Inequalities on Graphs: exam questions

10 questions · 27 marks · mark schemes at the end

Name _____ Date _____ Score / 27

- Calculators are allowed on both 4MA1 Higher papers (1H and 2H). Show your working: most marks are for method.
- Mark schemes start after the questions. M marks are for a correct method, A marks for an accurate answer that follows a correct method, and B marks for a correct result on its own.
- Online, with more practice: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/inequalities-on-graphs

1. **3 marks**

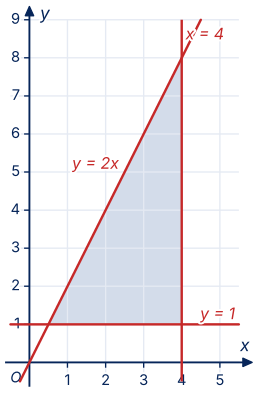
List the points with integer coordinates that satisfy all three inequalities

$x \geqslant 1$ $y > x$ $x + y < 6$

2. **3 marks**

The region R is above or on the line $y = 1$, below or on the line $y = 2x$, and to the left of or on the line $x = 4$.

Write down the three inequalities that define R.



3. **2 marks**

Does the point $(3, 2)$ satisfy both $2x + y < 8$ and $y \geqslant x - 2$? Give a reason.

4. **3 marks**

The region R satisfies $x \geqslant 0$, $y \geqslant 0$ and $x + 2y \leqslant 8$.

(a) Find the coordinates of the vertices of R. **(2)**

(b) Work out the area of R. **(1)**

5. **4 marks**

The lines $y = 2x$ and $x + y = 6$ are drawn.

(a) Find the coordinates of the point where the lines meet. **(2)**

(b) Write down two inequalities, one for each line, that are satisfied by the point $(1, 4)$. **(2)**

6. **2 marks**

The curve $y = x^2 - 4$ is drawn.

For which values of x is the curve below the x-axis?

7. **2 marks**

(a) Write down the inequality for the region on or below the line $y = 3 - x$. **(1)**

(b) Is the point $(1, 2)$ in this region? Give a reason. **(1)**

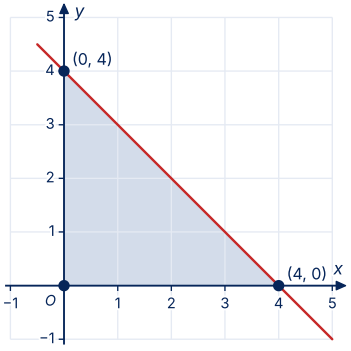
8. **3 marks**

How many points with integer coordinates satisfy $x > 0$, $y > 0$ and $2x + 3y \leqslant 12$?

9. **3 marks**

A triangle has vertices $(0, 0)$, $(4, 0)$ and $(0, 4)$.

Write down three inequalities that describe the region inside the triangle, including its edges.



10. **2 marks**

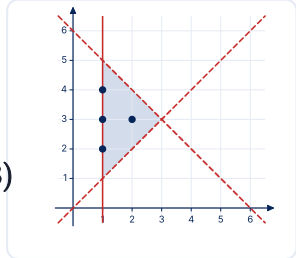
The region R lies between the lines $y = x$ and $y = x + 3$, including both lines.

Write down the inequalities that define R.

Answers and worked solutions

Question 1

3 marks



M1 at least two correct points, none wrong

M1 at least three correct points

A1 $(1,2), (1,3), (1,4), (2,3)$ only

Answer: $(1,2)$, $(1,3)$, $(1,4)$, $(2,3)$

Question 2

3 marks

B1 $y \geqslant 1$

B1 $y \leqslant 2x$

B1 $x \leqslant 4$

Answer: $y \geqslant 1$, $y \leqslant 2x$, $x \leqslant 4$

Question 3

2 marks

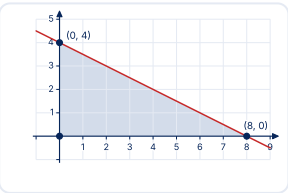
M1 $2 \times 3 + 2 = 8$

A1 No, because 8 is not less than 8

Answer: No ($2x + y = 8$, which is not less than 8)

Question 4

3 marks



(a)

B1 $(0,0)$ and $(8,0)$

B1 $(0,4)$

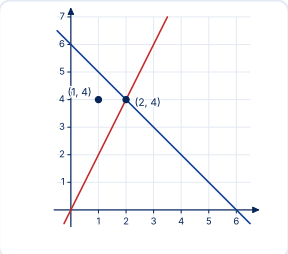
(b)

B1 16

Answer: (a) $(0,0)$, $(8,0)$, $(0,4)$; (b) 16 square units

Question 5

4 marks



(a)

M1 $x + 2x = 6$

A1 $(2,4)$

(b)

B1 $y > 2x$

B1 $x + y < 6$

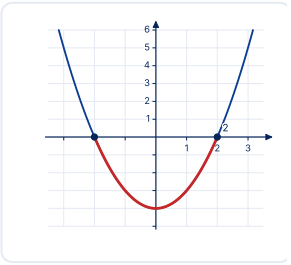
Answer: (a) $(2,4)$; (b) $y > 2x$, $x + y < 6$

Question 6

2 marks

M1 $x^2 - 4 = 0$ gives $x = \pm 2$

A1 $-2 < x < 2$



Answer: $-2 < x < 2$

Question 7

2 marks

(a)

B1 $y \leqslant 3 - x$

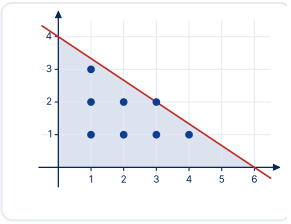
(b)

B1 Yes, $2 \leqslant 3 - 1 = 2$ (it lies on the line, which is included)

Answer: (a) $y \leqslant 3 - x$; (b) Yes

Question 8

3 marks



M1 points listed for at least two values of x, e.g. $x = 1$: $y = 1, 2, 3$

M1 $x = 2$: $y = 1, 2$; $x = 3$: $y = 1, 2$; $x = 4$: $y = 1$

A1 8

Answer: 8

Question 9

3 marks

B1 $x \geqslant 0$

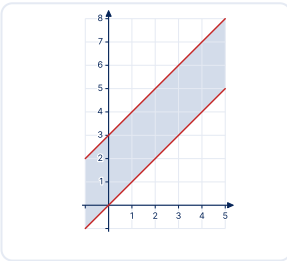
B1 $y \geqslant 0$

B1 $x + y \leqslant 4$

Answer: $x \geqslant 0$, $y \geqslant 0$, $x + y \leqslant 4$

Question 10

2 marks



B1 $y \geqslant x$

B1 $y \leqslant x + 3$

Answer: $x \leqslant y \leqslant x + 3$

Online, with every solution: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/inequalities-on-graphs
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