Worksheet Activity: The Muddy County Problem

Once upon a time there was a county that had no roads. Getting around the county was particularly difficult after rainstorms because the ground became very muddy—cars got stuck in the mud and people got their boots dirty. The locals decided that some of the streets must be paved, but they didn't want to spend more money than necessary. They specified two conditions:

- Enough streets must be paved so that it is possible for everyone to travel from their town to anyone else's town only along paved roads, and

- The paving should cost as little as possible.

Your instructor will provide you with a map of the county. Circles indicate a city and a line between two circles indicates a connection. The number of dashes attached to the connection between each house represents the cost of paving that route. Find the best route that connects all the cities, but uses as few dashes as possible.

What strategies did you use to solve the problem?

How Does This Relate To Compute Science?

Computer scientists and mathematicians often use a diagram to represent these problems. They call it a *graph*. This may be confusing at first because "graph" is sometimes used in statistics to mean a chart displaying numerical data, such as a bar graph, but the graphs that computer scientists use are not related to these. The lengths do not have to be drawn to scale.

Make up some of your own muddy city problems and try them out on your friends.

Can you find out a rule to describe how many roads or connections are needed for a best solution? Does it depend on how many cities there are in the county?