

Lesson 10

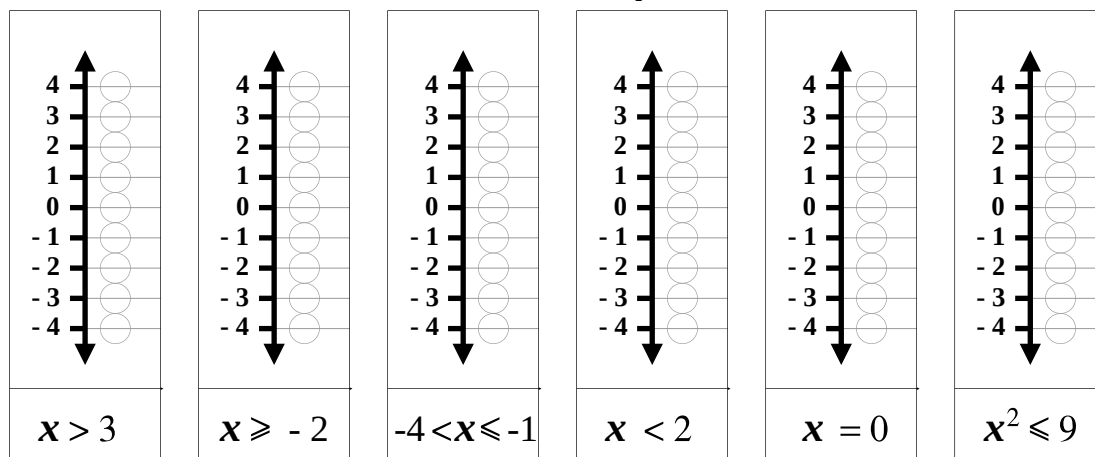
GCSE : Algebra of Inequalities

10.1 TEST

Non Calculator

Question 1

On the number ladders below, draw the inequalities;



[6 marks]

Question 2

Solve these inequalities

(i) $7x + 9 < 37$

(ii) $0.8x + 3.8 < 12.6$

(iii) $-13 + 2x \geq 19$

(iv) $4x - \frac{5}{8} \leq \frac{3}{8}$

(v) $4(x - 5) > 12$

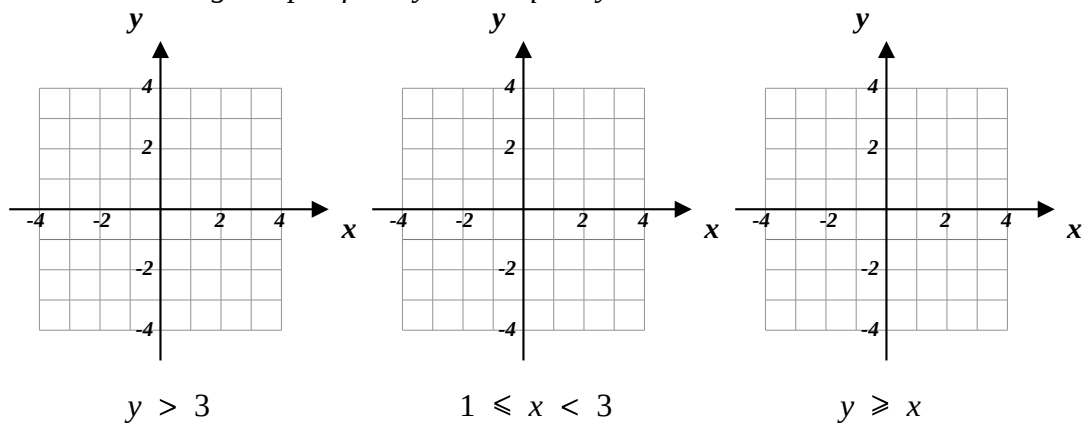
(vi) $\frac{x}{7} + 17 < 28$

[12 marks]

Question 3

Draw a graph for each inequality.

Mark the region specified by the inequality **R**.



[6 marks]

Question 4

In each of the following, list the possible values of x ;

(i) x is ODD and $233 \leq x < 241$

(ii) x is SQUARE and $8.5 < x < 27.2$

(iii) x is INTEGER and $\sqrt{12} < x < \sqrt{32}$

[3 marks]

Question 5

True or false ?

If y is a year in the 17th century then $1700 \leq y < 1800$.

[1 mark]

Question 6

Let A be the number of prime numbers less than 24.

Let B be the number of square numbers less than 101.

Which one of the following statements is true ?

(a) $A > B$

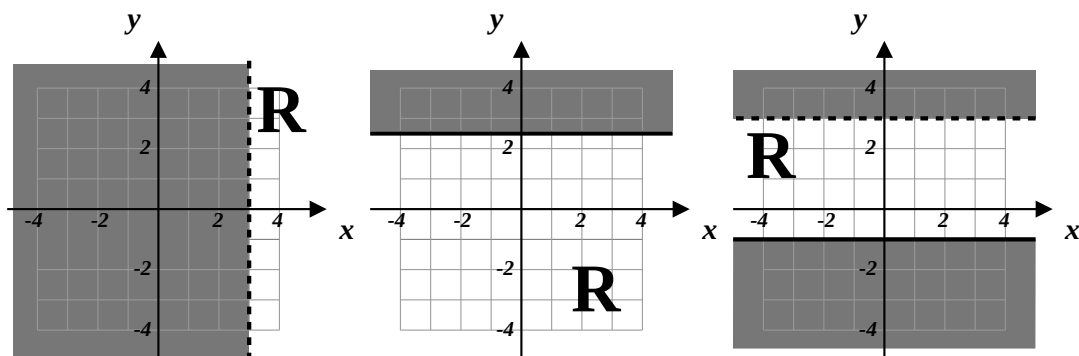
(b) $A < B$

(c) $A = B$

[2 marks]

Question 7

For each graph, write down the inequality specified by the region labelled **R**.

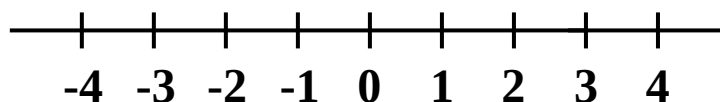


[3 marks]

Question 8

(i) Solve the inequality $-23 < 6x - 5 \leq 7$

(ii) On the number line, represent the solution to part (i).



[3 marks]

Question 9

Solve the following inequality;

$$\frac{3x + 19}{13} < 4$$

[3 marks]

Question 10

Solve the following inequalities;

(i) $\frac{4x}{3} + 7 < 15$

(ii) $101 - 7x < -4$

(iii) $7x + 59 > 3x + 87$

(iv) $42 < 3(x + 9) < 609$

[12 marks]

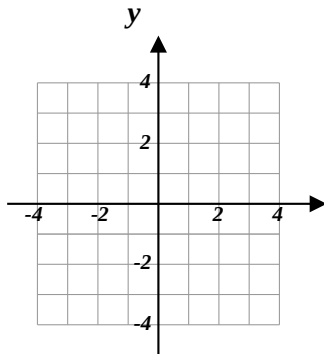
Question 11

If $x^2 < 25$ and x is a negative integer, what are the possible values of x ?

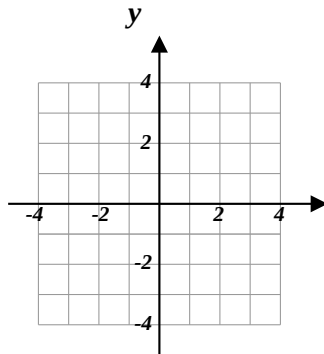
[2 marks]

Question 12

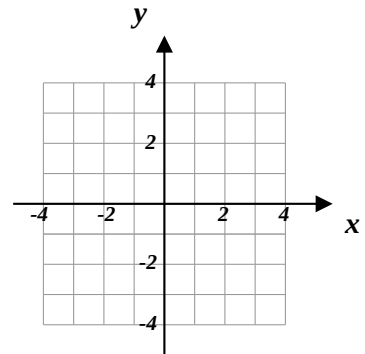
On the grids below, plot the given line.



$$y = 3x - 2$$



$$y = 0.5x + 1$$



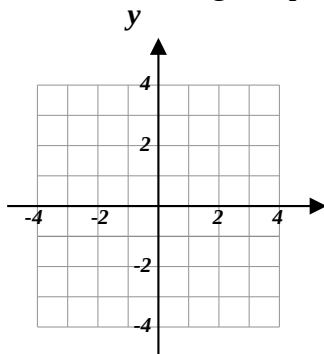
$$y = -x + 3$$

[6 marks]

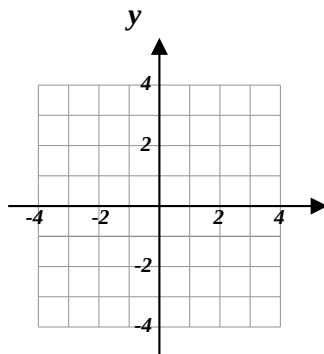
Question 13

Plot the following inequalities.

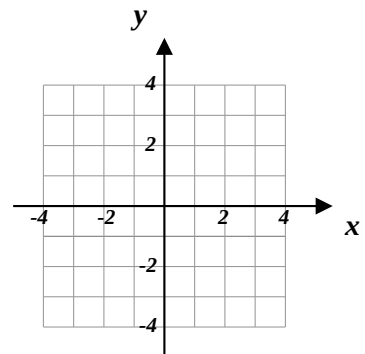
Label the region specified **R**.



$$y < 0.5x - 1$$



$$y \geq 2x + 1$$



$$y \leq -2x + 1$$

[6 marks]

Question 14

Without using a calculator, work out;

(i) $\left(\frac{1}{2}\right)^0$

(ii) $\left(\frac{1}{2}\right)^1$

(iii) $\left(\frac{1}{2}\right)^2$

(iv) $\left(\frac{1}{2}\right)^3$

(v) $\left(\frac{1}{2}\right)^4$

For $x \geq 0$, what inequality can you write that involves $\left(\frac{1}{2}\right)^x$?

[3 marks]

Question 15

GCSE exam question from May 2012, 3H, Q6.

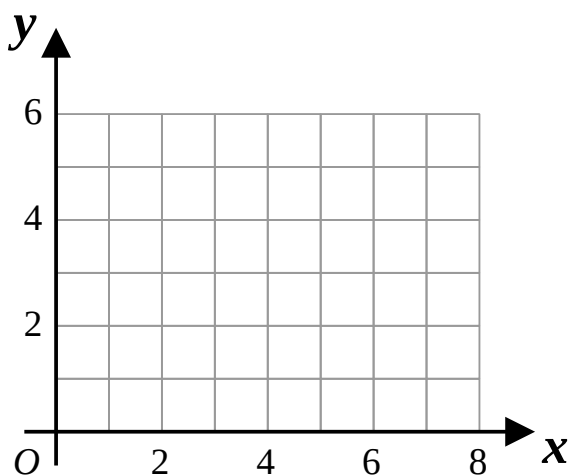
Show, by shading on the grid, the region defined by all three of the inequalities

$$x \leq 5$$

$$y \geq 3$$

$$y \leq x$$

Label your region **R**.



[3 marks]

Question 16

GCSE exam question from November 2009, 4H, Q9.

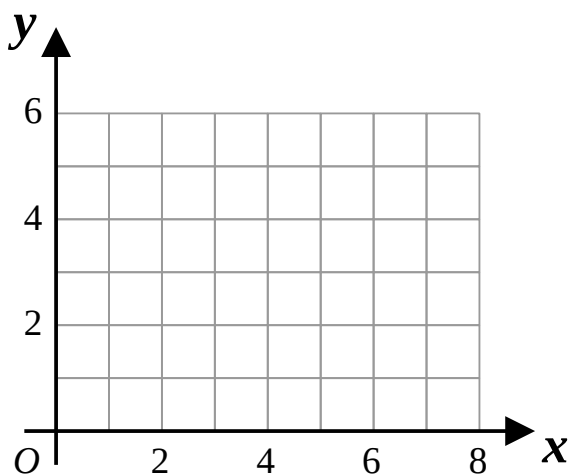
On the grid, show by shading the region which satisfies the inequalities

$$3 \leq x \leq 6$$

and

$$2 \leq y \leq 4$$

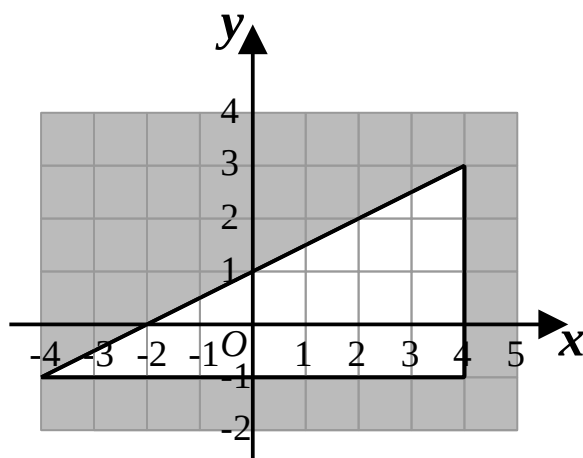
Label your region **R**.



[5 marks]

Question 17

GCSE exam question from May 2008, 4H, Q14.



Write down the three inequalities that define the **unshaded** region.

[3 marks]

Question 18

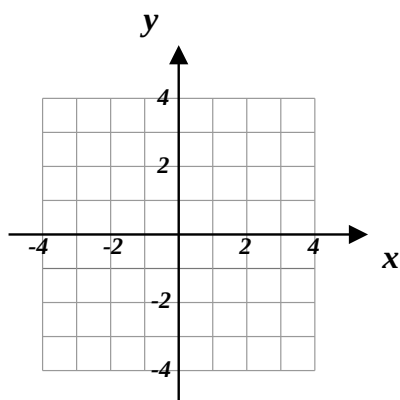
Show, by shading on the grid, the region which satisfies all three of these inequalities.

$$x \geq -1$$

$$y > x$$

$$y < 3$$

Label your region **R**.



[3 marks]

Question 19

This question is about solving the quadratic inequality

$$x^2 - 9x + 14 \leq 0$$

This is to be tackled by first plotting the graph of the related equality,

$$y = x^2 - 9x + 14$$

(a) To that end first complete the following table;

x	0	1	2	3	4	5	6	7	8	9	10
x^2				9	16					81	
$-9x$					- 36				- 72		
$+14$	14	14			14						14
y					- 6						

(b) On the grid on the opposite page, graph the equality.

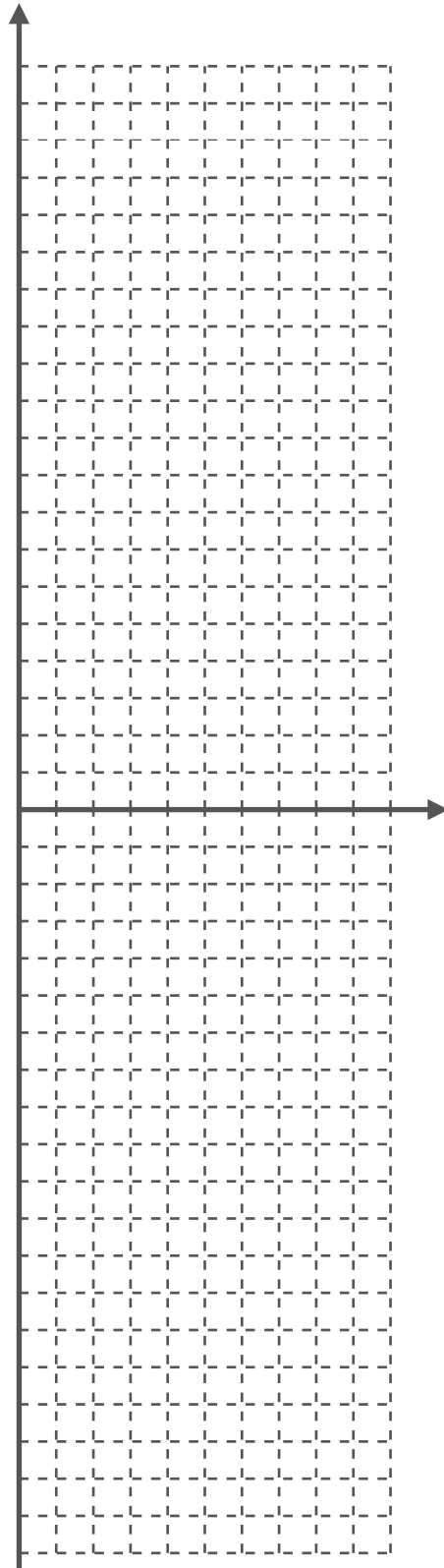
(c) From your graph, solve the quadratic inequality

$$x^2 - 9x + 14 \leq 0$$

giving your answer in the form

$$a \leq x \leq b$$

where a and b are numbers you must find.



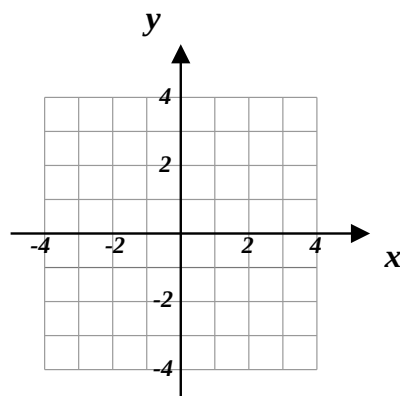
[7 marks]

Turn over for Question 20....

Question 20

Show, by shading on the grid, the region which satisfies the inequality $y^2 \leq 9$

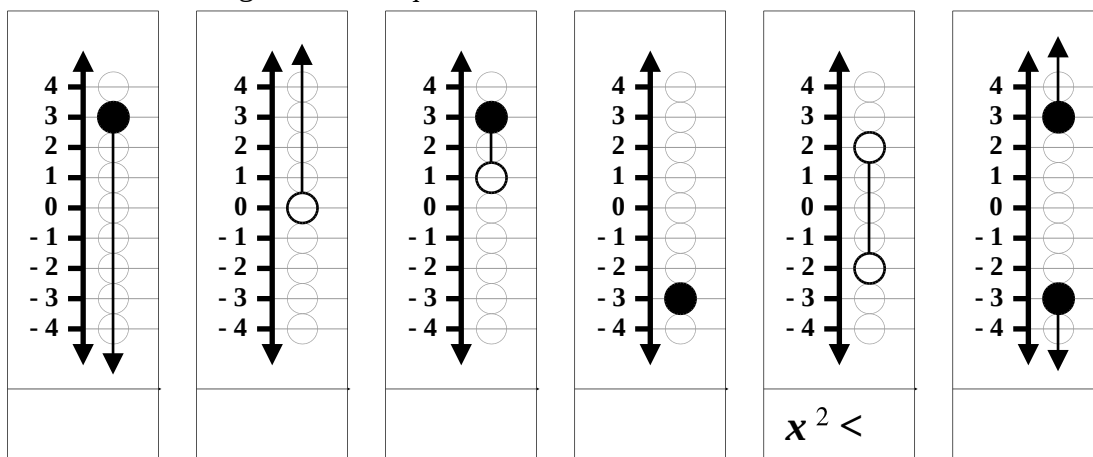
Label your region **R**.



[3 marks]

Question 21

Write out in algebra the inequalities illustrated below;



[6 marks]

Question 22

In a room are lots of boys and girls. I'm not sure exactly how many.....

Let x be the number of people originally in the room.

I get them to hold hands and leave as boy / girl pairs.

I count 156 such pairs leaving.

The people in the room is now less than 100.

(i) Write down an inequality for x from this information.

(ii) Solve your part (i) inequality.

[3 marks]

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