

PROJECT ON COUNTERFEIT COINS

1 The Problem

Consider the following scenario: There are n coins of which c are counterfeit. Some of the counterfeits are lighter, some are heavier. (Those that are lighter all weigh the same, those that are heavier all weigh the same.) You want to determine which coins are counterfeit, and for each one, whether it is heavy or light.

The basic operation is to use a balance beam to weight a set of coins against each other.

2 The Project

What is the least number of weightings you need to do to find the counterfeit? What if you know exactly how many are heavy and how many are light? What if you need only identify which are counterfeit but do not need to tell if they are heavy or light?

3 What is Known

See *Coin Weighting Problems* by Guy and Nowakowski in *American Mathematics Monthly*, Volume 102, No. 2, Feb 1995, 164–167.