I can see u!

Teacher notes

Why use this resource?

This resource aims to help develop students' fluency with the chain rule using a variety of functions. Students are asked to identify a suitable u or 'inner function' for each of the given functions and then find $\frac{dy}{dx}$. Different ways of rewriting the expressions involved may lead to alternative options for u. Some of these functions are explored further in Odd one out.

Preparation

Mini-whiteboards could help to encourage students to explore different possibilities for u.

Possible approach

Students should work in pairs or small groups. There are often several different possibilities for u, so group discussion will be important.

The problem starts with two quick warm-up questions: first composing two functions and then expressing a function as a composition of two functions. At this point you could ask for other functions that could be composed or viewed as a composition of functions.

The functions in the table can be tackled in any order, but they have been arranged so that students may make connections between the functions in neighbouring cells. The domains of the functions haven't been stated in the table, but students should think about these. In particular, if they rewrite an expression, is the function still defined on the same domain?

Key questions

- Could you draw a function machine diagram for y?
- Which functions are a power of another function?
- How could you rewrite y? Does this affect the domain of the function?

Possible support

Students could be shown the whole table and asked to group the functions in some way. The solution has broken the table down into categories of functions, which may help to support discussion. Thinking about what a function machine for y might look like could help students to break y down as a composition of functions.

Possible extension

What other functions are the composition of functions? Which can you differentiate?