

Probability Review

1. If two dice are rolled and their faces noted, find each of the following probabilities:
 - a) the sum of the two dice is 8
 - b) both dice show even numbers
 - c) the sum of the two dice is 8 OR both dice show even numbers
 - d) one die is even and the other is odd
2. In an archery tournament the probability that Sandy will hit the bullseye is 0.85 and the probability that Adam will hit it is 0.70. Find each of the following:
 - a) the probability that Adam hits the bullseye and Sandy doesn't
 - b) the probability that neither hits the bullseye
3. Two dice are rolled and their faces noted. Find each of the following probabilities.
 - a) the sum of the numbers is 7, given that at least on die shows a 5
 - b) the sum of the numbers is 7, given that exactly one die shows a 5
4. Six people are asked to pick a number from 1 to 20. What is the probability that at least two people will pick the same number?
5. An experiment consists of taking one card from a regular 52 card deck. What is the probability that:
 - a) the card chosen will be a diamond.
 - b) the card chosen will not be a jack or a king
 - c) the card chosen will be a diamond or an ace.

An experiment consists of drawing three cards one after another with replacement between draws. What is the probability:

- a) of drawing a spade, a five, and a red card in that order
6. A committee of 4 is selected from 8 boys and 7 girls. What is the probability that the committee:
 - a) has exactly two boys
 - b) is all male or all female
 - c) has at least one female
 7. When two dice are rolled calculate the probability of rolling:
 - a) a sum of 6 or 9
 - b) a sum greater than 6 if the first die is a 4
 - c) a sum less than 8 if one of the dice is a 3
 8. Determine the probability that a number chosen at random between 1 and 100 inclusive is not divisible by 3 or 7.
 9. Given $P(M|N) = \frac{1}{3}$, $P(M) = \frac{2}{3}$, $P(N) = \frac{1}{6}$, determine whether M and N are independent events.
 10. While Miss Gerrits is taking her attendance to the office, Julio, John and Gary are having a competition to see who can throw their last Finite test into the garbage. Their probabilities of hitting the basket are 0.6, 0.2 and 0.4 respectively. Find the probability that:
 - a) only John hits the garbage
 - b) exactly two of the students hit the garbage
 - c) none of the students hit the garbage

11. A manufacturer of calculators would like to separate defective calculators from calculators that are acceptable. Through an error, a shipment of twelve calculators is sent out containing three defective calculators and nine working calculators. A customer buys five of these calculators, without testing them.
 - a) What is the probability that all five will be acceptable?
 - b) What is the probability that two will be defective and three acceptable?
12. In the game of poker, a hand of five cards is dealt to each player from a deck of 52 cards.
 - a) Find the probability of a hand containing a spade flush (where all five cards are spades).
 - b) Find the probability of a hand containing a full house of three kings and two fives.
13. A bag contains five white balls, three green balls and eight red balls. You take out two balls at the same time.
 - a) What is the probability that the two will be green?
 - b) What is the probability that the two will be red?
14. Your name, along with nine others, is put in a hat. Four names are drawn at random to determine the winners of four identical prizes. What is the probability that your name will appear?
15. As a joke, your brother went through the kitchen cupboards and removed all of the labels from your soup cans. He took labels off of three pea soup cans, five vegetable soup cans and four onion soup cans. You need two cans of onion soup to make your favourite stew. What is the probability that the two cans you grab (at random) will both contain onion soup?
16. You are hired by your boss to conduct a survey on unemployment, crime, taxes and mail delivery. You make up a question on each of the topics for the survey sheet. If the questions are arranged in random order on the sheet, find the probability of the following:
 - a) the question about mail delivery will be first
 - b) the question about mail delivery will be first and the question on crime will be second.
17. There are five black mice and five white mice available for an experiment. A random selection is made from the set of ten mice. What is the probability that two black mice and one white mouse will be selected?
18. You have two boxes. The first box contains six red balls and four white balls. The second box contains five black balls and six green balls. One ball is selected at random from each box. What is the probability that the balls chosen will be white and black?
19. Six slips of paper, with a different digit from 1 to 6 printed on each, are placed in a box. The papers are well mixed. One slip is drawn and replaced. The papers are well mixed, and a second slip is drawn. Find the probability of each of the following:
 - a) The first is marked with an odd number and the second with an even number.
 - b) The first is marked with a four and the second with a number less than four.
 - c) Both slips are marked with an even number.
20. Two traffic lights operate independently of each other. the probability of being stopped at the first light is 0.2 and the probability of being stopped at the second is 0.6. Find the probability of each of the following:
 - a) you will stop at both lights
 - b) you will go through both lights
 - c) you will be stopped at the first but not the second light.

21. Hospitals contain backup generators in case of power failure. A hospital has two backup generators each of which has a 2% probability of failure. Only one generator is needed to supply emergency power. What is the probability that the backup system will work in the case of a power failure?
22. You are writing a multiple choice test. Every question has five choices, only one of which is correct. You have no idea how to answer three questions. What is the probability that you will get all three of these questions correct if you guess the answers?
23. If a dark-haired mother and father have a particular type of gene than the probability that any child that they have will be light-haired is 0.25. such a couple decides to have three children. What is the probability that all three children will have light hair?
24. If two dice are rolled and their faces noted, find each of the following probabilities:
- the sum of the two dice is 8
 - both dice show even numbers
 - the sum of the two dice is 8 OR both dice show even numbers
 - the sum of the numbers is 7, given that at least one die shows a 5
 - the sum of the numbers is 7, given that first die shows a 5
 - the sum is greater than 8 if the first die is a 6
25. Carol decides to have some friends over for dinner. Of her friends, she would like to invite 6 males and 8 females but her table only seats 8. Assuming that Carol will be at the table, what is the probability that:
- there will be four males and four females?
 - Gary and Tom will be there?
 - there will be at least one male present?
26. In an archery tournament the probability that Grace will hit the bullseye is 0.85 and the probability that Adam will hit it is 0.70. Find each of the following:
- the probability that Adam hits the bullseye and Grace doesn't
 - only one hits the bullseye
 - the probability that neither hits the bullseye
27. Six people are asked to pick a number from 1 to 20. What is the probability that at least two people will pick the same number?
28. Two dice are tossed. What is the probability of each of the following events?
- rolling a sum of 6
 - rolling a sum of 11
 - rolling a sum of 6 or 11
 - rolling a sum greater than 7
29. Two dice are tossed. What is the probability of each of the following?
- At least one die shows a 5
 - At least one die shows an odd number
 - Both dice show the same number
30. One die is tossed. What is the probability of each of the following?
- An odd number appears on the up face
 - A prime number appears on the up face
 - Either an odd number or a prime number appears on the up face.

31. A game is played in which two dice are tossed. You win if a sum of 5 or 9 occurs. You lose if a sum of 3 or 7 occurs. Find the following
- the probability that you win
 - the probability that you lose
 - Is this a fair game? Explain
32. You are given two dice. One die has 2 faces coloured red, 3 coloured green, and one coloured white. The other die has 4 faces coloured black, one coloured blue and one face coloured red. The two dice are tossed. Find the probability that the following colours will occur on an up face.
- green
 - black
 - green and black
 - green or black
 - red
 - green or red
33. A bag contains 2 red, 4 white and 6 black jelly beans.
- One jelly bean is drawn at random. What is the probability of drawing a red jelly bean?
 - One jelly bean is drawn and then replaced. A second jelly bean is drawn. What is the probability of drawing a red bean and then a black one?
 - One jelly bean is drawn but not replaced. Then a second jelly bean is drawn. What is the probability of drawing a red jelly bean and then a black one?
34. A coin is tossed 7 times in a row. What is the probability of getting 7 heads?
35. A coin is tossed at the same time that a die is rolled. Find the probability of each of the following occurring.
- a head on the coin and 3 on the die
 - a head on the coin or a 3 on the die
 - neither a head on the coin nor a 3 on the die
36. What is the probability of drawing two Jacks successively from a deck of 52 playing cards? Assume replacement is not made after the first draw.
37. a) What is the probability of throwing a sum of 7 with three dice?
b) What is the probability of throwing a sum of 7 or less with three dice?
38. From the integers 3 to 12 inclusive, two integers are chosen at random. Find the probability of each of the following.
- One integer is a factor of the other
 - The sum of the two integers is 15.
 - One integer is a factor of the other or their sum is 15.
39. What is the probability of throwing a sum of least one of 7, 10, or 12 with two dice?

ANSWERS

1 a) $\frac{5}{36}$ b) $\frac{1}{4}$ c) $\frac{11}{36}$ d) $\frac{1}{2}$

2 a) 0.105 b) 0.045

3 a) $\frac{2}{11}$ b) $\frac{1}{5}$

4 0.56395

5 a) $\frac{1}{4}$, $\frac{11}{13}$, $\frac{4}{13}$ b) $\frac{1}{104}$

6 a) 0.4308 b) 0.077 c) 0.9487

7 a) $\frac{1}{4}$ b) $\frac{2}{3}$ c) $\frac{7}{11}$

8 $\frac{57}{100}$

9 No

10 a) 0.048 b) 0.296 c) 0.192

11 a) .159 b) .3181

12 a) .000495198 b) .000009234

13 a) .025 b) .233

14 .4

15 .090909

16 a) $\frac{1}{4}$ b) $\frac{1}{12}$

17 .416666

18 $\frac{2}{11}$

19 a) $\frac{1}{4}$ b) $\frac{1}{12}$ c) $\frac{1}{4}$

20 a) .12 b) .32 c) .08

21 .9996

22 $\frac{1}{125}$

23 .015625

24 a) $\frac{5}{36}$ b) $\frac{1}{4}$ c) $\frac{11}{36}$ d) $\frac{2}{11}$ e) $\frac{1}{6}$ f) $\frac{2}{3}$

25 a) .2448 b) .2308 c) .9977

26 a) .105 b) .36 c) .045

27 0.56395

28 a) $\frac{5}{36}$ b) $\frac{1}{18}$ c) $\frac{7}{36}$ d) $\frac{5}{12}$

29 a) $\frac{11}{36}$ b) $\frac{3}{4}$ c) $\frac{1}{6}$

30 a) $\frac{1}{2}$ b) $\frac{1}{2}$ c) $\frac{2}{3}$

31 a) $\frac{2}{9}$ b) $\frac{2}{9}$ c) yes

32 a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{1}{3}$ d) $\frac{5}{6}$ e) $\frac{4}{9}$ f) $\frac{31}{36}$

33 a) $\frac{1}{6}$ b) $\frac{1}{12}$ c) $\frac{1}{11}$

34 $\frac{1}{128}$

35 a) $\frac{1}{12}$ b) $\frac{7}{12}$ c) $\frac{5}{12}$

36 $\frac{1}{221}$

37 a) $\frac{5}{72}$ b) $\frac{35}{216}$

38 a) $\frac{7}{45}$ b) $\frac{1}{9}$ c) $\frac{2}{9}$

39 $\frac{5}{18}$