Chapter Test

ACHIEVEMENT CHART

Category	Knowledge/ Understanding	Thinking/Inquiry/ Problem Solving	Communication	Application
Questions	All	5, 10, 12	1, 12	3, 4, 6–8, 10–12

1. Determine if a uniform, binomial, geometric, or hypergeometric distribution would be the best model for each of the following experiments. Explain your reasoning.

   a) drawing names out of a hat without replacement and recording the number of names that begin with a consonant

   b) generating random numbers on a calculator until it displays a 5

   c) counting the number of hearts in a hand of five cards dealt from a well-shuffled deck

   d) asking all students in a class whether they prefer cola or ginger ale

   e) selecting the winning ticket in a lottery

   f) predicting the expected number of heads when flipping a coin 100 times

   g) predicting the number of boys among five children randomly selected from a group of eight boys and six girls

   h) determining the waiting time before picking a winning number in a lottery.

2. A lottery ticket costs $2.00 and a total of 4 500 000 tickets were sold. The prizes are as follows:

Prize	Number of Prizes
$500 000	1
$50 000	2
$5 000	5
$500	20
$50	100

Determine the expected value of each ticket.

3. Of 25 people invited to a birthday party, 5 prefer vanilla ice cream, 8 prefer chocolate, and 4 prefer strawberry. The host surveys 6 of these people at random to determine how much ice cream to buy.

   a) What is the probability that at least 3 of the people surveyed prefer chocolate ice cream?

   b) What is the probability that none prefer vanilla?

   c) What is the expected number of people who prefer strawberry?

   d) What is the expected number of people who do not have a preference for any of the three flavours?

4. Suppose you randomly choose an integer n between 1 and 5, and then draw a circle with a radius of n centimetres. What is the expected area of this circle to the nearest hundredth of a square centimetre?

5. At the Statsville County Fair, the probability of winning a prize in the ring-toss game is 0.1.

   a) Show the probability distribution for the number of prizes won in 8 games.

   b) If the game will be played 500 times during the fair, how many prizes should the game operators keep in stock?

6. a) What is the probability that a triple will occur within the first five rolls of three dice?

   b) What is the expected waiting time before a triple?

7. In July of 2000, 38% of the population of Canada lived in Ontario. Design a simulation to estimate the expected number of residents of Ontario included in a random survey of 25 people in Canada.

8. A multiple-choice trivia quiz has ten questions, each with four possible answers. If someone simply guesses at each answer,
   a) what is the probability of only one or two correct guesses?
   b) what is the probability of getting more than half the questions right?
   c) what is the expected number of correct guesses?

9. In an experiment, a die is rolled repeatedly until all six faces have finally shown.
   a) What is the probability that it only takes six rolls for this event to occur?
   b) What is the expected waiting time for this event to occur?

10. The Burger Barn includes one of three different small toys with every Barn Burger. Each of the toys is equally likely to be included with a burger. Design a simulation to determine the number of Barn Burger purchases necessary for 3:1 odds of collecting all three different toys.

11. To determine the size of a bear population in a provincial park, 23 bears were caught and fitted with radio collars. One month later, 8 of 15 bears sighted had radio collars. What is the approximate size of the bear population?

ACHIEVEMENT CHECK			
Knowledge/Understanding	Thinking/Inquiry/Problem Solving	Communication	Application

12. Louis inserts a 12-track CD into a CD player and presses the random play button. This CD player's random function chooses each track independently of any previously played tracks.
   a) What is the probability that the CD player will select Louis's favourite track first?
   b) What is the probability that the second selection will not be his favourite track?
   c) What is the expected waiting time before Louis hears his favourite track?
   d) Sketch a graph of the probability distribution for the waiting times.
   e) Explain how having a different number of tracks on the CD would affect the graph in part d).
   f) If Louis has two favourite tracks, what is the expected waiting time before he hears both tracks?