

9. One person in a stadium filled with 100,000 people is chosen at random to win a free pair of airline tickets. What is the probability that it will *not* be you?
a. 1 in 100,000 b. 0.99 c. 0.99999
10. There are 365 possible birthdays in a year. In a class of 25 students, the chance of finding 2 students with the same birthday is
a. 25/365. b. $2 \times 25/365$. c. greater than 0.5.

Exercises 7E

REVIEW QUESTIONS

- What are arrangements with repetition? Give an example of a situation in which the n^r formula gives the number of possible arrangements.
- What do we mean by *permutations*? Explain the meaning of each of the terms in the permutations formula. Give an example of its use.
- What do we mean by *combinations*? Explain the meaning of each of the terms in the combinations formula. Give an example of its use.
- Explain what we mean when we say that *some* outcome is much more likely than a particular outcome. How does this idea affect our perception of coincidences?

DOES IT MAKE SENSE?

Decide whether each of the following statements makes sense (or is clearly true) or does not make sense (or is clearly false). Explain your reasoning.

- I used the permutations formula to determine how many possible relay orders we could make with the 10 girls on our swim team.
- I used the combinations formula to determine how many different five-card poker hands are possible.
- The number of different possible batting orders for 9 players on a 25-person baseball team is so large that there's no hope of trying them all out.
- It must be my lucky day, because the five-card poker hand I got had only about a 1 in 2.5 million chance of being dealt to me.
- The probability that two people in a randomly selected group will have the same last name is much higher than the probability that someone will have the same last name as I do.
- Someone wins the lottery every week, so I figure that if I keep playing eventually I will be the one who wins.

BASIC SKILLS & CONCEPTS

11–22: **Review of Factorials.** Use the skills covered in the Brief Review on p. 459 to evaluate the following quantities *without* using the factorial key on your calculator (you may use the multiplication key). Show your work.

11. $6!$ 12. $12!$ 13. $\frac{5!}{3!}$
14. $\frac{10!}{8!}$ 15. $\frac{12!}{4! 3!}$ 16. $\frac{9!}{4! 2!}$

17. $\frac{11!}{3!(11-3)!}$ 18. $\frac{30!}{29!}$ 19. $\frac{8!}{3!(8-3)!}$
20. $\frac{30!}{28!}$ 21. $\frac{6! 8!}{4! 5!}$ 22. $\frac{15!}{2! 13!}$

23–40: **Counting Methods.** Answer the following questions using the appropriate counting technique, which may be *either* arrangements with repetition, permutations, or combinations. Be sure to explain why this counting technique applies to the problem.

- How many different nine-digit zip codes can be formed?
- How many different five-character passwords can be formed from the lowercase letters of the alphabet?
- How many different five-character passwords can be formed from the lowercase letters of the alphabet if repetition is not allowed?
- A city council with nine members must elect a four-person executive committee consisting of a mayor, deputy mayor, secretary, and treasurer. How many executive committees are possible?
- How many ways can the nine performances at a piano recital be ordered?
- A city council with nine members must appoint a three-person subcommittee. How many subcommittees are possible?
- Suppose you have 20 CDs from which you choose 6 CDs to put in the CD player in your car. If you are not particular about the order, how many 6-CD sets are possible?
- How many 6-person lineups can be formed from a 15-player volleyball roster, assuming every player can be assigned to any position?
- How many different birth orders with respect to gender are possible in a family with five children? (For example, BBBGG and BGBGG are different orders.)
- How many different 5-card hands can be dealt from a 52-card deck?
- How many license plates can be made of the form XX-YYYY, where X is a letter of the alphabet and Y is a numeral 0–9?
- How many different groups of six balls can be drawn from a barrel containing balls numbered 1–36?
- How many different telephone numbers of the form *aaa-bbb-cccc* can be formed if the area code *aaa* cannot contain 0 and the prefix *bbb* cannot contain 9?
- How many anagrams (rearrangements) of the letters ILOVEMATH can you make?