WHAT HAVE WE LEARNED?

We've learned to harness the power of randomness. We've learned that a simulation model can help us investigate a question for which many outcomes are possible, we can't (or don't want to) collect data, and a mathematical answer is hard to calculate. We've learned how to base our simulation on random values generated by a computer, generated by a randomizing device such as a die or spinner, or found on the Internet. Like all models, simulations can provide us with useful insights about the real world.

TERMS

Random — An outcome is random if we know the possible values it can have, but not which particular value it takes. A random outcome is free of human influence. (p. 265)

Generating random numbers — Random numbers are hard to generate. Nevertheless, several Internet sites offer an unlimited supply of equally likely random values. (p. 266)

Simulation — A simulation models a real-world situation by using random-digit outcomes to mimic the uncertainty of a response variable of interest. (p. 267)

Trial — The sequence of several components representing events that we are pretending will take place. (p. 267)

Simulation component — A component uses equally likely random digits to model simple random occurrences whose outcomes may not be equally likely. (p. 268)

Response variable — Values of the response variable record the results of each trial with respect to what we were interested in. (p. 268)

ON THE COMPUTER

Simulation

Simulations are best done with the help of technology simply because running more trials makes for a better simulation, and computers are fast. There are special computer programs designed for simulation, and most statistics packages and calculators can at least generate random numbers to support a simulation.

All technology-generated random numbers are *pseudorandom*. The random numbers available on the Internet may technically be better, but the differences won't matter for any simulation of modest size. Pseudorandom numbers generate the next random value from the previous one by a specified algorithm. But they have to start somewhere. This starting point is called the "seed." Most programs let you set the seed. There's usually little reason to do this, but if you wish to, go ahead. If you reset the seed to the same value, the programs will generate the same sequence of "random" numbers.

APPLET
Generate random numbers

EXERCISES

1. Random outcomes For each of the following scenarios, decide if the outcome is random.

   a) Flip a coin to decide who takes out the trash. Is who takes out the trash random?

   b) A friend asks you to [illegible] professional sports team. Is the sports te[illegible]n?

   c) Names are selected ou[illegible]le roommates in a dormitory. Is your roo[illegible] random?