

Why use this resource?

This resource can help students develop their mathematical thinking and fluency of algebraic skills such as completing the square, manipulation and handling many variables. Using algebra at increasing levels of generality, choosing appropriate co-ordinate systems to make algebra simpler and developing a feel for links between algebra and geometry are areas of understanding which can all be enhanced by tackling this problem which might appear at first quite tricky. It may help students in developing sensitivity for geometry.

Preparation

White boards for sketching on. A few printouts of the suggestion tabs might be useful.

Possible approach

Ask students individually to try sketching, then share with a partner. Students hold up their boards - ask students who have sketched something to describe their thinking and how they approached the problem. This can be used to bring out the suggestion of working with specific concrete values for coordinates and λ first to develop ideas before increasing generality to answer the full problem.

Key questions

- Can you visualise this? How might we change the problem to help visualisation?
- How can we make the problem simpler?
- Does it matter what values we use if we try some concrete examples?
- Can you get a sense of what the result should be before ploughing into algebra?

Possible support

Students can use the specific values suggested in the Problem 1 section and then others suggested in Suggestion 1.

Possible extension

There are some extension ideas as questions in the solution tabs for any students who might need extra thoughts to peruse.

A version of this resource has been featured on the [NRICH website](#). You might like to look at some students' solutions that have been submitted there.