Puzzle:

A 120 wire cable has been laid firmly underground between two telephone exchanges located 10km apart.

Unfortunately after the cable was laid it was discovered to be the wrong type, the problem is the individual wires are not labeled. There is no visual way of knowing which wire is which and thus connections at either end is not immediately possible.

You are a trainee technician and your boss has asked you to identify and label the wires at both ends without ripping it all up. You have no transport and only a battery and light bulb to test continuity. You do have tape and pen for labeling the wires.

What is the shortest distance in kilometers you will need to walk to correctly identify and label each wire?