

# Ponder this

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This problem set includes a selection of probability problems. Probability theory started essentially as an empirical science and developed on the mathematical side later. Pascal and Fermat were among those who suggested the basics of probability theory as we now know it. The problems featured in this issue demonstrate diversity of ideas and different concepts of probability, in particular, they refer to Laplace and Bernoulli models as well as to geometric probability.

## Problem set 4

1. Eight counters are picked up at random from a bag containing 12 white counters and 8 black counters. What is the probability that exactly three of the removed counters are black? What is the probability that not more than three of the removed counters are black?
2. When two dice are rolled, what is the minimum number of rolls required so that the probability of obtaining two “ones” is greater than  $\frac{1}{2}$ ?
3. A die is rolled 10 times. What is the probability of a number 1 being obtained not more than four times?
4. A triangle is inscribed at random in a circle. What is the probability that the triangle has acute angles only?
5. Let  $x^2 + px + q$  be a quadratic polynomial with coefficients  $p$  and  $q$  being selected at random from the interval  $[-1, 1]$ . What is the probability that  $x^2 + px + q$  has real roots?

**Solutions to this set of problems for publication should be submitted to:**

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Solutions to this set will be made available on the AAMT website ([www.aamt.edu.au](http://www.aamt.edu.au)) after 1 May 2009.