and reverse both signs: $7 > x > 1$, i.e. $1 < x < 7$ · M1 M1 A1

✓ $x < 20$

Q17 · ● Secure · 2 marks

METHOD

Add 6: $\frac{x}{4} < 5$

Multiply by 4: $x < 20$ · M1 A1

✓ $-5 < x < -2$

Q18 · ● Secure · 3 marks

METHOD

Add 6 to all three parts: $6 < -3x < 15$

Divide by -3 and reverse both signs: $-2 > x > -5$, i.e. $-5 < x < -2$ · M1 M1 A1

✓ (a) region R shaded (see below); (b) 6

Q19 · ● Secure · 5 marks

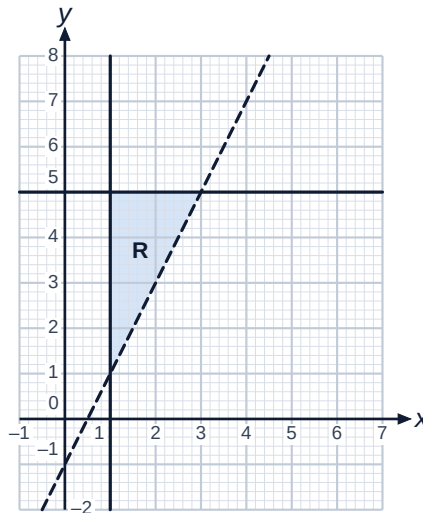
METHOD

(a) Boundary lines – $y \leq 5$: solid line; $x \geq 1$: solid line; $y > 2x - 1$: dashed line

R is the triangle with vertices $(3, 5)$, $(1, 5)$, $(1, 1)$

B1 each correct line · B1 correct region

(b) Count the grid points inside R, including points on solid lines only: 6 · B1



✓ (a) region R shaded (see below); (b) 6

Q20 · ● Secure · 5 marks

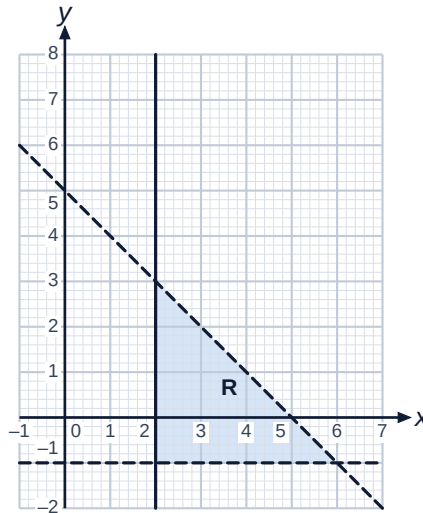
METHOD

(a) Boundary lines – $y > -1$: dashed line; $x \geq 2$: solid line; $x + y < 5$: dashed line

R is the triangle with vertices (2, 3), (2, -1), (6, -1)

B1 each correct line · B1 correct region

(b) Count the grid points inside R, including points on solid lines only: 6 · B1



$$\checkmark y > 2, x > 2, x + y < 7$$

Q21 • ● Greater Depth • 3 marks

METHOD

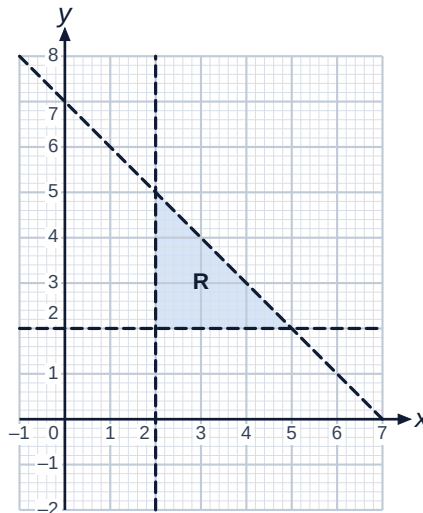
Find the equation of each boundary line, then decide which side is shaded and whether the line is included:

$y > 2$ (dashed, so strict)

$x > 2$ (dashed, so strict)

$x + y < 7$ (dashed, so strict)

B1 for each inequality (accept equivalent forms)



$$\checkmark 3 \leq x \leq 6$$

Q22 • ● Greater Depth • 4 marks

METHOD

$(x - 3)(x - 6) \leq 0$; critical values $x = 3$ and $x = 6$

The graph of $y = x^2 - 9x + 18$ is a U-shape crossing the x-axis at 3 and 6; it is below the axis between them: $3 \leq x \leq 6$

M1 factorise • M1 • A1

$$\checkmark -7 < x < 0$$

Q23 • ● Greater Depth • 4 marks

METHOD

$(x + 7)x < 0$; critical values $x = -7$ and $x = 0$

The graph of $y = x^2 + 7x$ is a U-shape crossing the x-axis at -7 and 0; it is below the axis between them: $-7 < x < 0$

M1 factorise • M1 • A1

$$\checkmark x \leq -8 \text{ or } x \geq 8$$

Q24 • ● Greater Depth • 3 marks

METHOD

$$x^2 = 64 \text{ when } x = -8 \text{ or } x = 8$$

The values outside the critical values satisfy the inequality: $x \leq -8$ or $x \geq 8$ • M1 critical values •

A1 A1

$$\checkmark -6 \leq x \leq 3$$

Q25 • ● Greater Depth • 4 marks

METHOD

$$(x + 6)(x - 3) \leq 0; \text{ critical values } x = -6 \text{ and } x = 3$$

The graph of $y = x^2 + 3x - 18$ is a U-shape crossing the x-axis at -6 and 3 ; it is below the axis between them: $-6 \leq x \leq 3$

M1 factorise • M1 • A1

$$\checkmark y > 1, x \geq 1, x + y \leq 5$$

Q26 • ● Greater Depth • 3 marks

METHOD

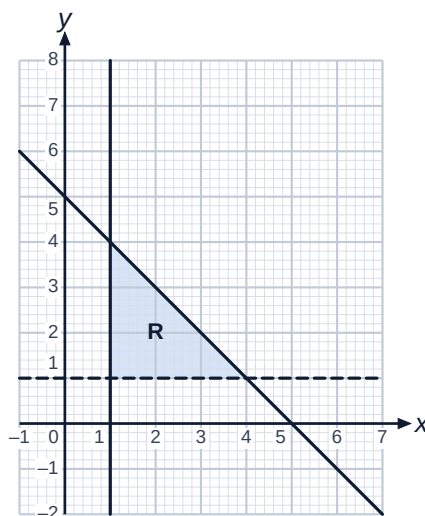
Find the equation of each boundary line, then decide which side is shaded and whether the line is included:

$$y > 1 \text{ (dashed, so strict)}$$

$$x \geq 1 \text{ (solid, so included)}$$

$$x + y \leq 5 \text{ (solid, so included)}$$

B1 for each inequality (accept equivalent forms)



$$\checkmark x \leq -4 \text{ or } x \geq 4$$

Q27 · ● Greater Depth · 3 marks

METHOD

$$x^2 = 16 \text{ when } x = -4 \text{ or } x = 4$$

The values outside the critical values satisfy the inequality: $x \leq -4$ or $x \geq 4$ · M1 critical values ·

A1 A1

$$\checkmark y < 5, x > 1, y > 2x - 1$$

Q28 · ● Greater Depth · 3 marks

METHOD

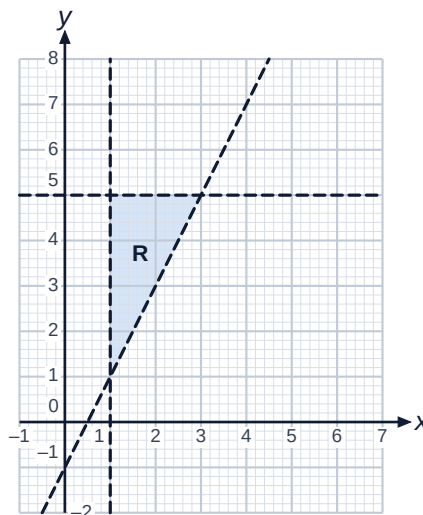
Find the equation of each boundary line, then decide which side is shaded and whether the line is included:

$$y < 5 \text{ (dashed, so strict)}$$

$$x > 1 \text{ (dashed, so strict)}$$

$$y > 2x - 1 \text{ (dashed, so strict)}$$

B1 for each inequality (accept equivalent forms)



$$\checkmark -7 \leq x \leq 7$$

Q29 · ● Greater Depth · 3 marks

METHOD

$$x^2 = 49 \text{ when } x = -7 \text{ or } x = 7$$

The values between the critical values satisfy the inequality: $-7 \leq x \leq 7$ · M1 critical values · A1

A1

✓ $y \geq 2, x > 1, x + y < 7$

Q30 · ● Greater Depth · 3 marks

METHOD

Find the equation of each boundary line, then decide which side is shaded and whether the line is included:

$y \geq 2$ (solid, so included)

$x > 1$ (dashed, so strict)

$x + y < 7$ (dashed, so strict)

B1 for each inequality (accept equivalent forms)

