Translating or not?

Teacher notes

Why use this resource?

This resource is designed to make students think about sketching graphs of unfamiliar functions, in particular reciprocals of familiar functions. They should start to recognise and understand some of the properties of functions, such as the location of asymptotes.

Possible approach

The opening section presents two innocuous looking tasks. Sketching the first family of graphs may prove straight-forward if students are familiar with transformations of functions.

The second task is much more demanding and students may benefit from working together in small groups to share ideas.

Possible support

The **Suggestion** section offers a number of ideas to help with sketching graphs in general.

Students may need help visualising the connection between zeros of a quadratic and the vertical asymptotes of its reciprocal function.

Possible extension

The **Things you may have noticed** section mentions a way of visualising the second family of graphs by using partial fractions to decompose the function. This could be set as a challenge for stronger students.

The fact that one family of graphs are related by a horizontal translation whereas the other family is quite different could lead into a deeper investigation.

- we apply a *vertical* translation to a straight line and a quadratic but one of them is indistinguishable from a *horizontal* translation...
- if we wanted a horizontal translation of $y = \frac{1}{x^2}$, what would the equation look like?

What would the reciprocal of a cubic family look like?

$$y = \frac{1}{x^3 + a} \quad \text{or} \quad y = \frac{1}{x^3 - x + a}$$

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