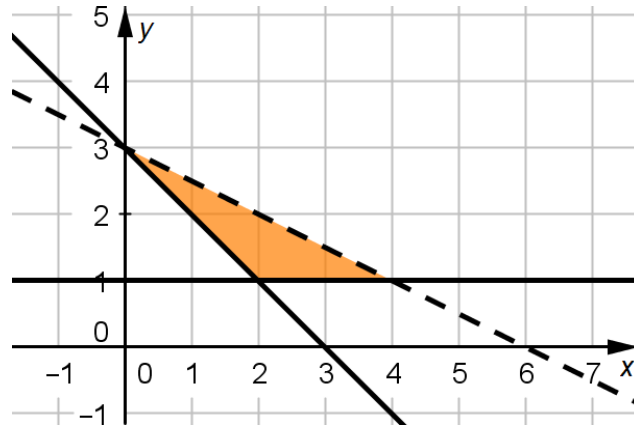
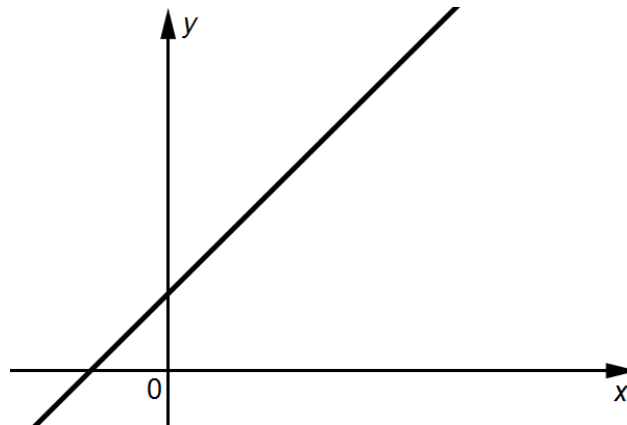


Higher Check In - 6.04 Algebraic inequalities

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 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’.



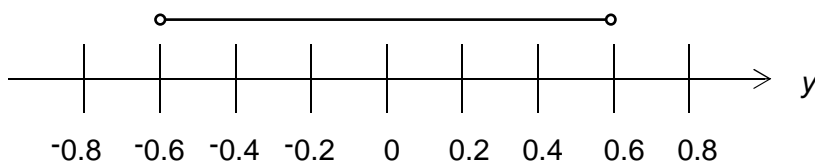
Answers

1. $x < -\frac{1}{2}$

2. $\{x: x \leq -1\}$ and $\{x: x \geq 4\}$

3. $x < 1.5$, so the largest integer value of x is 1.

4. $-\frac{3}{5} < x < \frac{3}{5}$ or $-0.6 < x < 0.6$



5. $y \geq 1$

$x + y \geq 3$ or $y \geq -x + 3$ oe

$x + 2y < 6$ or $y < -\frac{1}{2}x + 3$ oe

6. 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:

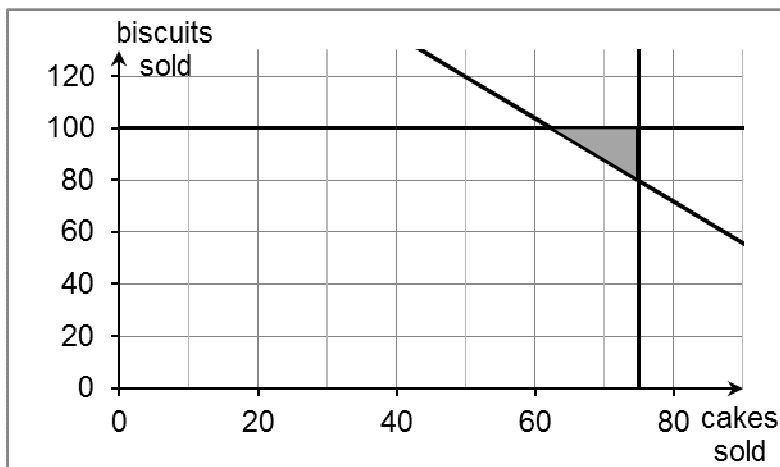
$$2 \times 0 - 0 > -2$$

$$0 > -2$$

The test point satisfies the inequality; therefore the region below the line satisfies the inequality.

7. $a = -3$ and $b = 10$

8. $40(\text{cakes sold}) + 25(\text{biscuits sold}) \geq 5000$, $\text{cakes sold} \leq 75$ and $\text{biscuits sold} \leq 100$.



9. $x = 2$ 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

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

$$k^2 < 64$$

$$k < \pm\sqrt{8}$$

$$-8 < k < 8$$



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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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