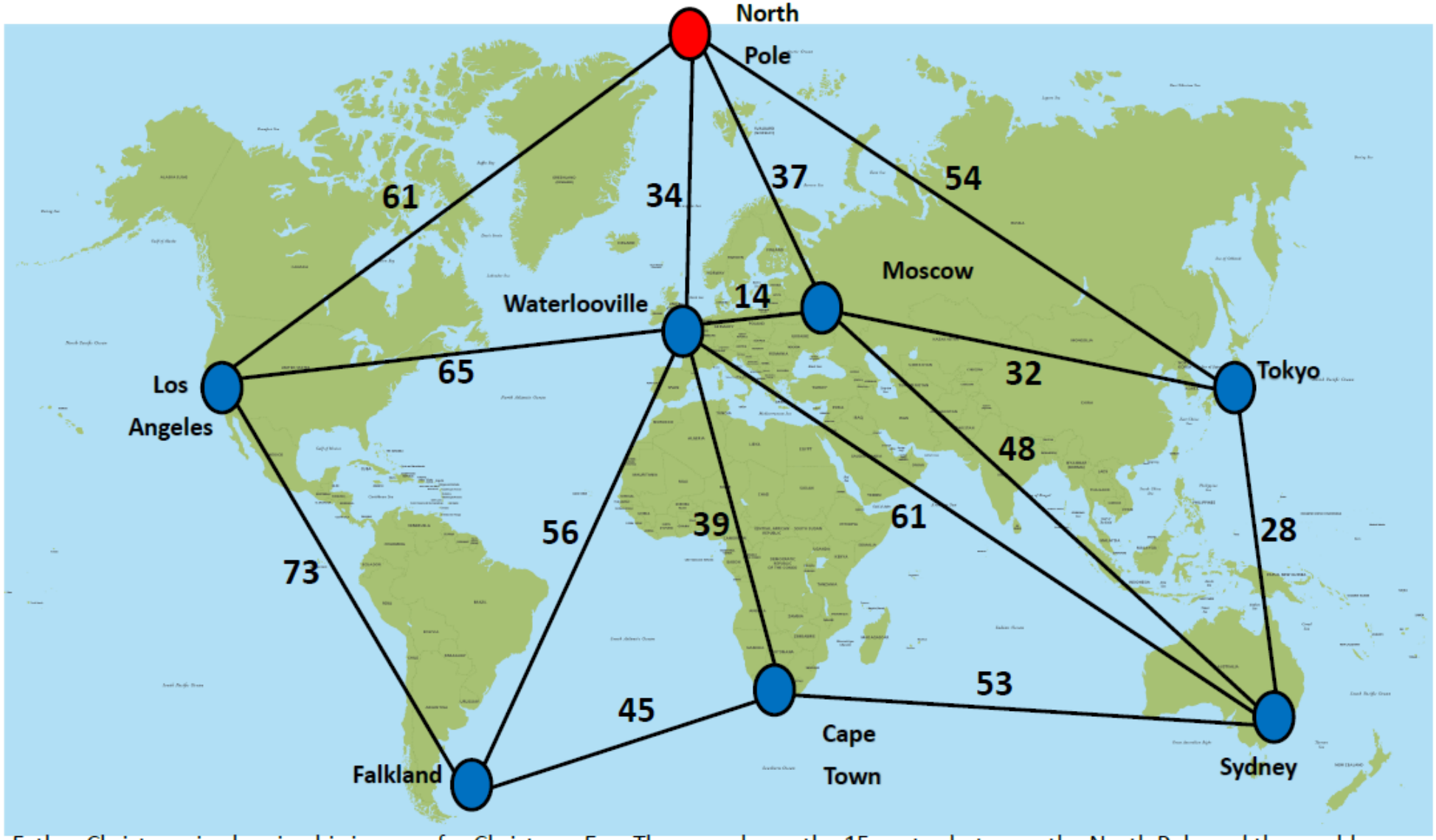

Father Christmas is planning his journey for Christmas Eve. The map shows the 15 routes between the North Pole and the worlds seven greatest cities. The numbers on the route lines indicate how many minutes it takes to travel between the two cities. Father Christmas wishes to travel all of the 15 routes (delivering presents on the way) in the shortest time possible. He is allowed to visit cities and travel routes more than once. Plot the route that takes the least amount of time to complete.

This problem may seem easy enough to complete. Just add up the values as you trace along trying to find the quickest route. There are thousands of potential routes that can be taken, all of which have varying total times for Father Christmas. But there is only one route that gives the smallest amount of time and that is what we are trying to find.

Imagine a robot vacuum cleaner trying to find the fastest route around a living room. Or a pain sensation in your toe flying through your bodily network to your brain in the fastest way possible.

This branch of mathematics is called **route inspection**. They are a way of finding the quickest path through networks (a series of arcs, the lines, connected by nodes, the blue circles) and being able to visit every arc and node.

If you manage to work out this problem for Father Christmas, a great extension task would be to work out how you can visit every station in the London Underground Network in the quickest possible time, something called The Travelling Salesman Problem.