



AUSTRALIAN MATHS TRUST

Maths Challenge Junior: Years 7–8 Practice Problem

J3: Fredholl Numbers

A number is called Fredholl if it has exactly two different digits and it has an equal number of each and it has no leading zeros. For example, **5050** and **322323** are Fredholl numbers but **242422**, **242411**, **011010** are not.

J3: Questions

- a. What is the smallest Fredholl number that is prime?
- b. Explain why all 6-digit Fredholl numbers are composite.
- c. Explain why all 4-digit Fredholl numbers are composite.

There are pairs of digits that can be arranged to make a prime 8-digit Fredholl number. For example, for the pair 1 and 3, 13131133 is prime (which can be checked on the internet). However there are pairs of digits that make only composite 8-digit Fredholl numbers. For example, all Fredholl numbers that use the pair 2 and 4 are even, hence composite.

- d. Find 27 pairs of digits that cannot make an 8-digit prime Fredholl number.