Multiple manipulations

Teacher notes

Why use this resource?

The aim of this resource is to highlight inconsistencies that can appear in methods that students may have been comfortably using for a long time. It may reveal misconceptions in the students' understanding of manipulating algebra, or raise awareness of the different effects they are having when they, for example, divide by a common factor in an expression, equation or inequality. Each collection wants students to consider some specific ideas:

Expressions: This collection highlights that cancelling algebraic factors can change the value of expressions at certain points. Often students are asked to simplify without considering the implications of this.

Equations: This collection encourages the use of common factors, for finding a common denominator, and for simplifying the equation. The aim is for students to consider what happens when they divide through by x, or try to divide by something which is zero.

Inequalities: The potential pitfall of multiplying both sides by an unknown is explored in this collection.

Possible approaches

Whilst this resource could be split into its three sections, the links between the collections mean that it is likely students would gain the most from thinking about it as a whole resource. It could be done in one go, or perhaps the three collections could be done separately, but sufficiently close together for students to compare and contrast their approaches and what they have learned.

It is quite possible that students won't use methods that lead to any problems arising. They may get the correct answers without knowing that they avoided a problem, or how they avoided it. For the last two questions in Equations and Inequalities, the given solutions show flawed methods. Showing students these 'methods' may help prompt discussions about the issues that can arise. (The correct solutions are included for the inequalities, though they are not explained in depth, as the focus is on why you should be careful when solving inequalities.)

Key questions

- How can you check if your solutions are correct?
- What approach do you use for each problem?
- Do you use similar or different approaches across the different collections?

These questions are provided on the problem page, but there are also questions throughout the solutions that are more focussed on the specifics of each collection.