

### Why use this resource?

This task is designed to build students' understanding of the properties of functions and their graphs and how those properties affect the outcome of combining functions by adding, subtracting and multiplying.

Starting with functions in algebraic form, students combine them in pairs and have to find appropriate sketch graphs to fill each cell of a grid. This requires some algebraic manipulation and some graph sketching, or at least imagining what the graph might look like.

### Preparation and possible approach

Students can either be asked to draw sketches of the combined functions, or can choose them from the provided set.

They are probably best working in pairs. For groups of three or more you might need to prepare larger format grids to work with. Each group needs an empty grid and a set of graphs (if you are using them). These can be printed on card or laminated for reuse if appropriate.

Note that there are more graphs in the set than there are grid cells, so none of the solutions can be found simply by elimination.

The graphs are not all drawn to scale, so students should focus on the key features rather than estimating  $x$  and  $y$  values.

### Key questions

- Without doing the algebra, can you tell me what sort of function you expect to get with this combination?
- Which of the available cards are possible candidates for this cell? What do they have in common and how do they differ?
- Describe what you see on the card—does that match the equation you have?

### Possible extension

Students could be encouraged to write equations for the three graphs that do not fit in the grid.