

Why use this resource?

This problem offers students the opportunity to think further about the solutions to quadratic equations in a more challenging context. Students are given an irrational root and will work backwards to find the original quadratic polynomial.

Possible approach

It is nice to consider a geometrical approach as well as an algebraic one. Students will be surprised at how quickly the problem is solved when you first draw a picture!

Key questions

What do we know about the form of a quadratic polynomial if we know one of the roots?

Possible support

students could be asked to generalise for integers before moving on to $1 + \sqrt{2}$

Possible extension

Can you find a polynomial (not necessarily a quadratic) with integer coefficients that has $\sqrt{2} + \sqrt{3}$ as a root? What other roots (if any) does it have?

There are more questions in the taking it further section.

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