Ab-surder!

Teacher notes

Why use this resource?

Students have met the idea of rationalising the denominator, but usually in the context of square roots. This resource offers the opportunity to extend this tool into working with cube roots (and, by implication, fourth and higher roots too). It draws together several different algebraic techniques, including factorising $a^3 \pm b^3$, multiplying out more complicated brackets and further practice in working with surds. It also invites students to consider how using polynomials can help with something that has no variables involved, a perhaps surprising result.

Preparation

Students may benefit from having considered Irrational roots beforehand. Students should be comfortable with rationalising denominators involving square roots.

Possible approach

Students may well benefit from working in small groups on this task. The warm-up problem invites students to consider what they would have to do in order to rationalise a fraction with just a cube root in the denominator. One could then ask what would happen if we had a more complicated denominator, and look at the first question in the main problem. Asking students to find different ways to approach the problem and comparing ideas from different students will encourage a consideration of different perspectives; the suggestions offered could be used to stimulate other possible entries to the problem. Having different tools will be of benefit for different examples and different contexts, so it is valuable to consider them.

Key questions

- How is rationalising a denominator related to polynomials?
- In what contexts may rationalising a denominator be useful?

Possible extension

- Students could be asked (as in the question) to come up with further examples of their own. Can they make examples which are easier or harder? Can they come up with an example which is harder, but not simply due to using larger numbers?

- A harder example would be $\frac{1}{\sqrt{2}+\sqrt[3]{2}}$, as this involves both square and cube roots. Again, there are multiple ways to approach this problem.