Learning probability with Fathom®

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Overview

- What the Standards say about the learning of probability

- What research says about the learning of probability

- Dice and coins with Fathom

- Solving problems by doing simulations

The Data Analysis and Probability Standard

In grades 9–12 all students should—

- understand the concepts of sample space and probability distribution and construct sample spaces and distributions in simple cases;

The Data Analysis and Probability Standard

- use simulations to construct empirical probability distributions;

- compute and interpret the expected value of random variables in simple cases;

- understand the concepts of conditional probability and independent events;

- understand how to compute the probability of a compound event.

Addressing Misconceptions

[A]n initial formalistic approach to probability is unlikely to help students overcome misconceptions. However, if probability is introduced first through experiments, students appear to have more success in overcoming their probabilistic prejudices.

Shaughnessy (1981)

Using Fathom

- Dice and coins

One Son Policy

In order to limit the growth of China's population, some politicians have suggested that families be limited to a single child. However, for a variety of cultural reasons, rural Chinese families highly value the birth of a male child.

Based on Konold, C. (1994). Teaching Probability through Modeling Real Problems. *Mathematics Teacher, 87*, 232-235.

One Son Policy

In a compromise, politicians are discussing implementation of the "One Son" policy. Under this policy, couples may continue to have children until the first son is born; thereafter, the couple is forbidden to have additional children.

One Son Policy

- Under full compliance of this policy, what will be the average number of children per family?

- What will be the ratio of girls to boys born under this policy?

The Monty Hall Dilemma

Applicants

How likely is it that at most 25 of the 50 people receiving a promotion are women when all the people in the applicant pool from which the promotions are made are well qualified and 65% of the applicant pool is female?

From: NCTM (2000). *Principles and Standards for School Mathematics*. Reston, VA: NCTM (p. 332).