

Now we can fill in the numbers in the numerator and the denominator of our probability fraction.

$$P(1 \text{ man}, 2 \text{ women}) = \frac{\text{number of ways of selecting 1 man and 2 women}}{\text{total number of possible combinations}} = \frac{{}_5C_1 \cdot {}_7C_2}{{}_{12}C_3} = \frac{105}{220} = \frac{21}{44}$$

The probability that the group selected to attend the conference consists of one man and two women is $\frac{21}{44}$.



A club consists of six men and four women. Three members are selected at random to attend a conference. Find the probability that the selected group consists of

- a. three men.
- b. two men and one woman.

EXERCISE SET 11.5 ●●●●●●

• Practice and Application Exercises

1. Martha, Lee, Nancy, Paul, and Armando have all been invited to a dinner party. They arrive randomly and each person arrives at a different time.
 - a. In how many ways can they arrive?
 - b. In how many ways can Martha arrive first and Armando last?
 - c. Find the probability that Martha will arrive first and Armando last.
2. Three men and three women line up at a checkout counter in a store.
 - a. In how many ways can they line up?
 - b. In how many ways can they line up if the first person in line is a woman, and then the line alternates by gender—that is a woman, a man, a woman, a man, and so on?
 - c. Find the probability that the first person in line is a woman and the line alternates by gender.
3. Six stand-up comics, A, B, C, D, E, and F, are to perform on a single evening at a comedy club. The order of performance is determined by random selection. Find the probability that
 - a. Comic E will perform first.
 - b. Comic C will perform fifth and comic B will perform last.
 - c. The comedians will perform in the following order: D, E, C, A, B, F.
 - d. Comic A or comic B will perform first.
4. Seven performers, A, B, C, D, E, F, and G, are to appear in a fund raiser. The order of performance is determined by random selection. Find the probability that
 - a. D will perform first.
 - b. E will perform sixth and B will perform last.
 - c. They will perform in the following order: C, D, B, A, G, F, E.
 - d. F or G will perform first.
5. A group consists of four men and five women. Three people are selected to attend a conference.
 - a. In how many ways can three people be selected from this group of nine?
 - b. In how many ways can three women be selected from the five women?
 - c. Find the probability that the selected group will consist of all women.
6. A political discussion group consists of five Democrats and six Republicans. Four people are selected to attend a conference.
 - a. In how many ways can four people be selected from this group of eleven?
 - b. In how many ways can four Republicans be selected from the six Republicans?
 - c. Find the probability that the selected group will consist of all Republicans.
7. To play the California lottery, a person has to correctly select 6 out of 51 numbers, paying \$1 for each six-number selection. If the six numbers picked are the same as the ones drawn by the lottery, mountains of money are bestowed. What is the probability that a person with one combination of six numbers will win? What is the probability of winning if 100 different lottery tickets are purchased?
8. A state lottery is designed so that a player chooses five numbers from 1 to 30 on one lottery ticket. What is the probability that a player with one lottery ticket will win? What is the probability of winning if 100 different lottery tickets are purchased?
9. A box contains 25 transistors, 6 of which are defective. If 6 are selected at random, find the probability that
 - a. all are defective.
 - b. none are defective.
10. A committee of five people is to be formed from six lawyers and seven teachers. Find the probability that
 - a. all are lawyers.
 - b. none are lawyers.

11. A city council consists of six Democrats and four Republicans. If a committee of three people is selected, find the probability of selecting one Democrat and two Republicans.
12. A parent-teacher committee consisting of four people is to be selected from fifteen parents and five teachers. Find the probability of selecting two parents and two teachers.

Exercises 13–18 involve a deck of 52 cards. If necessary, refer to the picture of a deck of cards, Figure 11.5 on page 629.

13. A poker hand consists of five cards.
- Find the total number of possible five-card poker hands.
 - A diamond flush is a five-card hand consisting of all diamonds. Find the number of possible diamond flushes.
 - Find the probability of being dealt a diamond flush.
14. A poker hand consists of five cards.
- Find the total number of possible five-card poker hands.
 - Find the number of ways in which four aces can be selected.
 - Find the number of ways in which one king can be selected.
 - Use the Fundamental Counting Principle and your answers from parts (b) and (c) to find the number of ways of getting four aces and one king.
 - Find the probability of getting a poker hand consisting of four aces and one king.
15. If you are dealt 3 cards from a shuffled deck of 52 cards, find the probability that all 3 cards are picture cards.
16. If you are dealt 4 cards from a shuffled deck of 52 cards, find the probability that all 4 are hearts.
17. If you are dealt 4 cards from a shuffled deck of 52 cards, find the probability of getting two queens and two kings.
18. If you are dealt 4 cards from a shuffled deck of 52 cards, find the probability of getting three jacks and one queen.

• Writing in Mathematics

19. If people understood the mathematics involving probabilities and lotteries, as you now do, do you think they would continue to spend hundreds of dollars per year on lottery tickets? Explain your answer.
20. Write and solve an original problem involving probability and permutations.

21. Write and solve an original problem involving probability and combinations whose solution requires $\frac{{}^{14}C_{10}}{{}^{20}C_{10}}$.

• Critical Thinking Exercises

22. An apartment complex offers apartments with four different options, designated by A through D. There are an equal number of apartments with each combination of options.

A	B	C	D
one bedroom two bedrooms three bedrooms	one bathroom two bathrooms	first floor second floor	lake view golf course view no special view

If there is only one apartment left, what is the probability that it is precisely what a person is looking for, namely two bedrooms, two bathrooms, first floor, and a lake or golf course view?

23. Reread Exercise 7. How much must a person spend so that the probability of winning the California lottery is $\frac{1}{2}$?
24. Suppose that it is a week in which the cash prize in Florida's LOTTO is promised to exceed \$50 million. If a person purchases 22,957,480 tickets in LOTTO at \$1 per ticket (all possible combinations), isn't this a guarantee of winning the lottery? Because the probability in this situation is 1, what's wrong with doing this?
25. The digits 1, 2, 3, 4, and 5 are randomly arranged to form a three-digit number. (Digits are not repeated.) Find the probability that the number is even and greater than 500.
26. In a five-card poker hand, what is the probability of being dealt exactly one ace and no picture cards?

• Group Exercise

27. Research and present a group report on state lotteries. Include answers to some or all of the following questions. As always, make the report interesting and informative. Which states do not have lotteries? Why not? How much is spent per capita on lotteries? What are some of the lottery games? What is the probability of winning top prize in these games? What income groups spend the greatest amount of money on lotteries? If your state has a lottery, what does it do with the money it makes? Is the way the money is spent what was promised when the lottery first began?