

Solve the problem by applying the Fundamental Counting Principle with two groups of items.

1. A restaurant offers 10 entrees and 6 desserts. In how many ways can a person order a two-course meal?
2. An apartment complex offers apartments with four different options, designated by A through D.

A = number of bedrooms (one through four)
 B = number of bathrooms (one through three)
 C = floor (first through fifth)
 D = outdoor additions (balcony or no balcony)

How many apartment options are available?

3. License plates in a particular state display 2 letters followed by 4 numbers. How many different license plates can be manufactured? (Repetitions are allowed.)

Answers
1)
2)
3)
4)
5)
6)
7)

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

4. Jamie is joining a music club. As part of her 4-CD introductory package, she can choose from 12 rock selections, 10 alternative selections, 7 country selections and 5 classical selections. If Jamie chooses one selection from each category, how many ways can she choose her introductory package?

Use the Fundamental Counting Principle to solve the problem.

5. There are 6 performers who are to present their acts at a variety show. How many different ways are there to schedule their appearances?

Use the formula for n^P_r to solve.

6. A church has 10 bells in its bell tower. Before each church service 4 bells are rung in sequence. No bell is rung more than once. How many sequences are there?

Solve the problem.

7. In how many distinct ways can the letters in ENGINEERING be arranged?

In the following exercises, does the problem involve permutations or combinations? Explain your answer. It is not necessary to solve the problem.

8. A record club offers a choice of 7 records from a list of 45. In how many ways can a member make a selection?

9. One hundred people purchase lottery tickets. Three winning tickets will be selected at random. If first prize is \$100, second prize is \$50, and third prize is \$25, in how many different ways can the prizes be awarded?

Answers
8)
9)
10)
11)
12)
13)

Use the formula for nC_r to evaluate the expression.

10. From 8 names on a ballot, a committee of 3 will be elected to attend a political national convention. How many different committees are possible?

11. In how many ways can a committee of three men and four women be formed from a group of 12 men and 12 women?

Use the theoretical probability formula to solve the problem. Express the probability as a fraction reduced to lowest terms.

12. You are dealt one card from a standard 52-card deck. Find the probability of being dealt an ace or a 9.

13. A die is rolled. The set of equally likely outcomes is {1, 2, 3, 4, 5, 6}. Find the probability of getting a 4.

Use the empirical probability formula to solve the exercise. Express the answer as a fraction or as a decimal, rounded to the nearest thousandth, if necessary.

14. The table below represents a random sample of the number of deaths per 100 cases for a certain illness over time. If a person infected with this illness is randomly selected from all infected people, find the probability that the person only lives 3-4 years after diagnosis.

Years after Diagnosis	Number deaths
1-2	15
3-4	35
5-6	16
7-8	9
9-10	6
11-12	4
13-14	2
15+	13

Answers

14)

15)

16)

17a)

17b)

17c)

15. In 1999 the stock market took big swings up and down. A survey of 996 adult investors asked how often they tracked their portfolio. The table shows the investor responses. What is the probability that an adult investor tracks his or her portfolio daily?

How frequently?	Response
Daily	222
Weekly	281
Monthly	292
Couple times a year	140
Don't track	61

Solve the problem.

16. Amy, Jean, Keith, Tom, Susan, and Dave have all been invited to a birthday party. They arrive randomly and each person arrives at a different time. In how many ways can they arrive? In how many ways can Jean arrive first and Keith last? Find the probability that Jean will arrive first and Keith will arrive last.
17. Six students, A, B, C, D, E, F, are to give speeches to the class. The order of speaking is determined by random selection. Find the probability that (a) E will speak first (b) that the students will speak in the following order: DECABF (c) that A or B will speak first.

18. A committee consisting of 6 people is to be selected from eight parents and four teachers. Find the probability of selecting three parents and three teachers.

19. If you are dealt 6 cards from a shuffled deck of 52 cards, find the probability of getting 3 jacks and 3 aces.

Answers
18)
19)
20)
21)
22)

You are dealt one card from a 52-card deck. Find the probability that you are not dealt:

20. a heart.

The chart shows the probability of a certain disease for men by age. Use the information to solve the problem. Express all probabilities as decimals, estimated to two decimal places.

Age	Probability of Disease X
20-24	less than 0.008
25-34	0.009
35-44	0.14
45-54	0.39
55-64	0.42
65-74	0.67
75+	0.79

21. What is the probability that a randomly selected man between the ages of 55 and 64 does not have this disease?

You randomly select one card from a 52-card deck. Find the probability of selecting:

22. An ace or an 8?

Solve the problem that involves probabilities with events that are not mutually exclusive.

23. In a class of 50 students, 31 are Democrats, 13 are business majors, and 3 of the business majors are Democrats. If one student is randomly selected from the class, find the probability of choosing a Democrat or a business major.

One card is randomly selected from a deck of cards. Find the odds:

24. in favor of getting a spade.

25. against getting a red queen.

Answers
23)
24)
25)
26)
27)
28)
29)

Solve the problem involving probabilities with independent events.

26. A single die is rolled twice. Find the probability of getting a 3 the first time and a 5 the second time.

Solve the problem that involves probabilities with events that are not mutually exclusive.

27. An ice chest contains 5 cans of apple juice, 7 cans of grape juice, 6 cans of orange juice, and 2 cans of pineapple juice. Suppose that you reach into the container and randomly select three cans in succession. Find the probability of selecting no grape juice.

Numbered disks are placed in a box and one disk is selected at random.

28. If there are 6 red disks numbered 1 through 6, and 4 yellow disks numbered 7 through 10, find the probability of selecting a yellow disk, given that the number selected is less than or equal to 3 or greater than or equal to 8.

The table shows the number of employed and unemployed workers in the U.S., in thousands, in 2000.

	Employed	Unemployed
Male	67,761	2433
Female	58,655	2285

Assume that one person will be randomly selected from the group described in the table.

29. Find the probability of selecting a person who is employed, given that the person is male.

A spinner has a pointer which can land on one of three regions labelled 1, 2, and 3 respectively.

30. Compute the expected value for the number on which the pointer lands if the probabilities for the three regions are $\frac{1}{2}$, $\frac{1}{5}$, and $\frac{3}{10}$ respectively.

Answers
30)
31)
32)
33)

Solve the problem.

31. An architect is considering bidding for the design of a new shopping mall. The cost of drawing plans and submitting a model is \$10,000. The probability of being awarded the bid is 0.12, and anticipated profits are \$100,000, resulting in a possible gain of this amount minus the \$10,000 cost for plans and a model. What is the expected value in this situation?

Solve the problem that involves computing expected values in a game of chance.

32. One option in a roulette game is to bet on red. (There are 18 red compartments, 18 black compartments, and two compartments that are neither red nor black.) If the ball lands on red, you get to keep the \$4 that you paid to play the game and you are awarded \$4. If the ball lands elsewhere, you are awarded nothing and the \$4 that you bet is collected. Find the expected value for playing roulette if you bet \$4 on red.

Solve the problem.

33. A 25 year old can purchase a one-year life insurance policy for \$10,000 at a cost of \$100. Past history indicates that the probability of a person dying at age 25 is 0.0017. Determine the company's expected gain per policy.