Rational Numbers

Rational numbers can be expressed in the form $\frac{a}{b}$ where a and b are integers.

Irrational Numbers

Irrational numbers are numbers which are not rational.

All irrational numbers can be expressed as a unique infinite decimal.

e.g. Prove $\sqrt{2}$ is irrational

"Proof by contradiction"

Assume $\sqrt{2}$ is rational

$\therefore \sqrt{2} = \frac{a}{b}$ where a and b are integers with no common factors

$b\sqrt{2} = a$

$2b^2 = a^2$

Thus a^2 must be divisible by 2

Any square that is divisible by 2 is divisible by 4

Thus a^2 must be divisible by 4

$\therefore \ 2b^2 = 4k$ where k is an integer

$b^2 = 2k$

So a^2 and b^2 are both divisible by 2 and must have a common factor

However, a and b have no common factors

so $\sqrt{2}$ is not rational

$\therefore \sqrt{2}$ is irrational

Exercise 2B; 2a, 3, 4 (root 3), 8, 14*