

Outcome	AEq3	Student can consistently:	Solve simple linear inequalities.
How the topic is examined	<ul style="list-style-type: none"> • Examined through test paper questions. • Questions are equally likely to appear on calculator or non-calculator papers. • These questions involve finding the range of values for the unknown. • It is possible that students might have to represent their solution set on a number line. 		
Prior knowledge	<ul style="list-style-type: none"> • Students should be confident with: <ul style="list-style-type: none"> ◦ Negative numbers ◦ Expanding brackets (AEx1) ◦ Simplifying expressions (AEx2) ◦ Solving basic equations (AEq1) • In addition questions involving this topic can have links to: <ul style="list-style-type: none"> ◦ Writing integer solutions of an inequality and representing on a number line (AEq4) ◦ Solving fractional equations (AEq5) 		
Suggested tuition approaches	<ul style="list-style-type: none"> • Students should understand that solving inequalities means that they are looking to find a set of values that the unknown can satisfy. • There are four types of inequality symbol that students could meet. They are $>$ (greater than), $<$ (less than), \geq (greater than or equals) and \leq (less than or equals). • There are different methods that students use to tackle this topic. <ul style="list-style-type: none"> ◦ Inverse functions (see AEx8 for notes on this topic) ◦ Balancing ◦ Tricks (e.g. change side, change sign) • Essentially the methods for solving an inequality are the same as those in AEq1. Indeed some teachers encourage students to change the inequality symbol into an equals sign and solve the equation and then replace the inequality symbol at the end. • For students who are aiming for a top grade and thinking about studying maths beyond GCSE they need to avoid using tricks and try to use one of the other methods, preferably the balancing method. • Students should however be able to cope solving these inequalities without changing the symbol to an equals. We will use a method of balancing (what we do to one side to the other) to solve these inequalities. • When solving inequalities students should show all their working out, showing clearly what they are doing at each step (shown in brackets below) 		

- Encourage students to keep the inequality symbol lined up to make the solution clear.
- The table below shows the most common example of problems that come up.

Simple inequality	Unknown on both sides	Double inequality
$3x - 5 < 10$ $(+5)$ $3x < 10 + 5$ $3x < 15$ $(\div 3)$ $x < \frac{15}{3}$ $x < 5$	$7x + 10 \geq 2x - 8$ $(-2x)$ $5x + 10 \geq -8$ (-10) $5x \geq -8 - 10$ $5x \geq -18$ $(\div 5)$ $x \geq \frac{-18}{5}$ $x \geq -3.6$	$-5 < 2e - 1 < 10$ $(+1)$ $-5 + 1 < 2e < 10 + 1$ $-4 < 2e < 11$ $(\div 2)$ $\frac{-4}{2} < e < \frac{11}{2}$ $-2 < e < 5.5$

- Students can leave their solutions as fractions if they find it easier, although any solutions that work out to be a whole number should be evaluated. Also equations could involve fractions.

Common errors and misconceptions

- Students sometimes don't balance correctly (e.g. they add on instead of subtract etc...). They need to think about doing the opposite.
- Students who change the inequality symbol into an = symbol forget to move it back at the end.
- Students just write down the number answer instead of the full inequality (e.g. 5 is the right number, but the solution is $x > 5$). For an equation you could just write down the number.

Suggested resources

- Questions
 - <http://www.cimt.org.uk/projects/mepres/allgcse/bkc16.pdf> (pp 200-204)
 - <https://corbettmaths.files.wordpress.com/2013/02/inequalities-pdf.pdf>
- Video tutorials
 - <http://corbettmaths.com/2013/05/07/solving-inequalities-one-sign-corbettmaths/>
 - <http://corbettmaths.com/2013/05/12/solving-inequalities-two-signs/>
- Past GCSE Questions
 - https://keshgcsemaths.files.wordpress.com/2013/11/61_algebra_inequalities.pdf