Can you find... asymptote edition

Teacher notes

Why use this resource?

This resource builds on students' capability to switch between graphical and the algebraic representations. As you are asked to work backwards from the graph to the function, students are forced to think about the behaviour of the curve at crucial points, as this is key to finding the function that gives a similar image.

Preparation

Ideally students should have access to graphing software so they can try their ideas and modify them easily.

Possible approach

There are many ways to approach this problem, which is one of the interesting features of this task. If methods can be shared, or if the approaches in the **Things you might have noticed** section can be discussed, then there is an opportunity for an even richer learning experience, as students can appreciate the different routes they could have taken.

Key questions

A series of prompting questions are given to help this exploration.

- What are the main features of the graph? How can we represent these algebraically?
- Where does the curve cross the axes? How can we represent this information algebraically?
- What happens to the y-values when the x-values are large, either positive or negative?

Possible support

Encourage students to identify graphs they do know that have some similar behaviour, for example:

- $y = x$ when x is not near zero.
- $y = \frac{1}{x}$ as a graph that contains asymptotes.
- The middle section looks like a cubic polynomial.

A version of this resource has been featured on the NRICH website. You might like to look at some students' solutions that have been submitted there.