# $\sqrt{2}$ is irrational

Teacher notes

## Why use this resource?

Students are presented with several statements, which they have to sort into the correct order to obtain a proof that $\sqrt{2}$ is irrational. They should explain how the ordered statements prove the result. This reasoning can be extended and adapted to prove the irrationality of other values.

## Preparation

The statement cards can be downloaded and printed out, or the cards can be sorted interactively on the website.

This is not the only way to prove that $sqrt2$ is irrational. You may wish to have other examples to hand so comparisons can be made.

## Possible approach

Ask pairs of students to sort the statements into an order which gives a proof that $\sqrt{2}$ is irrational. Then give students time to look at the order other students have placed the cards in before they provide the reasoning behind the statements. This approach may help students question their own and others reasoning more explicitly. Students may also realise that cards 2 and 7 could be placed in either order.

## Key questions

- What's the difference between a rational and irrational number?
- What does the prime factorisation of a number look like?
- Why does $2$ occur to an even power in any square number?

## Possible support

Understanding the part the statements on cards 2 and 7 play in the proof is likely to be the most challenging aspect of this problem. Encourage students to write down some concrete examples of the prime factorisation of both even and odd numbers.

## Possible extension

Students can adapt their argument for the different irrational numbers given in the problem.

They could also find other proofs that $\sqrt{2}$ is irrational and compare the approaches.