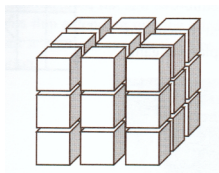


## Problem Abstracts

**Scheduling a Conference Season:** In this project, you will investigate mathematical strategies for scheduling conference seasons. You will look at the way the ACC scheduled its ACC men's basketball season of conference play (prior to 2004), and try to use this method to find a good schedule for league play in your school's women's basketball conference. If time permits, you will also investigate how the ACC has adapted their conference scheduling to allow for twelve teams and investigate the scheduling issues involved in this adaptation.

**Efficient Tofu Cutting:** How can you cut a cubical piece of tofu into smaller pieces efficiently? For example, can you cut a cube into 27 smaller cubes with less than six cuts?



**Locating Rocks:** How can math be used to locate rock under the earth's surface? When you locate a spot, how do you know how deep you should dig? To investigate this problem, we will solve a simplified version of this problem using your math skills from Algebra II and Geometry.

**Measuring Stream Flow and Output:** The amount of water that is the output of a stream is related to the volume of water flowing and time, or how fast the water flows. We will develop a way to measure stream output and put the method to practice. We will also model stream flow rates and compare hard data with other flow rate models.

**Knight's Tour:** Is it possible for a knight to "travel" around a chessboard? That is, using the move of a knight, can you land on every square once (and only once!) and end up where you started?

**Texas Hold'em:** Texas Hold'em is the most popular variation of poker played in casinos in the western United States and is the main event in the World Series of Poker. It's even rumored that the game will be played by the title character in the next James Bond movie. Like all games of chance, being successful at Texas Hold'em requires an understanding of probability, especially the likelihood of getting different combinations of cards under various circumstances. This problem examines some scenarios a player might experience while playing a game like Texas Hold'em and asks you to think about ideas such as whether or not the number of players matters and when you should bet or fold. You'll also be asked to explore some different methods for answering these questions, such as simulation (with actual cards or computers).

## CONTINUED ON REVERSE

**Filling Coal Cars:** Producing an optimal schedule for events with unpredictable timing that also involve costs for working times and for lag times is a fundamental problem in the mathematical areas of operations research and industrial mathematics. The problem presented here is based upon some consulting work done for a Wyoming coal company by a mathematical economist at the Colorado School of Mines. Trains that haul coal arrive at a loading facility at unpredictable times. They need to be loaded by a crew, which adds labor costs. Trains sitting idle also add to the cost. Given specific information about costs and loading times, the goal is to provide an estimate of the expected annual cost for the loading facility.

**Locating a Fire and Rescue Facility:** Finding the optimal location for an object where cost, transportation time or distance is an issue, is a fundamental problem in the mathematical areas of operations research and industrial mathematics. The problem presented here is a simplification of a real situation. A town is interested in placing fire and rescue facilities in locations that would minimize the response time, given a map containing data on the typical number of emergency calls and the transportation times.

**Restoring Power After a Storm:** Prioritizing tasks in the face of competing priorities and demands is a fundamental problem in the mathematical areas of operations research and industrial mathematics. The problem presented here is based upon some consulting work in response to hurricane Andrew in 1992. Power companies must have emergency response plans for restoring power after a storm. Given data on time and cost required for restoration of power, along with information the location of the crucial needs (hospitals, etc.), a scheme for service will be developed.