12-1 Practice

The Counting Principle

State whether the events are *independent* or *dependent*.

1. choosing an ice cream flavor and choosing a topping for the ice cream

2. choosing an offensive player of the game and a defensive player of the game in a professional football game

3. From 15 entries in an art contest, a camp counselor chooses first, second, and third place winners.

4. Jillian is selecting two more courses for her block schedule next semester. She must select one of three morning history classes and one of two afternoon math classes.

Solve each problem.

5. A briefcase lock has 3 rotating cylinders, each containing 10 digits. How many numerical codes are possible?

6. A golf club manufacturer makes irons with 7 different shaft lengths, 3 different grips, 5 different lies, and 2 different club head materials. How many different combinations are offered?

7. There are five different routes that a commuter can take from her home to the office. In how many ways can she make a round trip if she uses a different route coming than going?

8. In how many ways can the four call letters of a radio station be arranged if the first letter must be W or K and no letters repeat?

9. How many 7-digit phone numbers can be formed if the first digit cannot be 0 or 1, and any digit can be repeated?

10. How many 7-digit phone numbers can be formed if the first digit cannot be 0, and any digit can be repeated?

11. How many 7-digit phone numbers can be formed if the first digit cannot be 0 or 1, and no digit can be repeated?

12. How many 7-digit phone numbers can be formed if the first digit cannot be 0, and no digit can be repeated?

13. How many 6-character passwords can be formed if the first character is a digit and the remaining 5 characters are letters that can be repeated?

14. How many 6-character passwords can be formed if the first and last characters are digits and the remaining characters are letters? Assume that any character can be repeated.

Lesson 12-1

12-2 Practice

Permutations and Combinations

Evaluate each expression.

1. $P(8, 6)$ 2. $P(9, 7)$ 3. $P(3, 3)$

4. $P(4, 3)$ 5. $P(4, 1)$ 6. $P(7, 2)$

7. $C(8, 2)$ 8. $C(11, 3)$ 9. $C(20, 18)$

10. $C(9, 9)$ 11. $C(3, 1)$ 12. $C(9, 3) \cdot C(6, 2)$

Determine whether each situation involves a *permutation* or a *combination*. Then find the number of possibilities.

13. selecting a 4-person bobsled team from a group of 9 athletes

14. an arrangement of the letters in the word *Canada*

15. arranging 4 charms on a bracelet that has a clasp, a front, and a back

16. selecting 3 desserts from 10 desserts that are displayed on a dessert cart in a restaurant

17. an arrangement of the letters in the word *annually*

18. forming a 2-person sales team from a group of 12 salespeople

19. making 5-sided polygons by choosing any 5 of 11 points located on a circle to be the vertices

20. seating 5 men and 5 women alternately in a row, beginning with a woman

21. **STUDENT GROUPS** Farmington High is planning its academic festival. All math classes will send 2 representatives to compete in the math bowl. How many different groups of students can be chosen from a class of 16 students?

22. **PHOTOGRAPHY** A photographer is taking pictures of a bride and groom and their 6 attendants. If she takes photographs of 3 people in a group, how many different groups can she photograph?

23. **AIRLINES** An airline is hiring 5 flight attendants. If 8 people apply for the job, how many different groups of 5 attendants can the airline hire?

24. **SUBSCRIPTIONS** A school librarian would like to buy subscriptions to 7 new magazines. Her budget, however, will allow her to buy only 4 new subscriptions. How many different groups of 4 magazines can she choose from the 7 magazines?

12-4 Practice

Multiplying Probabilities

A die is rolled three times. Find each probability.

1. P(three 4s)   **2.** P(no 4s)

3. P(2, then 3, then 1)   **4.** P(three different even numbers)

5. P(any number, then 5, then 5)   **6.** P(even number, then odd number, then 1)

There are 3 nickels, 2 dimes, and 5 quarters in a purse. Three coins are selected in succession at random. Find the probability.

7. P(nickel, then dime, then quarter), if no replacement occurs

8. P(nickel, then dime, then quarter), if replacement occurs

9. P(2 nickels, then 1 quarter), if no replacement occurs

10. P(3 dimes), if replacement occurs

11. P(3 dimes), if no replacement occurs

For Exercises 12 and 13, determine whether the events are *independent* or *dependent*. Then find each probability.

12. Serena is creating a painting. She wants to use 2 more colors. She chooses randomly from 6 shades of red, 10 shades of green, 4 shades of yellow, 4 shades of purple, and 6 shades of blue. What is the probability that she chooses 2 shades of green?

13. Kershel's mother is shopping at a bakery. The owner offers Kershel a cookie from a jar containing 22 chocolate chip cookies, 18 sugar cookies, and 15 oatmeal cookies. Without looking, Kershel selects one, drops it back in, and then randomly selects another. What is the probability that neither selection was a chocolate chip cookie?

14. METEOROLOGY The Fadeeva's are planning a 3-day vacation to the mountains. A long-range forecast reports that the probability of rain each day is 10%. Assuming that the daily probabilities of rain are independent, what is the probability that there is no rain on the first two days, but that it rains on the third day?

RANDOM NUMBERS **For Exercises 15 and 16, use the following information.**

Anita has a list of 20 jobs around the house to do, and plans to do 3 of them today. She assigns each job a number from 1 to 20, and sets her calculator to generate random numbers from 1 to 20, which can reoccur. Of the jobs, 3 are outside, and the rest are inside.

15. Sketch a tree diagram showing all of the possibilities that the first three numbers generated correspond to inside jobs or outside jobs. Use it to find the probability that the first two numbers correspond to inside jobs, and the third to an outside job.

16. What is the probability that the number generated corresponds to an outside job three times in a row?

Lesson 12-4

12-5 Practice

Adding Probabilities

An urn contains 7 white marbles and 5 blue marbles. Four marbles are selected without replacement. Find each probability.

1. P(4 white or 4 blue)   **2.** P(exactly 3 white)   **3.** P(at least 3 white)

4. P(fewer than 3 white)   **5.** P(3 white or 3 blue)   **6.** P(no white or no blue)

Jason and Maria are playing a board game in which three dice are tossed to determine a player's move. Find each probability.

7. P(two 5s)   **8.** P(three 5s)   **9.** P(at least two 5s)

10. P(no 5s)   **11.** P(one 5)   **12.** P(one 5 or two 5s)

Determine whether the events are *mutually exclusive* or *inclusive*. Then find the probability.

13. A clerk chooses 4 CD players at random for floor displays from a shipment of 24 CD players. If 15 of the players have a blue case and the rest have a red case, what is the probability of choosing 4 players with a blue case or 4 players with a red case?

14. A department store employs 28 high school students, all juniors and seniors. Six of the 12 seniors are females and 12 of the juniors are males. One student employee is chosen at random. What is the probability of selecting a senior or a female?

15. A restaurant has 5 pieces of apple pie, 4 pieces of chocolate cream pie, and 3 pieces of blueberry pie. If Janine selects a piece of pie at random for dessert, what is the probability that she selects either apple or chocolate cream?

16. At a statewide meeting, there are 20 school superintendents, 13 principals, and 6 assistant principals. If one of these people is chosen at random, what is the probability that he or she is either a principal or an assistant principal?

17. An airline has one bank of 13 telephones at a reservations office. Of the 13 operators who work there, 8 take reservations for domestic flights and 5 take reservations for international flights. Seven of the operators taking domestic reservations and 3 of the operators taking international reservations are female. If an operator is chosen at random, what is the probability that the person chosen takes domestic reservations or is a male?

18. MUSIC Forty senior citizens were surveyed about their music preferences. The results are displayed in the Venn diagram. If a senior citizen from the survey group is selected at random, what is the probability that he or she likes only country and western music? What is the probability that he or she likes classical and/or country, but not 1940's pop?