

## WRITTEN EXERCISES

In Exercises 1 and 2, leave your answers in terms of factorials unless directed otherwise by your teacher.

- A**
- Five cards are dealt from a well-shuffled standard deck. What is the probability of getting:
    - all hearts?
    - no hearts?
    - at least one heart?
  - Thirteen cards are dealt from a well-shuffled standard deck. What is the probability of getting:
    - all clubs?
    - no clubs?
    - at least one club?
  - A bag contains 5 red marbles and 3 white marbles. If 2 marbles are randomly drawn, one after the other and without replacement, what is the probability that the number of red marbles is 0? 1? 2? (Check to see that the sum of the probabilities is 1.)
  - Repeat Exercise 3 if the bag contains 6 red marbles and 2 white marbles; that is, find the probabilities of drawing 0, 1, and 2 red marbles.
  - Free concert tickets are distributed to 4 students chosen at random from 8 juniors and 12 seniors in the school orchestra. What is the probability that free tickets are received by:
    - 4 seniors?
    - exactly 3 seniors?
    - exactly 2 seniors?
    - exactly 1 senior?
    - no seniors?
  - A town council consists of 8 Democrats, 7 Republicans, and 5 Independents. A committee of 3 is chosen by randomly pulling names from a hat. What is the probability that the committee has:
    - 2 Democrats and 1 Republican?
    - 3 Independents?
    - no Independents?
    - 1 Democrat, 1 Republican, and 1 Independent?



7. Find the probability that Eloise is on the committee.
  8. Find the probability that Eloise and Fernando are on the committee.
  9. Find the probability that either Eloise or Fernando is on the committee.
  10. Find the probability that neither Eloise nor Fernando is on the committee.
  11. Find the probability that Archibald is on the committee and Beatrix is not.
  12. Find the probability that Archibald and Beatrix are on the committee but Charlene is not.
  13. Find the probability that Denise is on the committee given that Archibald is.
  14. Find the probability that Denise is on the committee given that neither Archibald nor Beatrix is.
- B** 15. Thirteen cards are dealt from a well-shuffled standard deck. What is the probability of getting:
- |                          |                             |
|--------------------------|-----------------------------|
| a. all red cards?        | b. 7 diamonds and 6 hearts? |
| c. at least 1 face card? | d. all face cards?          |
16. Thirteen cards are dealt from a well-shuffled standard deck. What is the probability of getting:
- |                                  |                                     |
|----------------------------------|-------------------------------------|
| a. all cards from the same suit? | b. 7 spades, 3 hearts, and 3 clubs? |
| c. all of the 12 face cards?     | d. at least one diamond?            |
17. A committee of 4 is chosen at random from a group of 5 married couples. What is the probability that the committee includes no two people who are married to each other?

18. The letters of the word ABRACADABRA are written on separate slips of paper and placed in a hat. Five slips of paper are then randomly drawn, one after the other and without replacement. What is the probability of getting:

- all A's?
- both R's?
- at least one B?
- one of each letter?

19. **Manufacturing** A quality control inspector randomly inspects 4 microchips in every lot of 100. If one or more microchips are defective, the entire lot is rejected for shipment. Suppose a lot contains 10 defective microchips and 90 acceptable ones. What is the probability that the lot is rejected?

20. **Manufacturing** A lot of 20 television sets consists of 6 defective sets and 14 good ones. If a sample of 3 sets is chosen, what is the probability that the sample contains:

- all defective sets?
- at least one defective set?

**C** 21. A standard deck of 52 cards is shuffled and the cards are dealt face up one at a time until an ace appears.

- What is the probability that the first ace appears on the third card?
- Show that the probability of getting the first ace on or before the ninth card is greater than 50%.

