

# UNIT ACTIVITY:

## OBSERVING RANDOM PHENOMENA

In this activity, you will observe two random phenomena – flipping a coin and tossing a tack.

### Part I: Flipping a Coin

1.
  - a. What does it mean to say you are flipping a fair coin?
  - b. A run is a string of the same outcome in a row. If you flip a fair coin 100 times, estimate the length of the longest run you would expect to observe.
  
2.
  - a. Flip a coin 100 times. Record the outcome of each flip.
  - b. What is the length of the longest run (either heads or tails)? Is it longer or shorter than what you expected?
  - c. Calculate the proportion of heads in the first 10 flips, in the first 20 flips, in the first 50 flips, and in all 100 flips.
  - d. Based on the results from 100 flips, do you think you were flipping a fair coin? Explain.
  
3.
  - a. Combine the data from the class. Calculate the proportion of heads.
  - b. Does your proportion in (a) give you reason to believe that the coins students were flipping were not fair? Explain.

## Part II: Tossing a Thumbtack



*Figure 18.4. Tacks sitting point down and point up. Photo by Tomasz Sienicki.*

4. When you toss a thumbtack, it can land point up or point down. For flipping a coin, we expect the two outcomes, heads or tails, to be equally likely. But is the same true for tossing tacks? Your task in this question is to collect data on tossing a thumbtack and then to use your data to assign probabilities to the two possible outcomes.
- Collect data on the outcomes of tossing a thumbtack. You decide how many repetitions you will need. How many times did the tack land point up?
  - Use your data from (a) to assign probabilities to landing point up or point down.
  - What is the sum of your probability assignments from (b)?