Composing gets me nowhere

Teacher notes

Why use this resource?

This resource is designed to be used as an introduction to self-inverse functions. Students are asked to sketch a set of functions, work out which ones are self-inverse and find a graphical connection between them.

They will exercise algebraic skills and think about the features of graphs, what some have in common and how they differ.

Preparation

Students are assumed to be familiar with the idea of composing functions and would probably have come across inverse functions before tackling this. You might use the resource Compose! before this one.

The Warm-up can be used as an introduction to the concept of self-inverse before the main task is tackled. It introduces the notation and a definition and links back to inverse functions by asking about the name.

Key questions

- When sketching an unfamiliar function, what are some of the important things to look out for?
- Can you rewrite that expression so it looks like one you could sketch?
- Say what you see in the graphs. What is the same and what is different?

Possible support

Students could start by working with the linear functions as the algebra is then more straight-forward than working with rationals.

Possible extension

There are some questions within the Solution that can lead to further exploration and deeper understanding.

More confident students should be encouraged to think about the domain and range of the individual functions and what conditions must apply in order for them to be self-inverse.

Students can be asked to find other self-inverse functions, either by sketching or by working with the algebra.

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The resource ends with some open questions about transformations of $y = \frac{1}{x}$, which can lead to some interesting exploration. Writing it as $xy = 1$ can sometimes be helpful.

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https://undergroundmathematics.org/combining-functions/composing-gets-me-nowhere