

XI MATHEMATICS PROBABILITY

1. Two students A and B appeared in IIT examination. The probability that A will qualify the examination is 0.05 and that B will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that **i)** both A and B will not qualify the IIT examination **ii)** at least one of them will not qualify the IIT examination **iii)** only one of them will qualify the IIT examination
2. A box contains 6 red marbles numbered from 1 to 6 and 4 white numbered from 12 to 15. Find the probability that a marble drawn at random is white.
3. A ball is drawn at random from a box containing 6 blue, 8 black and 10 brown balls. Write the probability that the ball drawn is not black.
4. A box contains 10 red marbles 20 blues marbles and 30 green marbles, 5 marbles are drawn from the box, what is the probability that **(i)** all will be blue **(ii)** at least one will be green
5. In a race there are five teams A, B, C, D and E. What is the probability that A, B and C are first three to finish (in any order) (Assume that all finishing orders are equally likely).
6. Three coins are tossed once. Find the probability of getting:

(i) 3 heads	(ii) 2 heads	(iii) atleast 2 heads	(iv) atmost 2 heads	(v) no head
(vi) 3 tails	(vii) exactly two tails	(viii) no tail	(ix) atmost two tails	x) atmost 1 head
7. 4 cards are drawn from a well shuffled pack of 52 cards. What is the probability of obtaining:

i) Four cards of the same suit?	ii) all face cards?
iii) two red and two black cards?	iv) cards are of the same colour?
8. Find the probability that when a hand of 7 cards is drawn from a well shuffled pack of cards, it contains

i) all kings	ii) 3 kings	iii) at least 3 kings
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9. Three letters are dictated to three persons and an envelope is addressed to each of them, the letters are inserted into envelopes at random so that each envelope contains exactly one letter. Find the probability that atleast one letter is in its proper envelope.
10. Given $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$. Find $P(A \text{ or } B)$ if A and B are mutually exclusive events.
11. A and B are two events such that $P(A) = 0.25$, $P(B) = 0.50$ and $P(A \cap B) = 0.14$ find $P(A \text{ or } B)$
12. An integer is chosen at random from the first 200 digits. What is the probability that the integer chosen is divisible by 6 or 8.
13. If A and B are two non mutually exclusive events with $P(A) = \frac{1}{4}$, $P(B) = \frac{2}{5}$ and $P(A \cup B) = \frac{1}{2}$,

find i) $P(A \text{ and } B)$,	ii) $P(A \text{ and not } B)$,	iii) $P(\text{neither } A \text{ nor } B)$.	iv) $P(A \cap B')$	v) $P[(A \cap B)']$
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14. In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that

a) the student opted for NCC or NSS	b) the student has opted neither NCC nor NSS
c) the student has opted NSS but not NCC	
15. Give an example for an experiment, which has sample space as an infinite set.
16. Describe the sample space when a coin is tossed four times.
17. Consider the experiment in which a coin is tossed repeatedly until a head comes up. Describe the sample space.
18. One die of red colour, one of white colour and one of blue colour are placed in a bag. One die is selected at random and rolled, its colour and the number on its uppermost face is noted. Describe the sample space.
19. An experiment consists of rolling a die and then tossing a coin once if the number on the die is even. If the number on the die is odd, the coin is tossed twice. Write the sample space for this experiment.
20. If E and F are events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \text{ and } F) = \frac{1}{8}$, Find $P(\text{not } E \text{ and not } F)$.
21. If A, B, C are three events associated with a random experiment, prove that : $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$.
22. In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting a prize if you buy two tickets.
23. A and B are two events such that $P(A) = 0.54$, $P(B) = 0.69$, $P(A \cap B) = 0.35$. Find $P(A' \cap B')$ and $P(B \cap A')$.
24. A committee of two persons is selected from two men and two women. What is the probability that the committee will have (a) no man? (b) one man? (c) two men?
25. In a lottery, a person chooses six different natural numbers at random from 1 to 20, and if these six numbers match with the six numbers already fixed by the lottery committee, he wins the prize. What is the probability of winning the prize in the game?
26. A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that letter is:

(i) a vowel	(ii) a consonant.
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27. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that: **a)** Both Anil and Ashima will not qualify the examination. **(b)** At least one of them will not qualify the examination and **(c)** Only one of them will qualify the examination.
28. The number lock of a suitcase has 4 wheels, each labeled with ten digits i.e., from 0 to 9. The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?
29. The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing the English examination is 0.75, what is the probability of passing the Hindi examination?
30. On his vacations, Atul visits four countries (P, Q, R and S) in a random order. Describe the Sample Space of his visit and then find what is the probability that he visits **(i)** P just before Q? **(ii)** P either first or second **(iii)** P first and Q last **(iv)** P before Q and Q before R? **(v)** P before Q?
31. If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5 and 7. What is the probability of forming a number divisible by 5 when **i)** the digits are repeated? **ii)** the repetition of the digits are not allowed?
32. A box contains 9 red, 7 white and 4 black balls. If two balls are drawn at random, find the probability that: **i)** both balls are red; **ii)** one ball is white **iii)** balls are of the same colour. (Give the simplified answers)
33. If $P(A) = \frac{3}{4}$ and $P(B) = \frac{1}{2}$ and if A and B are mutually exclusive find $P(A \cup B)$.
34. In a class of 50 students 30 opted for Biology and 18 opted for Biotechnology. 6 students opted for both Biology and Biotechnology. If one student is selected at random, find the probability that **i)** The student opted for Biology or Biotechnology **ii)** The student has opted neither Biology nor Biotechnology **iii)** The Student has opted Biotechnology but not Biology
35. Out of 100 students two sections of 40 and 60 are formed. if you and your friend are among the 100 students, find the probability that **a)** both enter the same section **b)** both enter different sections.
36. From a well – shuffled pack of 52 cards, a card is drawn. Find the probability that it is: **i)** either a heart or a queen **ii)** either an ace of red colour or a card of black colour. **iii)** a king or a heart or a red card.
37. Two cards are drawn at random from a pack of 52 cards. What is the probability that it will be: **i)** a club and a heart **ii)** a king and a queen **iii)** two kings **iv)** two cards of same colour.
38. A and B are two exhaustive events of an experiment. If $P(\bar{A}) = 0.65$, $P(A \cup B) = 0.65$ and $P(B) = p$, find p.
39. A box contains 6 red marbles numbered from 1 through 6 and 4 white marbles numbered from 12 through 15. Find the probability that the marble drawn at random is **i)** white **ii)** white and odd numbered **iii)** even numbered **iv)** red or even numbered.
40. The letters of the word EQUATION are arranged in a row. Find the probability that all vowels are together.
41. In a single throw of three dice, find the probability of getting **i)** a total of 5 **ii)** a total of at most 5 **iii)** a total of at least 5.
42. In a single throw of two dice, find the probability that neither a doublet nor a total of 10 will appear.
43. Three light bulbs are selected at random from 20 bulbs of which 5 are defective. What is the probability that exactly one is defective?
44. Two dice are thrown together. what is the probability that the sum of the numbers on the two faces is neither divisible by 3 nor by 4?
45. A committee of 5 persons is to be constituted from a group of 6 gents and 8 ladies. If the selection is made randomly, find the probability that there are 3 ladies and 2 gents in the committee.
46. Four cards are drawn at random from a pack of 52 cards. Find the probability of getting one card from each suit.
47. A and B are two mutually exclusive events such that $P(A) = 0.5$ and $P(B) = 0.4$, then find **i)** $P(A \cup B)$ **ii)** $P(A' \cap B')$ **iii)** $P(B \cap A')$. **iv)** $P(B' \cap A)$. **v)** $P(B' \cap A')$.
48. An urn contains 5 blue and an unknown number of red balls. Two balls are drawn at random. If the probability of both being blue is $\frac{5}{14}$, find the number of red balls in the urn.
49. If a two digit number is formed with the digits 2, 3, 5, 8, 9 without repetition of digits, what is the probability that the digits used are 3 and 5?
50. Six boys and six girls sit in a row. Find the probability that all the six girls sit together.
51. A, B and C are three mutually exclusive and exhaustive events associated with a random experiment. Find $P(A)$, if $P(B) = \frac{3}{2} P(A)$ and $P(C) = \frac{1}{2} P(B)$
52. A bag contains 5 red, 4 green and 3 yellow balls. Three balls are drawn at random; find the probability of drawing exactly two red balls.
53. Six boys and six girls sit in a row. Find the probability that all the six girls sit together.

54. Two cards are drawn at random from a pack of 52 cards. Find the probability that both cards are of black colour or they are queens.
55. A bag contains 5 red, 4 green and 3 yellow balls. Three balls are drawn out of it at random. Find the probability of drawing exactly 2 red balls.
56. A bag contains 9 balls of which 4 are red, 3 are blue and 2 are yellow. The balls are similar in shape and size. A ball is drawn at random from the bag. Calculate the probability that it will be : a) red b) not blue c) either red or blue.
57. What is the probability that :
a) a non-leap year has 53 Tuesdays [Ans: 1/7] b) a leap year has 53 Fridays [Ans: 2/7]
58. A card is drawn from a pack of cards. Find the probability of getting a king or a heart or a red card.
59. An urn contains 5 blue and an unknown number of red balls. Two balls are drawn at random. If the probability of both of them being blue is $\frac{5}{14}$, find the number of red balls. [Ans: 3]
60. Two unbiased dice are thrown. Find the probability that neither a doublet nor a total of 10 will appear. [Ans: 7/9]
61. Five marbles are drawn from a bag which contains 7 blue marbles and 4 black marbles, what is the probability that
a) all will be blue b) 3 will be blue and 2 black?
62. The letters of the word EQUATION are arranged in a row. Find the probability that all vowels are together.
63. A box contains 100 bolts and 50 nuts. It is given that 50% bolts and 50% nuts are rusted. Two objects are selected from the box at random. Find the probability that both are bolts or both are rusted.