Integral sorting

Teacher notes

underground mathematics

Why use this resource?

This resource aims to improve students' fluency at choosing a substitution for any given integral, by asking them to reflect on common structures that appears across integrals, for example $\int \frac{f'(x)}{f(x)}\,dx$. It also emphasises the link between integration by substitution and differentiation by the chain rule, as students may use both in order to match the cards together.

Preparation

Students should be familiar with the processes of integration by substitution and differentiation by the chain rule. They can match the cards interactively, or you can download and print sets of cards from here.

Possible approaches

Students should work in pairs or small groups. They could be asked to find substitutions and group the cards together at the same time, or they could be asked to find the substitutions only once they have matched all the cards.

Alternatively, you could provide students with only the cards containing integrals and ask them to do the following:

- find a substitution that can be used to solve each integral.
- sort the integrals into groups. What features could be used to define the groups?

Key questions

- Are there any integrals that you can use the same substitution for? If so, what is similar about the integrals?
- Are there any integrals where the answers have a similar structure? Does the substitution you use reflect this?

Possible support

- Students can differentiate to check they have the correct answer.
- Students could be given a choice of substitutions, e.g. $u = \cos x$ and $u = \sin x$, for $\int \frac{\cos x}{\sin x}\,dx$. helping them to see why some work and some don't.

Possible extension

At the end of the solution, the cards are sorted by the structure of the integrals. Students could be asked to find another integral to add to each group.