

8.3 EXERCISES

 PRACTICE

Identify the sample space for each experiment.

1. A coin is flipped and then a single die is rolled.
2. Choosing a number from all positive two-digit integers where the digits are repeated (for example, 11).
3. Five marbles are in a bag, one of each of the following colors: blue (B), clear (C), green (G), yellow (Y), and red (R). Two marbles are drawn consecutively. Assume that the first marble is not put back in the bag before the second marble is drawn. Order of the selection matters. In other words, BG and GB are two different selections.
4. When choosing an outfit, you have a choice of three shirts: white (W), black (B), or patterned (P); a choice of two types of jeans: faded (F) or dark wash (D); and a choice of four pairs of shoes: sandals (S), running shoes (R), climbing boots (C), or mules (M). List the outcomes in the sample space in regard to the outfits (combination of shirt, jeans, and shoes) you could pick from.

Determine whether each probability is empirical or classical.

5. In order to find the percentage of bass that Troy had in his pond this spring, he decided to spend three days catching a total of 15 fish each day and counting how many of those were bass.
6. Jason wants to know how likely he is to win a raffle if he bought 3 of the 1000 tickets that were sold.
7. Virginia wants to know how likely it is for her to win a backgammon game if she only needs to roll a double six to win.
8. Emre wants to see how many students drive a hybrid car. He surveys 100 college freshmen at a Winter Welcome event and asks what kind of car they drive.

 **APPLICATIONS**

Calculate each empirical probability. Round your answer to the nearest millionth when necessary.

9. A news organization asked a selection of voters exiting a polling place their age bracket in order to paint a picture of turnout on election day. Here's the record of the results collected so far.

| Voting Age | | | |
|------------|-------|-------|--------------|
| 17–29 | 30–44 | 45–64 | 65 and Older |
| 9 | 8 | 32 | 15 |

- What is the probability that the next voter to exit will be between 30 and 44?
 - What is the probability that the next voter to exit will be in either of the youngest two age groups?
 - What is the probability that the next voter to exit will be under 65?
10. The blood types of 200 people are collected at a doctor's office. The table shows the breakdown of patients per blood type. Based on the data in the table, what is the probability that a new patient will have type O blood?

| Blood Type Survey Results | |
|---------------------------|--------------------|
| Blood Type | Number of Patients |
| A | 50 |
| B | 65 |
| O | 70 |
| AB | 15 |

11. As students were exiting the student center on campus, Vicki took note whether they were listening to headphones. The table shows results that she collected. Based on Vicki's data, what is the probability that a randomly selected student will have headphones on when exiting the student center?

| Data for Students Exiting the Student Center | |
|--|--------------------|
| | Number of Students |
| Headphones | 33 |
| No Headphones | 51 |

12. A sample of 500 active-duty military showed that 82 of them suffered from post-traumatic stress disorder (PTSD). However, 95 of those studied reported that they would be too embarrassed to seek mental health services.
- Based on this sample, if a soldier is chosen at random, what is the probability that he/she suffers from PTSD?
 - Based on this sample, if a soldier is chosen at random, what is the probability that he/she would be willing to seek mental health services?

Use classical probability to calculate each probability. Assume individual outcomes are equally likely. Round your answer to the nearest millionth when necessary.

13. What is the probability that, out of 235 attendees (including yourself) at a conference, you are selected to win the door prize at the opening session?
14. A standard die is rolled.
 - a. Find the probability that the roll produces a number less than 3.
 - b. Find the probability that the number rolled is an even number.
 - c. Find the probability that the number rolled is greater than 0.
15. On an American roulette wheel, there are 18 red pockets, 18 black pockets, and 2 green pockets. What is the probability of landing on a red pocket?
16. The table shows a breakdown for all employees on nonfarm payrolls in the United States during March 2014 (the values are not seasonally adjusted).

| Employees on Nonfarm Payrolls (in Thousands), March 2014 | | |
|---|--|------------------------------------|
| | Area of Employment | Number of Employees (in Thousands) |
| Private Sector | Goods-Producing | 18,558.2 |
| | Wholesale Trade | 5803.7 |
| | Retail Trade | 15,004.0 |
| | Transportation and Warehousing | 4524.8 |
| | Utilities | 550.3 |
| | Information | 2653.0 |
| | Financial Activities | 7870.0 |
| | Professional and Business Services | 18,832.0 |
| | Education and Health Services | 21,481.0 |
| | Leisure and Hospitality | 14,143.0 |
| | Other Private Service-Providing Services | 5464.0 |
| Public Sector | Federal Government | 2705.0 |
| | State Government | 5217.0 |
| | Local Government | 14,341.0 |
| | Total Nonfarm Employees | 137,147.0 |
| Source: Bureau of Labor Statistics. "Table B-1. Employees on nonfarm payrolls by industry sector and selected industry detail." Accessed June 2014. http://www.bls.gov/news.release/empsit.t17.htm | | |

- a. Find the probability that a random nonfarm employee was employed in the leisure and hospitality sector during March 2014.
 - b. Find the probability that a random nonfarm employee was in the public sector during March 2014.
17. What is the probability that a card drawn randomly from a standard deck of cards will be an ace?
 18. A book contains 321 pages numbered 1, 2, 3, ..., 321. If a student randomly opens the book, what is the probability that the page has a two- or three-digit number and all of its digits are the same?

19. Consider parents with four biological children. Find the probability that all four siblings are boys.
20. Mason has 213 songs on his iPod. He's categorized them in the following manner: 20 from sound tracks, 8 spiritual, 31 jazz, 16 Latin American, 27 R&B, 47 rock, and 64 pop. If Mason puts his iPod on shuffle, what is the probability that the first song played is a pop song?
21. Landon decided to play a joke on his friends at work. When he stocked the vending machine with sodas, he randomly put the drinks into the different slots. If he put in 15 Diet Coke, 15 Coke, 12 Sprite, 17 Dr. Pepper, and 10 Fanta cans, what is the probability that the next person will get a Fanta drink when they put their money into the machine?