Differentiating exponentials

Teacher notes

Why use this resource?

The aim of the resource is to derive a general form for differentiating a^x for a a positive number. The problem is broken down into steps and students are provided with prompting questions to help them.

Preparation

Students will need to know the laws of logarithms and the derivative of e^x.

Possible approaches

This could either be used with students who are familiar with the chain rule to build on what they know about e^x, or it could be used as part of an introduction to the chain rule, giving students a chance explore how they might deal with the composite function $e^{x \ln x}$.

Key questions

- Which is steeper, e^x or 2^x?
- How can we rewrite $y = 2^x$ in terms of $y = e^{kx}$??
- Why does this help us differentiate $y = 2^x$?

Possible extension

Students could make links between the transformations of the graphs $y = e^{x \ln 2}$ and $y = e^x$, and think about how this would affect the tangent to the curve.