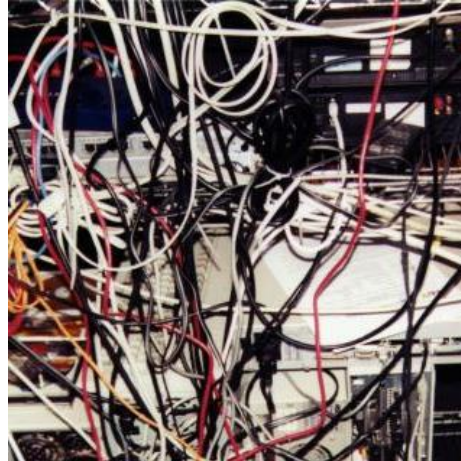
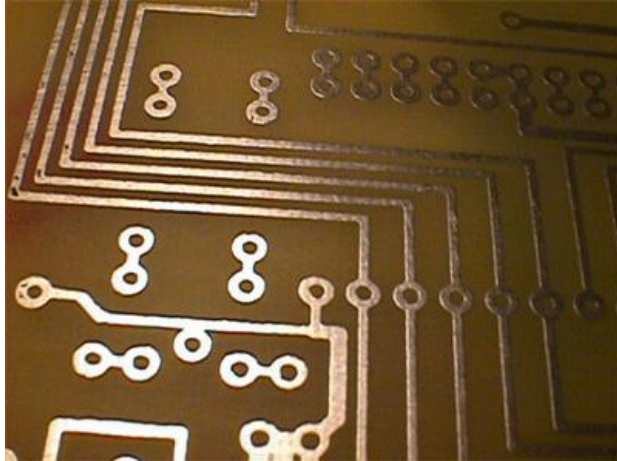
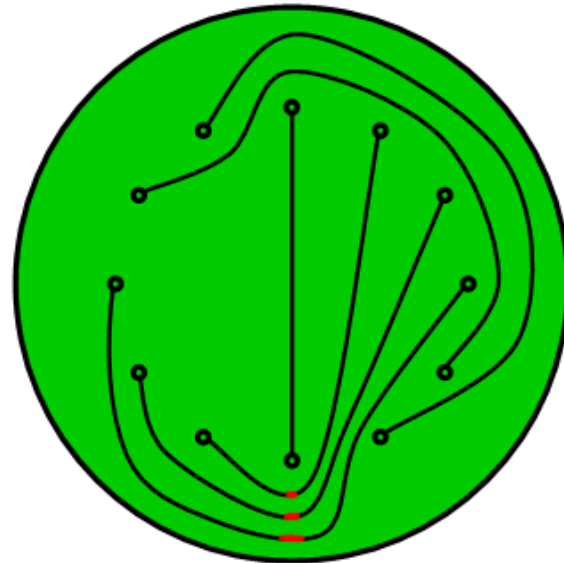
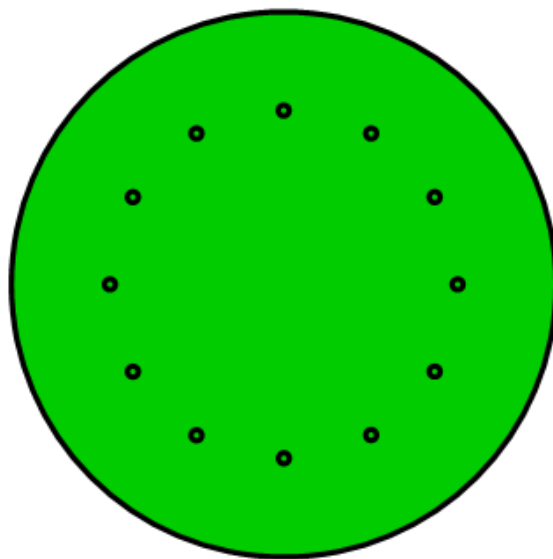


Connect the Dots

Circuit boards are made by imprinting a conducting metal like copper on a non-conducting material like fibreglass. If it were not for circuit boards, connections could be made by wires, but this can get very messy!



Design a circuit board that connects opposite pairs of points on this circular disk. The problem is that no connectors may overlap and no more than two connectors may go "around the back" of the point.



The circuit board on the right successfully connects opposite points, but 3 connectors go around the back (red) of the lowest point so this circuit board will melt.



Extensions:

How many different solutions can you find?

Prove that it is impossible for a pair of points to be connected directly across the circular disk (as is shown in the melting example above).

Solve for 18 points where only 3 connectors may go "around the back" of a point.

Circuit boards may be printed on both sides with the dots going through from one side of the board to the other. Create your own problem using two-sided printing.

The Math in This Problem:

In this puzzle, students will gain an understanding of circuit boards and their well-designed structure to prevent the use, and its messy arrangement, of wires. Given certain constraints, puzzle-solvers will need to figure out a way to structure a circuit board so that connections can be made successfully.

