

Why use this resource?

This problem can help to deepen students' understanding of straight lines. The aim is to find a shaded area between two straight lines given minimal information. Function notation is used on the given diagram and students should be encouraged to consider how much they can find out about the straight lines shown even though they are not provided with their equations. Thinking about the geometrical aspects of the diagram should be encouraged and some consideration of gradient will prove useful. This naturally leads to thinking about transformations.

Preparation

If students have not yet met function notation a brief explanation will be necessary, little other preparation is needed.

Possible approach

It could be particularly helpful to use the Suggestion section fairly early and students encouraged to write down their thoughts on paper or mini-whiteboards. This could then be shared in a whole class plenary or in their groups before students are required to tackle the main problem.

A think-pair-share approach could be used with enough time spent in pairs that some students have come up with full solutions. Alternatively sharing in groups of two or three pairs could happen sooner and groups decide whether to pursue one particular approach or continue along multiple paths if all appear to be going somewhere.

Key questions

- Does it matter what k is?
- Can we write an equation for either or both lines? How many more unknowns do we need?
- What do we know already?
- How can we use what we know?

Possible support

The Suggestion section is a good starting point if many students need a hint.

Some students might need prompting to remember the formula for a trapezium or think about similar triangles. Prompting questions to encourage thinking could be used;

- What can we write down about the whole shaded region?
- How do the parallel lines help us?
- What labels might we usefully add?

Possible extension

What if the top line doesn't pass through the origin?

Could be followed up with [What else do you know?](#) if students have met any calculus.