

To log or not to log?

Teacher notes

Why use this resource?

This is a sorting exercise requiring students to think about which tools they would use to solve a range of equations involving exponentials of one sort or another. Sometimes the use of logarithms is essential, sometimes it is one method amongst others and sometimes it will not help at all.

Preparation

The set of equations to sort is available as a separate printable that could be printed on card or laminated for reuse if appropriate.

Each group of students should be given a set of the cards. Before starting, they should be encouraged to think about and discuss the headings under which they could sort the equations. To start off this discussion they might be encouraged to look at one or two carefully chosen equations that demonstrate the differences for example $x^5 = 50$ and $3^x = 43$.

Possible approach

Students are probably best tackling this task in groups of two or three so that they can check one another's work as they go.

After working at it briefly, they could be asked to share with the class what categories they are using and given opportunity to refine what they are doing.

There is a [section](#) allowing the cards to be sorted on screen which could be used at this initial sharing, during the activity or for final plenary. Headings or Venn diagrams could be drawn if displayed on a board.

Note that students are not required to actually solve each equation, though many of them will often be solved in the process of deciding what methods are required.

Key questions

- What is the same and what is different about that pair of equations?
- Can you explain what it is about that equation that makes it go under that heading?
- Can you think of a different way of solving that equation which does/doesn't involve using logarithms?

Possible support

Students can be encouraged to start with the simpler and more familiar equations. Ensure they understand the methods they use and how to describe those methods.

Possible extension

Students could be asked to write further examples of equations for each heading. They could also think about alternative categorisations.

If a Venn diagram has been used, are there any empty regions? How could they be filled in?

Students could explore possible methods for solving the equations for which analytical methods aren't available.

A version of this resource has been featured on the [NRICH website](https://undergroundmathematics.org/exp-and-log/to-log-or-not-to-log). You might like to look at some students' solutions that have been submitted there.