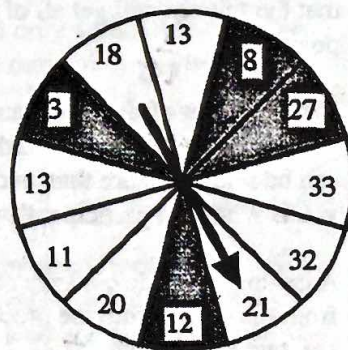


Exercises for Section 1.2

1. A six sided fair die is rolled. Find the probability that the die shows:
- (a) a 5. $\frac{1}{6}$ (d) an even number. $\frac{1}{2}$
 (b) a number smaller than 6. $\frac{5}{6}$ (e) a number greater than 2. $\frac{4}{6}$
 (c) a 3 or a 4. $\frac{1}{3}$ (f) any number except 5. $\frac{5}{6}$
2. A card is drawn from a well-shuffled standard deck of 52 cards. Find the probability of drawing:
- (a) a 4. $\frac{1}{13}$ (g) a 4 or a queen. $\frac{9}{13}$
 (b) a black card. $\frac{1}{2}$ (h) a red 5 or a black 9. $\frac{1}{13}$
 (c) a red 7. $\frac{1}{26}$ (i) a heart or a diamond. $\frac{1}{2}$
 (d) a spade. $\frac{1}{4}$ (j) a red face card. $\frac{3}{26}$
 (e) the 6 of spades. $\frac{1}{52}$ (k) a 4, 5, 6, or 7. $\frac{4}{13}$
 (f) a face card. $\frac{3}{13}$ (l) anything except an ace, king, or queen. $\frac{29}{52}$
3. A jar contains 4 blue, 5 red, 8 green and 1 yellow marble. If one marble is drawn at random from the jar, find the probability that the marble is:
- (a) blue. $\frac{2}{9}$ (e) not blue. $\frac{7}{9}$
 (b) red. $\frac{5}{18}$ (f) not red. $\frac{13}{18}$
 (c) green. $\frac{4}{9}$ (g) red or green. $\frac{13}{18}$
 (d) yellow. $\frac{1}{18}$ (h) blue or yellow. $\frac{5}{18}$
4. A letter is chosen at random from the word BANANA. Find the probability that the letter is:
- (a) an A. $\frac{1}{3}$ (d) a consonant. $\frac{1}{3}$
 (b) an N. $\frac{1}{3}$ (e) not a B. $\frac{5}{6}$
 (c) an A or an N. $\frac{5}{6}$
5. For the spinner shown at right, find the probability of spinning a number that is:
- (a) odd. $\frac{7}{12}$ (d) prime. $\frac{1}{3}$
 (b) in a shaded sector. $\frac{1}{3}$ (e) a multiple of 3. $\frac{1}{3}$
 (c) even and in a white sector. $\frac{1}{4}$ (f) 13. $\frac{1}{6}$
6. One hundred Ping-Pong balls are placed in a box. Fifteen of the balls are numbered (one number per ball) from 1 to 15 while the rest of them are not numbered. In a contest, participants are invited to draw one ball from the box with the promise of winning an amount of money equal to the number shown on the ball. If the ball that is drawn is not numbered, the participant must pay \$1.00. Expressing your answer as a decimal, find the probability that a contestant:
- (a) must pay \$1.00. 0.85 (c) wins more than \$10.00. 0.05
 (b) wins \$15.00. 0.01 (d) wins less than \$5.00 or has to pay. 0.89
7. A red and a green die are rolled. Chart or graph the sample space, and find the probability that:
- (a) the sum of the dice is 8. $\frac{5}{36}$ (d) both dice show the same number. $\frac{1}{6}$
 (b) the sum of the dice is greater than 8. $\frac{5}{18}$ (e) the number on the red die is larger than the number on the green die. $\frac{5}{12}$
 (c) the sum of the dice is less than 7. $\frac{5}{12}$ (f) the numbers on the dice differ by 1. $\frac{5}{18}$



Chapter 1 Probability And The Binomial Theorem

8. If all of the letters of the word ABOUT are arranged at random in a line, find the probability that the arrangement will:
- (a) spell the word ABOUT. $\frac{1}{120}$
 - (b) not spell the word ABOUT. $\frac{119}{120}$
 - (c) start and end with a vowel. $\frac{3}{10}$
 - (d) start and end with a consonant. $\frac{1}{10}$
 - (e) begin with AB. $\frac{1}{20}$
 - (f) have the A at either end and the O in the middle. $\frac{1}{10}$
 - (g) have the three vowels together. $\frac{3}{10}$
 - (h) have the two consonants side by side. $\frac{4}{10}$
 - (i) not have the two consonants side by side. $\frac{3}{5}$

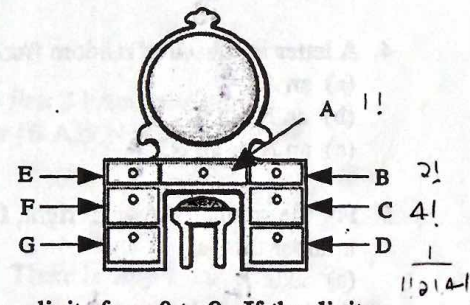
$\frac{2 \cdot 3 \cdot 2 \cdot 1 \cdot 1}{120}$

9. If all of the letters of the word BANANA are placed at random in a row, find the probability that the resulting word:
- (a) starts with a B. $\frac{1}{6}$
 - (b) starts with AA. $\frac{1}{5}$
 - (c) starts and ends in N. $\frac{1}{5}$
 - (d) starts with a consonant and ends in a vowel. $\frac{3}{10}$
 - (e) has consonants and vowels alternating. $\frac{1}{10}$

$\frac{A A \dots}{5!}$
 $\frac{2! 3!}{60}$

10. Al, Ben, Charles, Dianne, Ellen, and Faye are seated at random around a circular table. Find the probability that:
- (a) Dianne sits next to Al.
 - (b) Dianne does not sit next to Al.
 - (c) the boys and girls alternate.
 - (d) each boy is directly opposite a girl.
 - (e) Al does not sit beside a girl.
 - (f) the boys are all together and the girls are all together.

11. Thieves broke into a house and removed the drawers from a dresser in search of money. After searching through the drawers, they replaced them in the dresser, however they had forgotten which drawer went where. If drawers E and B are interchangeable with each other, as are drawers C, D, F, and G, determine the probability that the thieves will get all of the drawers back in their original positions.



12. In one format of the lotto game PICK 3, participants must select three digits from 0 to 9. If the digits you select are in the exact order as the digits selected by the Lottery Corporation, you win. The digits can be selected more than once (but don't have to be) so choices of 777, 000, 090, 445, and 813 are valid. What is a participant's probability of winning if just one set of three digits is picked?

13. A carton of one dozen eggs contains three that are rotten. If a set of two eggs is chosen at random from the carton, find the probability of selecting:

- (a) two rotten eggs. $\frac{1}{22}$
- (b) two good eggs. $\frac{6}{11}$
- (c) 1 rotten egg and 1 good egg. $\frac{9}{22}$

14. A jar contains 3 blue, 4 green, and 5 yellow marbles. If a set of three marbles is chosen at random from the jar, find the probability that your selection contains:

- (a) 3 blue marbles. $\frac{1}{220}$
- (b) 3 green marbles. $\frac{4}{55}$
- (c) 3 yellow marbles. $\frac{1}{22}$
- (d) no blue marbles. $\frac{21}{55}$
- (e) no green marbles. $\frac{14}{55}$
- (f) no yellow marbles. $\frac{7}{44}$
- (g) 3 marbles, not all of which are blue. $\frac{219}{220}$
- (h) 3 marbles, not all of which are green. $\frac{54}{55}$
- (i) 1 marble of each color. $\frac{3}{11}$
- (j) at least 1 blue marble. $\frac{21}{55}$
- (k) at least 1 yellow marble. $\frac{37}{44}$
- (l) at least 2 green marbles. $\frac{13}{55}$

$\frac{4C_2 3C_1 + 4C_3}{12C_3}$