1. An unbiased coin is tossed 5 times. Find the probability of the given event:
   a. The coin lands heads exactly once.
   b. The coin lands heads at least once.

2. Four balls are selected at random without replacement from an urn containing three white balls and five blue balls. Find the probability of the given event:
   a. All of the balls are blue.
   b. Two of the balls are white, and two are blue.

3. Two light bulbs are selected at random from a lot of 24, of which 4 are defective. What is the probability that:
   a. Both of the light bulbs are defective?
   b. At least 1 of the light bulbs is defective?

4. Electronic baseball games manufactured by Tempco Electronics are shipped in lots of 24. Before shipping, a quality-control inspector randomly selects a sample of 8 from each lot for testing. If the sample contains any defective games, the entire lot is rejected. What is the probability that a lot containing exactly 2 defective games will still be shipped?

5. Four different written driving tests are administered by the Motor Vehicle Department. One of these four tests is selected at random for each applicant for a driver’s license. If a group consisting of two women and three men apply for a license, what is the probability that:
   a. Exactly two of the five will take the same test?
   b. The two women will take the same test?

6. A student studying for an exam knows the meanings of 12 words from a list of 20 words. If the test contains 10 words from the study list, what is the probability that at least 8 of words on the list are words that the student knows?

7. A druggist wishes to select three brands of aspirin to sell in his store. He has five major brands to choose from: A, B, C, D, and E. If he selects the three brands at random, what is the probability that he will select:
   a. Brand B?
   b. Brand B and C?
   c. At least one of the two brands B or C?

8. There are 12 signs of the Zodiac: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, and Pisces. Each sign corresponds to a different calendar period of approximately one month. Assuming that a person is just as likely to be born under one sign as another, what is the probability that in a group of five people, at least two of them were born under the sign of Aries?
Answers:

1. a. \(\frac{5C1}{2^5}\)
   
   b. \(\frac{5C1 + 5C2 + 5C3 + 5C4 + 5C5}{2^5}\) or \(1 - \frac{5C0}{2^5}\)

2. a. \(\frac{5C4}{8C4}\)
   
   b. \(\frac{(5C2)(3C2)}{8C4}\)

3. a. \(\frac{4C2}{24C2}\)
   
   b. \(\frac{(4C1)(20C1) + (4C2)}{24C2}\) or \(1 - \frac{20C2}{24C2}\)

4. \(\frac{22C8}{24C8}\)

5. a. \(\frac{(5C2)4!}{4^5}\)
   
   b. \(\frac{4(4^3)}{4^5}\)

6. \(\frac{(12C8)(8C2) + (12C9)(8C1) + (12C10)}{20C10}\)

7. a. \(\frac{4C2}{5C3}\)
   
   b. \(\frac{3C1}{5C3}\)
   
   c. \(\frac{4C2 + 3C2}{5C3}\)

8. \(\frac{(5C2)11^3 + (5C3)11^2 + (5C4)11 + (5C5)}{12^5}\)