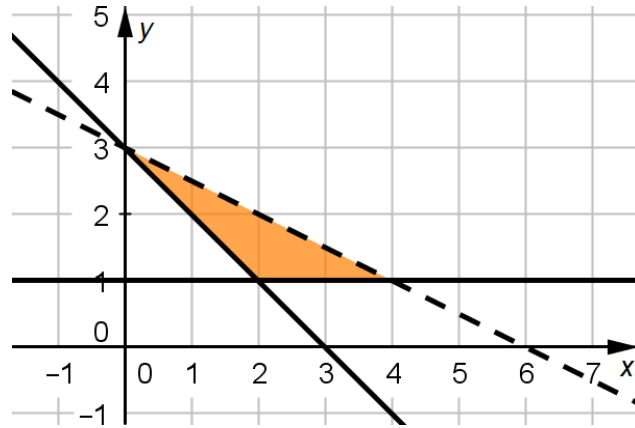
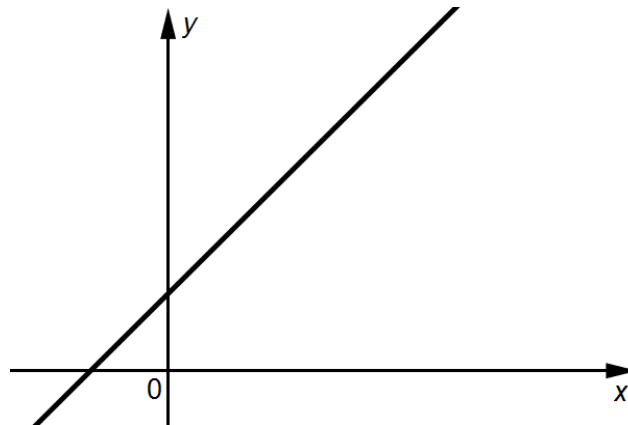


## Higher Check In - 6.04 Algebraic inequalities

1. Solve the inequality  $4(x+1) < \frac{5-2x}{3}$ .
2. Solve  $x^2 - 3x - 4 \geq 0$ , giving your answer using set notation.
3. Find the largest integer value that satisfies  $3 > \frac{6}{5-2x}$ .
4. Show the solutions to  $x^2 < \frac{9}{25}$  on a number line.
5. Write down the inequalities that define the shaded region.



6. The diagram below shows the line  $2x - y = -2$ .



Explain how you would decide which side of the line satisfies the inequality  $2x - y > -2$ .



# GCSE (9–1) MATHEMATICS

7. A quadratic inequality in the form  $x^2 + ax \leq b$  has the solution set  $\{x : -2 \leq x \leq 5\}$ .  
Work out the values of  $a$  and  $b$ .
8. Class 11A are going to sell cakes and biscuits to raise money. They want to raise at least £50. They are going to sell the cakes for 40p each and the biscuits for 25p each. They will have a maximum of 75 cakes and 100 biscuits to sell at the event. Show this information on a graph, shading the region which represents the numbers of cakes and biscuits they will need to sell to raise enough money.
9. Identify the integer values of  $x$  and  $y$  that satisfies these three inequalities.  
 $x + y < 6$        $y < x^3$        $y > 2$
10. A rectangular patio is 2m longer than it is wide. Find possible values for the width of the patio if the area of the patio is at least  $35 \text{ m}^2$ .

## Extension

The following text is taken from an A level textbook:

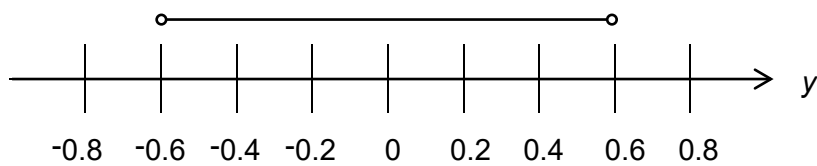
“A quadratic equation  $ax^2 + bx + c = 0$  has no ‘real solutions’ when  $b^2 - 4ac < 0$ .”

Find the possible values of  $k$  for which the equation  $2x^2 + kx + 8 = 0$  has no ‘real solutions’.

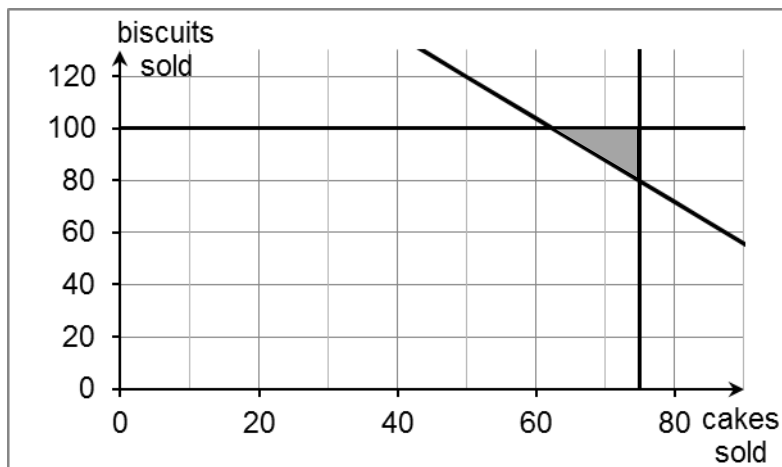


## Answers

- $x < -\frac{1}{2}$
- $\{x : x \leq -1\}$  and  $\{x : x \geq 4\}$
- $x < 1.5$ , so the largest integer value of  $x$  is 1.
- $-\frac{3}{5} < x < \frac{3}{5}$  or  $-0.6 < x < 0.6$



- $y \geq 1$   
 $x + y \geq 3$  or  $y \geq -x + 3$  oe  
 $x + 2y < 6$  or  $y < -\frac{1}{2}x + 3$  oe
- Choose a point on one side of the line and test whether the point satisfies the inequality by substitution. For example,  $(0, 0)$  which lies below the line gives:  
 $2 \times 0 - 0 > -2$   
 $0 > -2$   
The test point satisfies the inequality; therefore the region below the line satisfies the inequality.
- $a = -3$  and  $b = 10$
- $40(\text{cakes sold}) + 25(\text{biscuits sold}) \geq 5000$ ,  $\text{cakes sold} \leq 75$  and  $\text{biscuits sold} \leq 100$ .



- $x = 2$  and  $y = 3$



# GCSE (9–1) MATHEMATICS

10.  $w(w + 2) \geq 35$

$$w^2 + 2w - 35 \geq 0$$

$$(w - 5)(w + 7) \geq 0$$

$w \leq -7$  makes no sense as the width of a rectangle, so  $w \geq 5$  metres.

## Extension

$$k^2 - 4 \times 2 \times 8 < 0$$

$$k^2 < 64$$

$$k < \pm\sqrt{64}$$

$$-8 < k < 8$$



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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Solve a linear inequality in one variable			
AO1	2	Solve a quadratic inequality in one variable, expressing the solutions in set notation			
AO1	3	Find integer solutions to a linear inequality			
AO1	4	Solve a quadratic inequality in one variable, expressing the solutions on a number line			
AO1	5	Write inequalities in two variables from a graph			
AO2	6	Identify a region on a graph which satisfies an inequality			
AO2	7	Interpret a solution set of a quadratic inequality			
AO2	8	Write and solve several linear inequalities in two variables, representing the solution set on a graph			
AO3	9	Find integer solutions to several linear inequalities in two variables			
AO3	10	Write and solve a quadratic inequality in one variable			

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