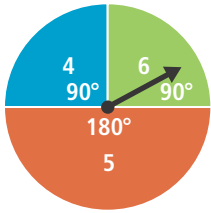




UNDERSTAND

11. **Communicate Precisely** Explain what it means for a coin to be a fair coin.
12. **Reason** You spin the spinner shown.



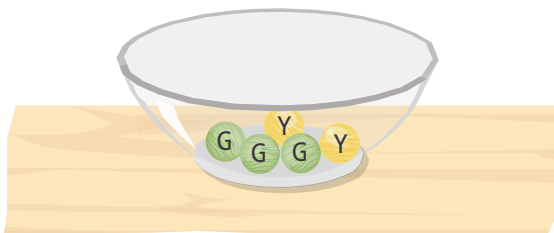
Describe a theoretical probability distribution for the experiment.

13. **Communicate Precisely** Five students in a class of 27 students ate hamburgers for lunch. Suppose the teacher selects a student in the class at random and then selects another student at random. Success for each selection is selecting a student who ate a hamburger. Is this a binomial experiment? Explain.
14. **Error Analysis** A standard number cube is rolled 7 times. Success for each roll is defined as getting a number less than 3. Abby tried to calculate the probability of 5 successes. Describe and correct her error.

$$P(5) = \left(\frac{1}{3}\right)^5 \left(\frac{2}{3}\right)^2 \approx 0.002$$

X

15. **Mathematical Connections** A marble is selected from the bowl shown 4 times. The marble is returned to the bowl after each selection.



- a. Show that there are exactly ${}_4C_2$ ways to get exactly 2 green marbles.
- b. How are ${}_5C_3$ and ${}_5C_2$ related? Explain.

PRACTICE

A card is chosen at random from the box containing 10 cards: 3 yellow, 4 red, 2 green, and 1 blue. SEE EXAMPLES 1 AND 2

16. Define a probability distribution for this experiment on the sample space $\{Y, R, G, B\}$.
17. Graph the probability distribution.

In a certain game, the player can score 0, 1, 2, 3, or 4 points during their turn. The table shows the number of times Kennedy scored each number of points the last time she played the game.

SEE EXAMPLE 2

| Score | 0 | 1 | 2 | 3 | 4 |
|-----------|---|---|---|---|---|
| Frequency | 3 | 7 | 9 | 6 | 5 |

18. Define an experimental probability distribution based on Kennedy's scores.
19. Graph the probability distribution you defined in Exercise 18.

Is the experiment a binomial experiment? Explain.

SEE EXAMPLE 3

20. A quality control specialist tests 50 LED light bulbs produced in a factory. Success is that a tested light bulb burns for at least 2,000 hours without dimming. For each light bulb, the probability of success is 0.9.
21. There are 10 black and 10 red cards face down on the table. One card is selected at random. Then another card is selected at random. Success is getting a red card.
22. A basketball player is shooting 2 free throws. The probability of her making the first free throw is 0.86. The probability of her making the second free throw is 0.92.

Each time Bailey is at bat, the probability that he gets a hit is 0.250. If he bats 10 times in the course of two games, what is the probability of each result? Round to the nearest tenth of a percent. SEE EXAMPLE 4

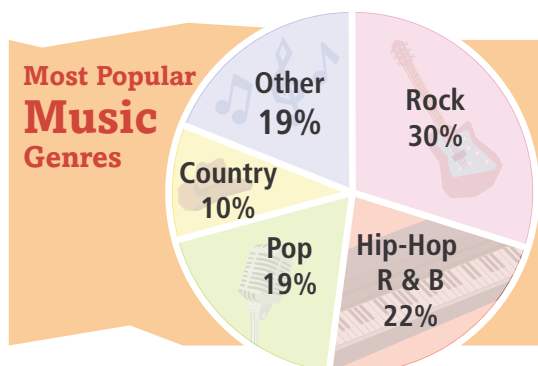
23. He gets no hits.
24. He gets exactly 1 hit.
25. He gets exactly 2 hits.
26. He gets fewer than 3 hits.





APPLY

27. **Model with Mathematics** The circle graph shows the result of a survey of the most popular types of music in the U.S., based on sales, downloads, and streaming.



- Define a probability distribution for the sample space.
 - Graph the probability distribution.
 - According to the survey, which is the most popular type of music in the United States?
28. **Higher Order Thinking** A pharmaceutical company is testing a new version of a medication. In a clinical trial of the old version of the medication, 18% of the subjects taking the old medication experienced headaches.
- Suppose that 18% of the people taking the new medications will experience headaches. If 8 subjects are selected at random and given the new medication, what is the probability that less than two of them will experience headaches?
 - Suppose that two of the eight subjects experience headaches after taking the new medication. Is that cause for concern? Explain your reasoning.
29. **Communicate Precisely** In a quiz show, a contestant is asked 6 questions. Each question has 5 answer choices. Assume that the contestant picks an answer at random for each question and the probability of guessing the correct answer is 20%. What is the probability of guessing correctly on at least 4 of the questions? Round your answer to the nearest tenth of a percent.



ASSESSMENT PRACTICE

30. You are going to roll a game piece two times. The game piece has 10 sides of equal area, each with one of the numbers 0 through 9. Assume that it is equally likely to land with any of the sides on top. Success is defined as getting a 3 on top.



Let P be the function defined on $\{0, 1, 2\}$ such that $P(n)$ is the probability of n successes. Select all that apply.

- This is a binomial experiment.
 - P is a probability distribution for the sample space $\{0, 1, 2\}$.
 - $P(0) = 0.81$
 - $P(1) = 0.09$
 - $P(2) = 0.01$
31. **SAT/ACT** A standard number cube is rolled 6 times. Success is defined as getting a number greater than 4. Rounded to the nearest percent, what is the probability of exactly 2 successes?
- Ⓐ 2% Ⓑ 8% Ⓒ 23% Ⓓ 33% Ⓔ 50%
32. **Performance Task** Get 5 index cards. Draw a picture on one side and no picture on the other side of each card.

Part A You are going to throw all 5 cards up in the air and count the number of cards that land face up. Assume that it is equally likely that each card will land face up and face down. Define a theoretical probability distribution for the sample space $\{0, 1, 2, 3, 4, 5\}$.

Part B Perform the experiment 20 times. Each time you perform the experiment, record the number of cards that land face up. Find the experimental probability for each outcome in the sample space $\{0, 1, 2, 3, 4, 5\}$ and define an experimental probability distribution the sample space.

Part C Compare the results of Part A and B. If they are different, explain why you think they are different.