

Activity 4: Minimal connector

There are a variety of contexts in which it is important to be able to minimise the length of a network joining some fixed points in order to minimise use of resources or energy. This might be in wanting to create an oil pipeline that is as short as possible but which connects four towns, designing heating or plumbing systems in houses, creating a fibre-optic cable network, a network of tunnels, or on a micro-scale, connecting electronics components in a manner that minimises propagation times. Points on the network do not need to be connected directly to each other but you must be able to get from any point to any other point. The smaller the network is, the greater the environmental saving and the greater the efficiency of the system.

Starting point

Imagine four points (they could be houses, or towns, or data points) arranged at the corners of a square of side length 10km, what is the minimum network that can connect them?



Figure 11.6 Typical initial solutions to the 'four towns' problem

(N.B. A solution of less than 27km is possible!)