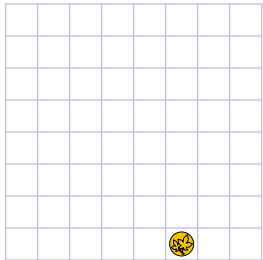# Chapter 5 Test

1. **Knowledge and Understanding** At several branches of the Trillium Bank, transaction times with tellers during a two-hour period were recorded. Time, in the table, has been rounded to the nearest minute.

Time (min)	1	2	3	4	5	6 or more
Frequency	20	12	9	5	3	1

    (a) Define the random variable, X.
    (b) Create a probability distribution from these data.
    (c) Determine the expected transaction time at the Trillium Bank.

2. A baseball player has a batting average of 0.275. In most games, a player has four at-bats. Determine the probability that the player gets
    (a) exactly three hits in a game   **(b)** at least one hit in a game
    (c) the expected number of hits in a game

3. DZ Technical, a small electronics firm, produces microprocessors for a large computer manufacturer. The computer manufacturer samples 12 microprocessors from each shipment and will reject the entire shipment if there are 2 or more defective units in the sample. Determine the probability that the shipment will be accepted if DZ Technical knows that 10% of its units are defective.
    (a) Design and carry out a simulation to estimate the probability.
    (b) Compute the theoretical probability.

4. **Communication** What is a Bernoulli trial? Describe a situation that is representative of a Bernoulli trial.

5. Determine the 10th term in the expansion of $\left(x^2 + \dfrac{2}{\sqrt{x}}\right)^{15}$.

6. **Application** A penny is placed in the bottom row of an eight-by-eight grid, as shown. If the penny can be moved one square at a time to the row above, either diagonally or straight ahead, how many paths will lead to the square in the top left-hand corner?

7. **Thinking, Inquiry, Problem Solving** Use the Binomial Theorem to determine an expansion of $(a + b + c)^3$. (**Hint:** Express the trinomial as a binomial and expand.)

8. Which technique yields the most reliable results: a probability distribution determined using theoretical probabilities or a probability distribution determined through simulation? Explain.