Year 11 Unit 2

Millthorpe School
Mathematics Department

Inequalities (Higher)

Prior knowledge: Year 10 unit 3 graphs
Year 10 unit 6 solving linear equations inc simultaneous

Leads onto: Year 11 exams
Year 12 absolute value (modulus) functions

| What do I need to be able to do?	Keywords/formula

- Use and understand inequality symbols - Represent inequalities on a number line - Solve linear inequalities - Draw and identify linear graphs - Represent linear inequalities on a graph - Determine a region that satisfies two or more inequalities - Solve quadratic inequalities **Solve simultaneous equations with one linear and one quadratic equation** **Determine the number of roots/points of intersection** **Use the equation of a circle as one of a pair of simultaneous equations**	**Inequality symbols:**
	   > greater than
	   < less than
	   $\geq$ greater than or equal to
	   $\leq$ less than or equal to
	   $\neq$ not equal to
	NOTE all of these are dependent on which way round you say them
	
	Inclusive inequality: one which includes the end value eg $x \geq 4$ includes 4
	
	Strict inequality: one which does not include the end value eg $x > 4$ does not include 4
	
	Integer: a positive or negative whole number
	
	Equation of a straight line: $y = mx + c$
	Quadratic equation: $ax^2 + bx + c = 0$
	Equation of a circle: $x^2 + y^2 = r^2$

Linear inequalities

Inequalities can be **represented** on a number line
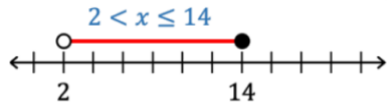
$X = 3$
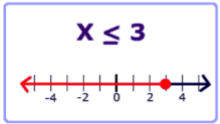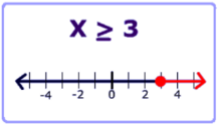
Inclusive inequalities are represented by a closed circle

$X \geq 3$ | $X \leq 3$

$X > 3$ | $X < 3$
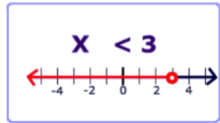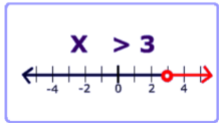
Strict inequalities are represented by an open circle

Inequalities can represent a value that lies between two points

$2 < x \leq 14$

Inequalities can be **solved** in the same way as equations

$$4x + 1 < 13$$
$$4x < 12$$
$$x < 3$$

Solutions can be represented as a **range of values** eg x < 3
On a **number line** (as above)
Or as **integer values** eg 2, 1, 0, -1, -2, -3….

Simultaneous equations can be solved by **elimination** - adding or subtracting one equation from another once the coefficients are the same

Graphing inequalities

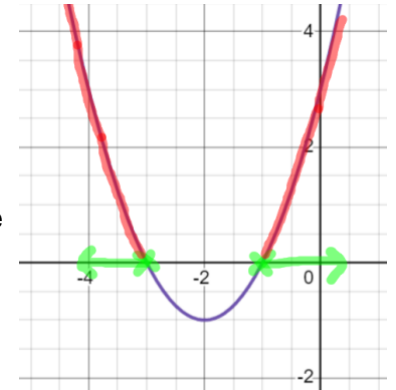**Strict inequalities** are represented by a dashed line: $y > 2x + 1$
Inclusive inequalities are represented by a solid line: $y \geq 2x + 1$

Regions can be bounded by two or more inequalities
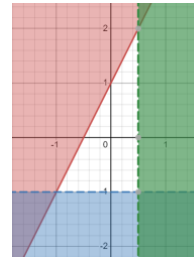
$y \geq 2x + 1$
$y < 1$
$x > 0.5$

Quadratic inequalities require you to factorise then use the roots of the equation as the key values of the inequalities: $x^2 + 4x + 3 > 0$ has the solutions $x > -1 \; and \; x < -3$

Quadratic simultaneous equations can be solved by **substitution** - replacing one variable in the quadratic equation with the linear equation
$x^2 + y^2 = 9$
$y = 3x - 4$ becomes $x^2 + (3x - 4)^2 = 9$

which has two solutions (points of intersection)