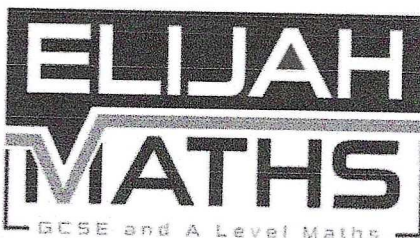
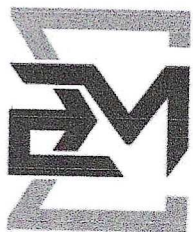
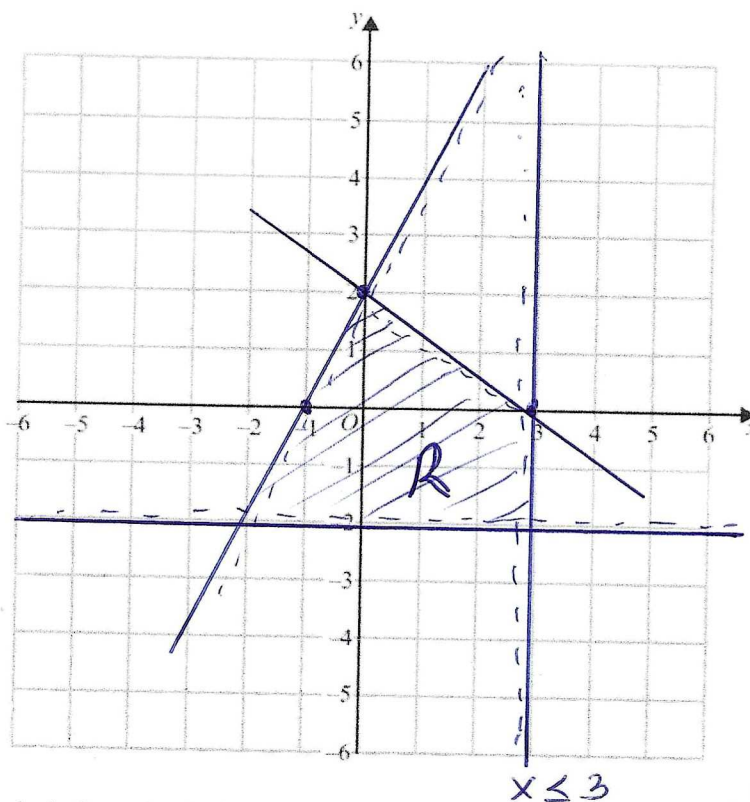


Marked Solutions - GCSE



INEQUALITIES: LINEAR, QUADRATIC AND GRAPHS

QUESTION 1



$y \geq -2$

$x \leq 3$

at least 2 correct lines = 2 marks
Correct region =

On the grid, shade the region **R** that satisfies all the following inequalities.

$x \leq 3$

$y \geq -2$

$y \leq 2x + 2$

$2x + 3y \leq 6$

Label the region **R**.

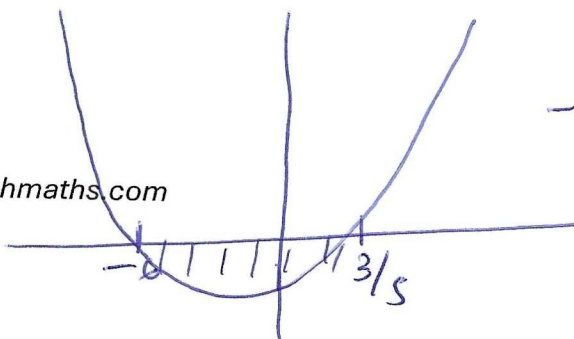
[3]

QUESTION 2

Solve $(5x - 3)(x + 6) < 0$

CV: $x = \frac{3}{5}$, $x = -6$ (1)

Exam Tip
always sketch the graph



$-6 < x < \frac{3}{5}$ (1)

[2]

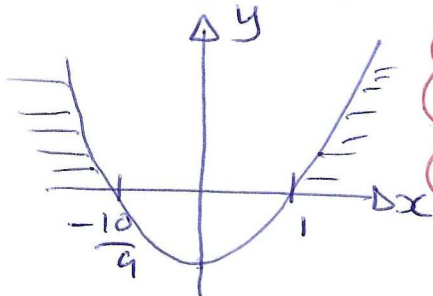
Question 3(a) Factorise $9x^2 + 9x - 10$

$$\begin{aligned} & \overbrace{9x^2 + 9x - 10}^{-90} \\ & (9x+10)(9x-9) \\ & (9x+10)(x-1) \end{aligned}$$

(1) (1)

(b) Hence, or otherwise, solve $9x^2 + 9x - 10 > 0$

$$CV: x = -\frac{10}{9}, x = 1 \quad (2)$$



Exam tip
always sketch
the graph

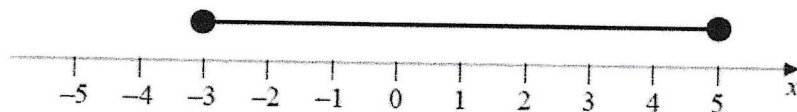
$$x < -\frac{10}{9}, x > 1 \quad (1)$$

(2)

Question 4

Jervis is asked to show the inequality $-3 < x \leq 4$ on a number line.

Here is his answer.



(a) Write down two mistakes Jervis has made.

1. Circle at -3 should not be shaded. (1)

2. Circle on right should be at 4 and not at 5. (1)

(2)

(b) Work out the greatest integer that satisfies the inequality

$$7y - 19 < 25$$

$$7y < 44$$

$$y < \frac{44}{7}$$

$$y < 6\frac{2}{7}$$

Greatest integer = 6.
(2)

Question 5

Find the set of possible values of x for which

$$9x^2 - 36 < 0 \quad \text{and} \quad 20 - 7x - 3x^2 > 0 \quad -60$$

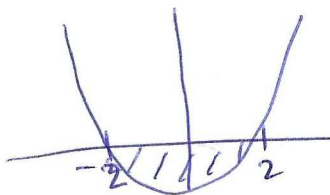
You must show all your working.

$$9x^2 - 36 < 0$$

$$9(x^2 - 4) < 0$$

$$9(x-2)(x+2) < 0$$

$$\text{CV: } x = 2, x = -2$$



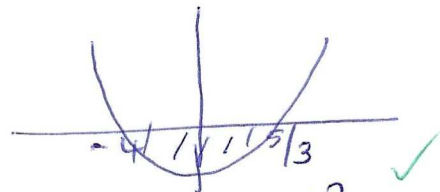
$$-2 < x < 2$$

$$3x^2 + 7x - 20 < 0$$

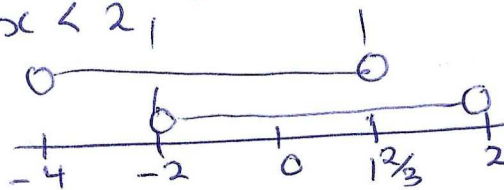
$$\frac{(3x+12)(3x-5)}{3} < 0$$

$$(x+4)(3x-5) < 0$$

$$\text{CV: } x = -4, x = \frac{5}{3}$$



$$-4 < x < \frac{5}{3}$$



$$-2 < x < \frac{5}{3} \quad \text{(5)}$$

Exam tip

If $f(x) < 0$

$\Rightarrow a < x < b$

If $f(x) > 0$

$\Rightarrow x < a, x > b$

Question 6

$$-3 < n \leq 7$$

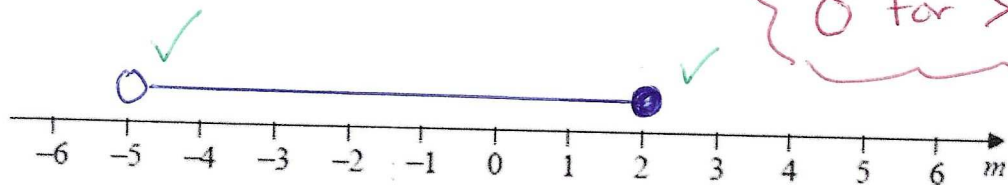
n is an integer.

- (a) Write down the greatest possible value of n .

7 ✓

(1)

- (b) On the number line below, show the inequality $-5 < m \leq 2$



Exam tip

● for \geq or \leq

○ for $>$ or $<$

(2)

- (c) Solve $\frac{4}{5}h - 6 < 10$

$$\frac{4}{5}h < 16 \checkmark$$

$$4h < 80 \checkmark$$

$$h < 20$$

Exam tip

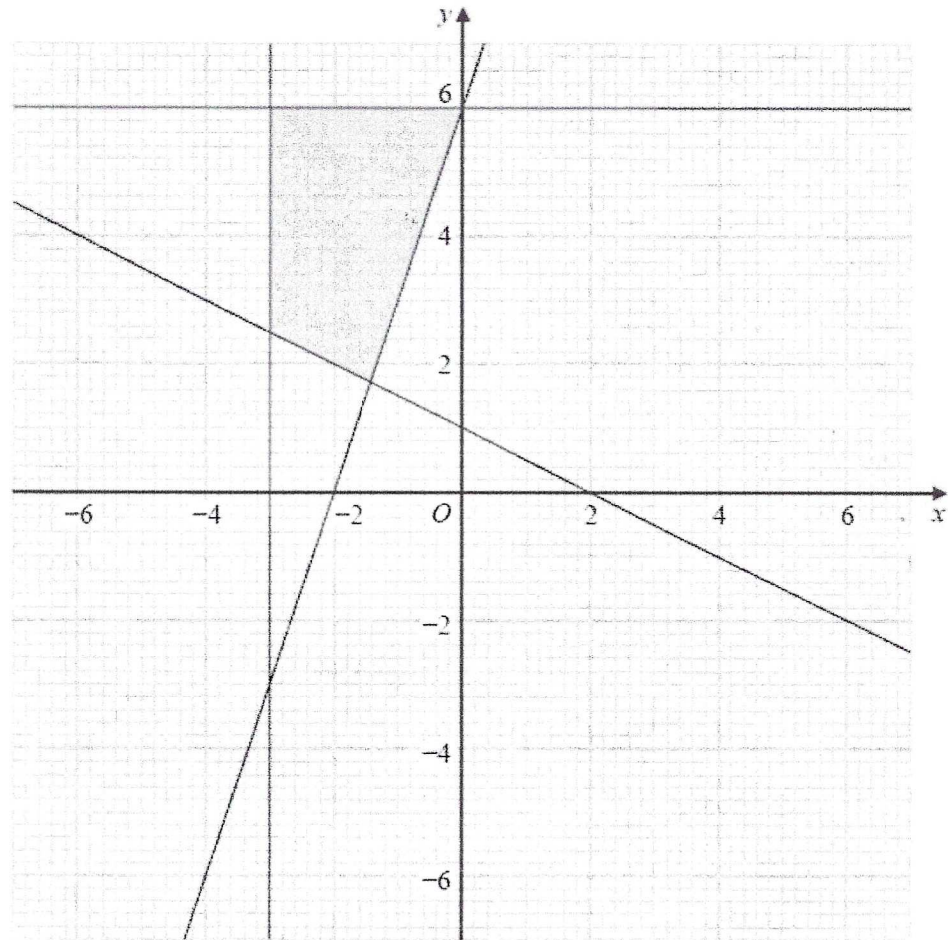
Solve same way as equations, only maintain inequality symbol

$h < 20$ ✓

(3)

Question 7

The shaded region shown on the grid is bounded by four straight lines.



Find the four inequalities that define the shaded region.

For (iii) and (iv)

consider $y = mx + c$

- (i) $y \leq 6$ ①
- (ii) $x \geq -3$ ①
- (iii) $y \geq 3x + 6$ ①
- (iv) $y \geq -\frac{1}{2}x + 1$ ①

(4)

Question 8

x and y are integers such that

$$-9 < x < -4$$

$$-11 < y < -7$$

$$\text{and } x = y + 1$$

Find all the possible values of x .

$$x = -8, -7, -6, -5 \quad \checkmark$$

$$y = -10, -9, -8$$

$$x = y + 1$$

$$\text{If } y = -10; x = -9 \quad \otimes$$

$$y = -9; x = -8 \quad \checkmark$$

$$y = -8; x = -7 \quad \checkmark$$

$$x = -7, x = -8 \quad \checkmark$$

(2 marks)

Question 9

On the grid show, by shading, the region that satisfies all of these inequalities.

$$3y + 3 < x$$

$$x < 4$$

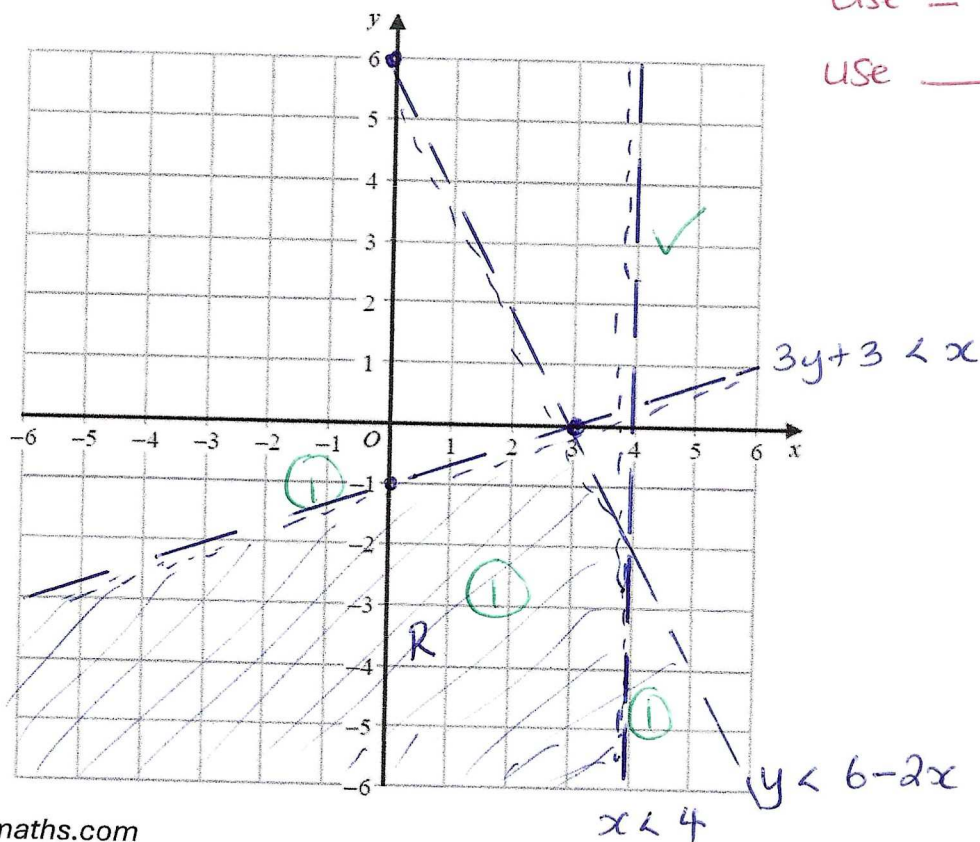
$$y < 6 - 2x$$

Label the region **R**.

Exam Tip

Use $---$ for $>$ or $<$

Use $---$ for \geq or \leq

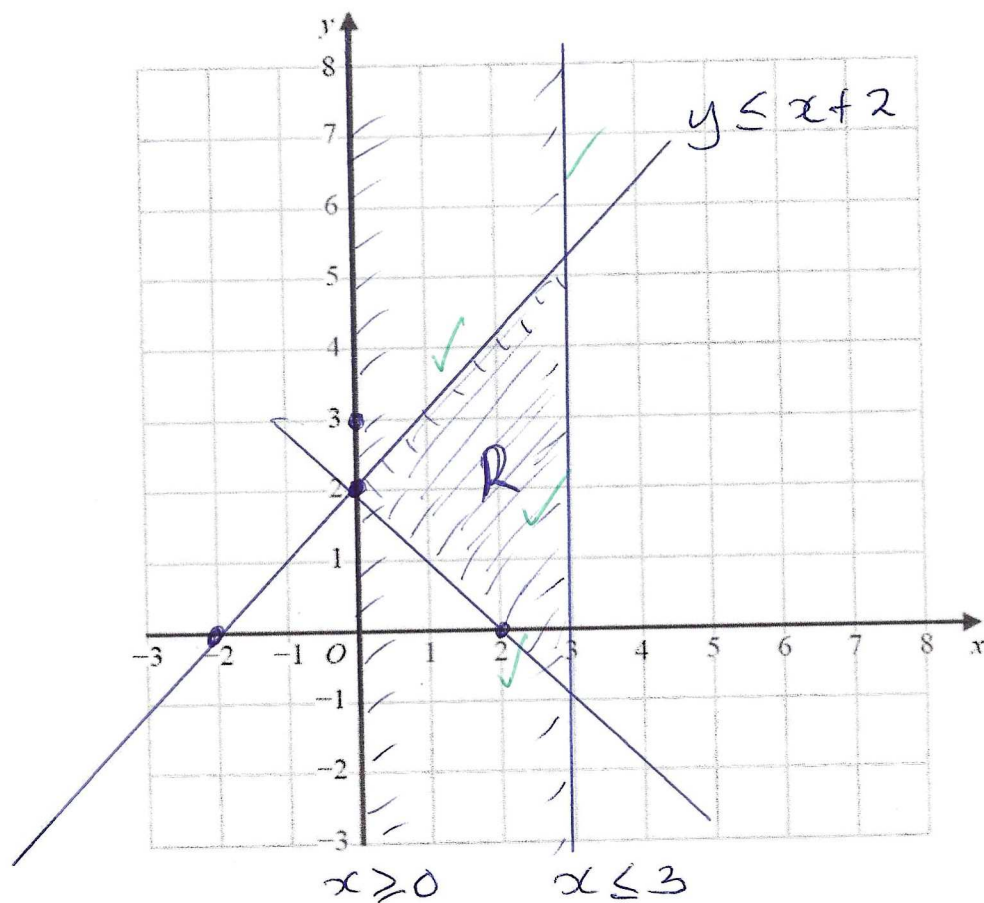


Question 10

-(a) On the grid show, by shading, the region that satisfies all these inequalities.

$$x \geq 0 \quad x \leq 3 \quad y \leq x + 2 \quad 3x + 2y \geq 6$$

Label the region **R**.



(4)