

1. If A and B are two independent events, find $P(B)$ when $P(A \cup B) = 0.60$ and $P(A) = 0.35$.
2. A card is drawn from a well shuffled pack of 52 cards. The outcome is noted and the pack is again reshuffled without replacing the card. Another card is then drawn. What is the probability that the first card is a spade and the second is a Black King.
3. Find the chance of drawing two white balls in succession from a bag containing 3 red and 5 white balls, if the ball first drawn is not replaced.
4. Given $P(A) = 0.3$, $P(B) = 0.2$. find $P(B/A)$ if A and B are mutually exclusive events.
5. Given $P(A) = 1/4$, $P(B) = 2/3$ and $P(A \cup B) = 3/4$. Are the events independent ?
6. A bag contains 5 brown and 4 white socks. A man pulls out 2 socks. Find the probability that these socks are of same colour.
7. Out of 10 consecutive integers, 2 are chosen at random. Find the probability that their sum is odd.
8. If $P(A) = 0.4$, $P(B) = p$ and $P(A \cup B) = 0.7$, find the value of p if A and B are independent events.
9. In two successive throws of a pair of dice, find the probability of getting a total of 8 each time.
10. An urn contains 9 balls, two of which are red, 3 blue and 4 black. Three balls are drawn at random. Find the probability that they are of the same color.
11. A policeman fires 4 bullets on a dacoit. The probability that the dacoit will not be killed by a bullet is 0.4. What is the probability that the dacoit is still alive?
12. 'A' speaks truth in 60% cases and 'B' in 90% cases. In what % of cases are they likely to contradict each other in stating the same fact?
13. A speaks truth 60% of the cases and B in 70% of the cases. In What % of cases are they likely to
a) contradict each other b) agree with each other, in stating the same fact?
14. The probability that A, B and C hitting a target are $1/3$ and $2/5$ and $3/5$ respectively. If each one A, B and C shoots the target ,What is the probability that a) the target is hit b) exactly one of them hits the target c) None hits the target
15. A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $1/7$ and that of wife's selection is $1/5$. What is the probability that a) both of them will be selected?
b) One of them will be selected c) none of them will be selected
16. Three bags contain 7 white, 8 red; 9 white, 6 red and 5 white, 6 red balls respectively. One ball at random was drawn from each bag. Find the probability that they are of the same color.
17. 4 Cards are drawn from a well shuffled pack of 52 cards. Find the probability of drawing all the 4 cards of the same suit if a card is replaced after each draw.
18. A bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one ball is drawn from each bag, find the probability that a) both are white b) both are black c) one is white and one is black.
19. A box contains 3 red and 5 black balls. Two balls are drawn one by one at a time at random without replacement. Find the Probability of getting 1 red and 1 black ball.
20. A bag contains 6 black and 3 white balls. Another bag contains 5 black and 4 white balls. If one ball is drawn from each bag, find the probability that these two balls are of the same colour.

21. A bag contains 3 red and 5 black balls and a second bag contains 6 red and 4 black balls. A ball is drawn from each bag. Find the probability that one is red and other is black.
22. Two cards are drawn from a well shuffled pack of 52 cards without replacement .What is the probability that one is red and the other is a king of black.
23. Two cards are drawn without replacement from a will shuffled pack of 52 cards. Find the probability that one is a spade and other is a queen of red colour.
24. A bag contains 5 white and 3 black balls. Four balls are successively drawn out without replacement. What is the probability that they are alternately of different colours?
25. Cards are numbered 1 to 25. Two cards are drawn one after the other. Find the probability that the number on one card is multiple of 7 on the other it is a multiple of 11.
26. Bag A contains 4 red 5 black balls and bag B contains 3 red and 7 black balls. One ball is drawn from bag A and two from bag B. Find the probability that out of 3 balls drawn, two are black and one is red.
27. The probability of A, B, C solving a problem are $\frac{1}{3}$, $\frac{2}{7}$, and $\frac{3}{8}$ respectively. If all the three try to solve the problem simultaneously, find the probability that a) exactly one of them solves the problem b) exactly two of them solves c) none of them solves d) the problem is solved.
28. A, B, and C shot to hit a target. If A hits the target 4 times in 5 trials ; B hits it 3 times in 4 trials and C hits 2 times in 3 trials ; what is the probability that the target is hit by at least 2 persons.
29. The probability that A hits a target is $\frac{1}{3}$ and the probability that B hit it is $\frac{2}{5}$. If each one A and B shoots at the target ,What is the probability that a) the target is hit b) exactly one of them hits the target c) None hits the target
30. The probability of a student a passing an examination is $\frac{3}{7}$ and of student B passing is $\frac{5}{7}$. Assuming the two events "A passes", "B passes" as independent, find the probability of a) only A passing the examination b) only one of them passing the examination.
31. There are three urns A, B; C. Urn A contains 4 white balls and 5 blue balls. Urn B contains 4 white and 3 blue balls. Urn C contains 2 white balls and 4 blue balls. One ball is drawn from each of these urns. What is the probability that out of these three balls drawn, two are white balls and one is a blue ball?
32. A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $\frac{1}{7}$ and that of wife's selection is $\frac{1}{5}$. What is the probability that a) both of them will be selected? b) One of them will be selected c) none of them will be selected.
33. A bag contains 4 white and 5 black balls and another bag contains 3 white and 4 black balls. A ball is drawn at random from the first bag and without seeing its colour is put in the second bag. A ball is taken out from the latter. Find the probability that the ball drawn is white.
34. The odds against a husband who is 45 years old, living till he is 70 are 7:5 and the odds against his wife who is now 36, living till she is 61 are 5:3 . Find the probability that a) the couple will alive 25 years hence b) exactly one of them will be alive 25 years hence c) none of them will be alive 25 years hence d) at least one of them will be alive 25 years hence
35. Two persons A and B throw a die alternately till one of them gets a three and wins the game. Find their respective probability of winning, if A begins.
36. A bag contains 4 red and 3 black balls. A second bag contains 2 red and 4 black balls. One bag is selected at random from the selected bag, one ball is drawn. Find the probability that the ball drawn is red.
37. A bag contains 6 red 5 blue balls and another bag contains 5 red and 8 blue balls. A ball is drawn from the first bag and without noticing its colour is put in the second bag, a ball is drawn from the second bag. Find the probability that the ball is drawn is blue color.

38. A and B appear for an interview for two posts. The probability of A's selection is $\frac{1}{3}$ and that of B's selection is $\frac{2}{5}$. Find the probability that only one of them will be selected.
39. Two unbiased dice are thrown. Find the probability that the sum of the numbers obtained on the two dice is neither a multiple of 2 nor a multiple of 3.
40. An anti-aircraft gun can take a maximum of three shots at an enemy plane moving away from it. The probability of hitting the plane at the first, second, and the third shot are $\frac{2}{3}$, $\frac{2}{5}$ and $\frac{3}{8}$ respectively. What is the probability that the plane is hit?
41. Two cards are drawn from a well shuffled pack of 52 cards without replacement. Find the probability that neither a jack nor a card of spade is drawn.
42. A problem in Mathematics is given to three students whose chances of solving it are $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{1}{6}$. What is the probability that at least one of them solves the problem?
43. A and B are two independent events. The probability that both A and B occur is $\frac{1}{6}$ and the probability that neither of them occurs is $\frac{1}{3}$. Find the probability of occurrence of A.
44. If $P(A) = \frac{7}{13}$, $P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$. Find $P(A' \cap B)$.
45. A couple has 2 children. Find the probability that both the children are boys, if it is known that at least one of the children is a boy.
46. A, B and C toss a coin in succession till one of them tosses a head and wins the game. Find their respective probability of winning assuming that A starts the game.
47. A die is thrown again and again until three sixes are obtained. Find the probability of obtaining the third six in the sixth throw of a die?
48. A and B throw a die alternately till one of them gets a six and wins the game. Find their respective probabilities of winning if A starts first.
49. The probability of A, B, C solving a problem is $\frac{1}{3}$, $\frac{2}{7}$, and $\frac{3}{8}$ respectively. If all the three try to solve the problem simultaneously, find the probability that a) exactly one of them solves the problem b) exactly two of them solves c) none of them solves d) the problem is solved.
50. A bag contains 4 white and 5 black balls and another bag contains 3 white and 4 black balls. A ball is drawn at random from the first bag and without seeing its colour is put in the second bag. A ball is taken out from the latter. Find the probability that the ball drawn is white.
51. The odds against a husband who is 45 years old, living till he is 70 are 7:5 and the odds against his wife who is now 36, living till she is 61 are 5:3. Find the probability that a) the couple will be alive 25 years hence b) exactly one of them will be alive 25 years hence c) none of them will be alive 25 years hence d) at least one of them will be alive 25 years hence
52. Four dice are thrown simultaneously. Find the probability that a) all show the same number b) all show different number.
53. Three horses A, B, C are in a race. A is twice as likely to win as C and C is twice as likely to win as B. Find the respective probability of winning.
54. A coin is tossed until a head appears or until it has been tossed three times. Given that 'head' does not occur on the first toss, what is the probability that the coin is tossed thrice?
55. Fatima and John appear in an interview for two vacancies on the same post. The probability of Fatima's selection is $\frac{1}{7}$ and that of John's selection is $\frac{1}{5}$. What is the probability that:
- Both of them will be selected.
 - Only one of them is selected.
 - None of them will be selected.

56. A company estimated that the probabilities of success for three products introduced in the market are $\frac{1}{3}$, $\frac{2}{5}$ and $\frac{2}{3}$ respectively. Assuming independence, find the probability that i) one of the product is successful. ii) at least two of them are successful .
57. The probability of student A passing an examination is $\frac{3}{5}$ and of student B passing is $\frac{4}{5}$. Assuming the two events : 'A passes', 'B passes', as independent find the probability of:
- Both students passing the examination
 - Only A passing the examination
 - Only one of the two passing the examination
 - Neither of the two passing the examination
58. A letter is known have to come from TATANAGAR or CALCUTTA. On the envelope just two consecutive letters TA are visible. Find the probability that the letter has come from
- Calcutta
 - Tatanagar
59. (a) Define random variable .
(b) Distinguish between discrete and continuous random variable with examples.
60. What do you mean by the probability distribution of a random variable?
61. Two coins are tossed at random. Obtain the probability distribution of the number of tails obtained.
62. A dice is tossed twice. Getting 'an odd number' is regarded as a success. Find the probability distribution of number of successes.
63. Three coins are tossed at random. Obtain the probability distribution of the number of heads obtained. Hence find its mean and variance.
64. Two dice are thrown three times. Obtain the probability distribution of 'doublets'. Also find its mean and variance.
65. Three cards are drawn with replacement from a pack of 52 cards. Obtain the mean and variance of the distribution of number of kings obtained.
66. Two cards are drawn simultaneously without replacement from a pack of cards. Find the mean and variance of the number of red cards
67. Two dice are thrown simultaneously and 'getting a number less than 3' is called a success. Obtain the mean and variance of the number of successes.
68. A pair of dice is rolled twice. Let X denote the number of times, 'a total of 9 is obtained'. Find the mean and variance of the random variable X.
69. A box contains 12 bulbs of which 3 are defective. If 3 bulbs are drawn from the box at random, find the probability distribution of X, the number of defective bulbs drawn. Hence compute the mean of X.
70. The sum of mean and variance of a binomial distribution is $\frac{35}{16}$, for 5 trials. Find the distribution.
71. A pair of dice is thrown 4 times . If getting a doublet is considered a success, find the mean and variance of the number of successes.
72. Two dice are rolled at random 12 times. Obtain the mean and variance of the distribution of doublets obtained.
73. 10% of the tools produced by a machine are defective. Find the probability distribution of the number of defective tools in a sample of 3 drawn at random.
74. 3 defective bulbs are mixed with 7 good ones, 3 bulbs are drawn at random. Find the probability distribution of the defective bulbs.

75. A box contains 12 bulbs of which 3 are defective. A sample of 3 bulbs is selected from the box. Let X denote the number of defective bulbs in the sample, find the probability distribution of X .
76. Find the mean and standard deviation of the probability distribution of the numbers obtained when a card is drawn at random from a set of 7 cards numbered 1 to 7.
77. A pair of dice is thrown twice. Let X denote the number of times 'a total--of 7' appears on them. Obtain the probability distribution of X .
78. Two cards are drawn successively (i) with replacement, (ii) without replacement from a well shuffled pack of cards. Obtain the probability distribution of ' the number of aces' obtained in both the cases.
79. A dice is thrown at random three times. Obtain the probability distribution of 'number of sixes' obtained.
80. A coin is tossed 7 times. Write the probability distribution of getting r heads.
81. Four rotten mangoes are mixed accidentally with 20 good mangoes. obtain the probability distribution of the number of rotten mangoes in a random draw of 2 mangoes without replacement.
82. Three urns contain respectively 3 green and 2 white balls , 5green and 6 white balls and 2 green, 4white balls. One ball in drawn from each urn. Find the mean and variance of the probability distribution of the discrete random variable , "Number of white balls drawn".
83. An urn contains 5 white and 3 black balls. Three balls are drawn at random with replacement, (ii) without replacement obtain the probability distribution of black balls drawn.
84. Three cards are drawn at random successively with replacement from a well shuffled pack of cards. Getting 'a card of spades' is regarded a success. Obtain the probability distribution of the number of successes.
85. Two cars are drawn without replacement from a well shuffled pack of 52cars. Obtain the probability distribution of the number of face cards (jack queen, king and ace).
86. A box contains 13 bulbs out of which 5 bulbs are defective. Three bulbs are drawn one by one from the box without replacement. Find the probability distribution of the number of defective bulbs drawn.
87. A random variable X has the following probability distribution:

X:	0	1	2	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2 + K$

- (i) Find k ii) Obtain $P(X \geq 5)$ and $P(2 \leq X \leq 5)$
88. The probability distribution of a random variable X is given by
- | | | | |
|------|--------|------------|----------|
| X | 0 | 1 | 2 |
| P(X) | $3c^3$ | $4c-10c^2$ | $5c - 1$ |
- where $c > 1$ then find each of the following :
- Value of c
 - $P(X < 2)$
 - $P(1 < X \leq 2)$
89. If X is a random variable with probability distribution as given below, find the value of k .

X	0	1	2	3
P(X)	k	$3k$	$3k$	k

90. Let X denote the number of hours one study in a randomly chosen day. The probability that X takes the values x , has the following form where k is some unknown constant.

$$P(X=x) = \begin{cases} 0.1 & \text{if } x=0 \\ kx & \text{if } x=1 \text{ or } 2 \\ k(5-x) & \text{if } x=3 \text{ or } 4 \\ 0 & \text{otherwise} \end{cases}$$

- i) find the value of k ii) what is the probability that you study a) at least two hours b) exactly two hours c) at most 2 hours ?
91. Let X denote the number of colleges where you will apply after your results and $P(X=x)$ denotes your probability of getting admission in x number of colleges. It is given that

$$P(X=x) = \begin{cases} kx & \text{if } x=0 \text{ or } 1 \\ 2kx & \text{if } x=2 \\ k(5-x) & \text{if } x=3 \text{ or } 4 \end{cases} ; k \text{ is a positive constant}$$

- (a) Find the value of k .
 (b) What is the probability that you will get admission in exactly two colleges?
 (c) Find the mean and variance of the probability distribution.
92. A random variable X takes the values 0,1,2,3 and its mean is 1.3. If $P(X=3)=2P(X=1)$ and $P(X=2)=0.3$. then find $P(X=0)$.
93. A coin is tossed eight times. Find the probability of obtaining:
 (i) At least 6 heads, (ii) no heads, and (iii) all heads.
94. A box contains 100 transistors, 20 of which are defective. Ten are selected at random for inspection. Find the probability that (i) All 10 are defective, (ii) All 10 are good, (iii) At least one is defective, and (iv) At the most 3 are defective.
95. A pair of dice is thrown 7 times. If getting a total of 7 is considered a success, what is the probability of
 i) No Success ii) 6 Successes iii) At least 6 Successes iv) At most 6 Successes.
96. If on an average 1 ship in every 10 is sunk, find the chance that out of 5 ships expected, at least 4 will arrive safely.
97. Assume that the probability that a bomb dropped from an aeroplane will strike a target is $\frac{1}{5}$. If six bombs are dropped, find the probability that: a. exactly two will strike the target, b. at least two will strike the target.
98. An experiment succeeds twice as often it fails. Find the probability that in the next six trials, there will be at least 4 successes.
99. Two dice are thrown six times. 'A total of 7' is considered as success. Find the probability of at least 4 successes.
100. Four cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that :
 i. All the four cards are spades?
 ii. Only three cards are spades?

- iii. None is a spade?
101. On the basis of the past experiences, 60% of the operations performed by a doctor are successful. If on a given day he performs 5 operations, find the probability that: (i.) none is successful (ii) at least 4 are successful.
102. The probability that a bulb produced by a factory will fuse after 150 days of use is .05. Find the probability that out of 5 such bulbs a) none b) not more than one c) at least one will fuse after 150 days of use.
103. The probability of a bomb hitting a target is $\frac{1}{3}$. Two bombs are enough to destroy a bridge. If 5 bombs are dropped at the bridge, find the probability that the bridge is destroyed.
104. The probability of a shooter hitting the target is $\frac{3}{4}$. How many minimum numbers of times he must fire so that the probability of hitting the target at least once is more than 0.99
105. On a multiple choice test, with three possible answers, (out of which only one is correct) for each of five questions, what is the probability that the student would get four or answers correct by just guessing.
106. From a lot of 10 items containing 3 defective, a sample of 4 items is drawn at random. Let the random variable X denote the number of defective items in the sample. If the sample is drawn without replacement, find (i) Mean of X (ii) Variance of X .
107. Three rotten oranges are mixed with seven good ones. Find the probability distribution of the number of rotten oranges, if three oranges are drawn at random.
108. A football match may be either won, drawn or lost by the host country's team, So there are three ways of forecasting the result of any one match, one correct and two incorrect. Find the probability of forecasting at least three correct results for four matches.
109. In a hurdle race, a player has to cross 8 hurdles. The probability of clearing any hurdle is $\frac{4}{5}$. What is the probability that he will knock down less than 2 hurdles?
110. Suppose that one of three men, a politician, a businessman, and a educationist will be appointed as the vice-chancellor of a university. The respective probabilities of their appointments are 0.50, 0.30 & 0.20. The probabilities that research activities will be promoted by these people if they are appointed are 0.30, 0.70 and 0.80 respectively. If the research activities were promoted, what is the probability that it was due to the appointment of an educationist as the vice-chancellor?
111. A company has two plants to manufacture scooters. Plant 1 manufactures 70% of the scooters and plant 2 manufactures 30%. At plant 1, 80% of the scooters are rated of standard quality and at plant 2, 90% of the scooters are rated of standard quality. A scooter is chosen at random and is found to be of standard quality. Find the probability that it has come from (i) plant 1 (ii) plant 2.
112. A factory has three units A, B and C . Unit A produces 25% of the product, unit B produces 25% and the unit C produces 50%. If the percentage of defective items produced by three units A, B and C respectively 1%, 2% and 3% and Item selected randomly from the total production of the factory is found to be defective, what is the probability that it is produced by machine C?
113. A company produces certain type of sophisticated item by three machines. The respective daily production figures are : machine A: 300 units, Machine B 450 units and Machine C 250 units. Past experience shows that the percentage of defectives in the three machines are 0.1, 0.2 and 0.7 respectively for the machines A,B and C. an

item is drawn at random from a day's production and is found to be defective. What is the probability that it is not produced by machine C?

114. Three urns are given, each containing red and white balls as indicated.
 Urn 1: 6 red and 4 white
 Urn 2: 2 red and 6 white
 Urn 3: 1 red and 8 white An urn is chosen at random and a ball is drawn from the urn. The ball drawn is red. Find the probability that (i) the urn chosen was that (ii) the urn chosen was 2 or 3.
115. A company has two plants to manufacture scooters. Plant-1 manufactures 70% of the scooters and Plant-2 manufactures 30%. At Plant-1, 80% of the scooters are rated of standard quality and at Plant-2, 90% of the scooters are rated of standard quality. A scooter is chosen at random and is found to be of standard quality. Find the probability that it has come from Plant-2.
116. In a competitive examination, an examinee either guesses or copies or known the answer to a multiple choice question with four choices. The probability that he makes a guesses is $\frac{1}{3}$ and the probability that he copies the answer is $\frac{1}{6}$. The probability that the answer is correct given that he copies it is $\frac{1}{8}$. Find the probability that he (i) guesses (ii) copies and (iii) knows, the answer to the question, given that he correctly answered it.
117. A factory has two machines A and B. Past record shows that machine A produced 60% items of the output and machine B produced 40% of items. Further 2% of the items produced by machine A and 1% produced by machine B were found defective All items are put into one stockpile and then one item is chosen at random from this and is found defective. What is the probability that it was produced by machine B
118. An insurance company insured 2000 scooter drivers,4000 car drivers and 6000 truck drivers. The probability of an accident are respectively 0.01,0.03 and 0.15 respectively. One of the insured person meets with an accident. what is the probability that he is a scooter driver?
119. A laboratory blood test is 99% effective in detecting a certain disease when it is infact, present. However, the test also yields a false positive result for 0.5% of the healthy person tested. If 0.1 % of the population actually has the disease, what is the probability that the person has the disease given that his test result is positive?
120. In a factory which manufactures bolts, machines A, B, and C manufactures respectively 25%, 35% and 40% of the bolts. Of their outputs, 5, 4, 2 percent are respectively defective bolts. A bolt is drawn ar random from the product and is found to be defective. What is the probability that it is manufactured by machine B.
121. A doctor is to visit a patient. From the past experience it is known that the doctor coming by train, bus and scooter or taxi are $\frac{1}{10}, \frac{1}{5}, \frac{3}{10}, \frac{2}{5}$ respectively. The probabilities that he will be late are $\frac{1}{4}, \frac{1}{3}, \frac{1}{12}$ if he comes by train, bus or scooter respectively but by taxi he never comes late. When he arrives he is late. What is the probability that he comes by bus?
122. Coloured balls are distributed in three bags as shown in the table below:

Bag	Number of black balls	Number of white balls	Number of red balls
I	1	2	3
II	2	4	1
III	4	5	3

A bag is selected at random and then two balls are randomly drawn from the selected bag. They happen to be black and red. What is the probability that they came from bag I? [6 marks]

123. Coloured balls are distributed in three bags as shown in the table below:

Bag	Number of black balls	Number of white balls	Number of red balls
I	2	1	3
II	4	2	1
III	5	4	3

A bag is selected at random and then two balls are randomly drawn from the selected bag. They happen to be white and red. What is the probability that they came from bag II? [6 marks]

124. Three bags contain balls as follows:

Bag	Number of white balls	Number of black balls	Number of red balls
I	1	2	3
II	2	1	1
III	4	3	2

A bag is chosen at random and two balls are drawn from it .they happened to be red and white. What is the probability that they came from the second bag.

125. For three persons A, B, C the chances of being selected as a manger are in the ratio 4:1:2 respectively. The respective probabilities of them introducing a radical change in marketing strategy are 0.3,0.8,0.5.If change does take place, find the prob that it due to the appointment of B or C.
126. A man is known to speak the truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.
127. A man is known to speak the truth 3 out of 5 times. He throws a die and reports that it is a number greater than 4. Find the probability that it is actually a number greater than 4.
128. Bag 1 contains 3 red and 4 black balls and bag 2 contains 4 red and 5 black balls. One ball is transferred from bag I to bag II and then a ball is drawn from bag II. The ball so drawn was found to be red in colour. Find the probability that the transferred ball is i) red in colour. ii) black in colour.
129. If a machine is correctly set up, it produces 90% acceptable items. If it is incorrectly set up, it produces 40% acceptable items. past experience shows that 80% of the set ups are correctly done. If after a certain set up, the machine produces 2 acceptable items, find the probability that the machine was correctly set up.
130. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be hearts . Find the probability of the missing card to be a heart.
131. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn at random and are found to both clubs. Find the probability of the lost card being of clubs.
132. A candidate has to reach the examination centre in time. Probability of him going by bus or scooter or by other means of transport are $\frac{3}{10}$, $\frac{1}{10}$ and $\frac{3}{5}$ respectively. The probability that he will be late is $\frac{1}{4}$ and $\frac{1}{3}$ respectively, if he travels by bus or scooter. But he reaches in time if he uses any other mode of transport. He reached late at the centre. Find the probability that he travelled by bus.
133. Two groups are competing for the position on the Board of Directors of a corporation. The probabilities that the first and the second groups will win are 0.6 and 0.4 respectively. Further, if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3, if the second group wins. Find the probability that the new product was introduced by the second group.

134. There are three coins. One is a two headed coin(having head on both faces), another is a biased coin that comes up tails 25% of the times and the third is an unbiased coin. One of the three coins is chosen at random and tossed, it shows head. What is the probability that it was from the two headed coin?

135. There are two bags, Bag I and Bag II. Bag I contains 4 white and 3 red balls while another Bag II contains 3 white and 7 red balls. One ball is drawn at random from one of the bags and it is found to be white. Find the probability that it was drawn from Bag I.

Class XII Mathematics

Probability

Board Questions

2008 Delhi

1. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability distribution of the number of successes. [4 marks] [ans: 625/1296;500/1296;150/1296;20/1296;1/1296]
2. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probabilities of an accident are respectively 0.01, 0.03 and 0.15 respectively. One of the insured person meets with an accident. What is the probability that he is a scooter driver? [6 marks] [ans: 1/52]

2008 AI

3. 12 cards, numbered 1 to 12, are placed in a box, mixed up thoroughly and then a card is drawn random from the box. If it is known that the number on the drawn card is more than 3, find the probability that it is an even number. [4 marks] [ans: 5/9]
4. In a bulb factory, machines A, B and C manufacture 60%, 30% and 10% bulbs respectively. 1%, 2% and 3% of the bulbs produced respectively by A, B and C are found to be defective. Find the probability that this bulb was produced by the machine A. [6 marks] [ans: 2/5]

2008 Foreign

5. Two cards are drawn simultaneously from a well shuffled pack of 52 cards. Find the mean and standard deviation of the number of kings. [4 marks] [ans: 2/13; 0.373]
6. In a factory which manufactures bolts, machines A, B and C manufactures respectively 25%, 35% and 40% of the bolts. Of their outputs, 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the total production and is found to be defective. Find the probability that it is manufactured by the machine B. [6 marks] [ans: 28/69]

2009 Delhi

7. A die is thrown again and again until three sixes are obtained. Find the probability of obtaining the third six in the sixth throw of a die? [4 marks] [ans:]
8. (Set 1) Three bags contain balls as shown in the table below:

Bag	Number of white balls	Number of black balls	Number of red balls
I	1	2	3
II	2	1	1
III	4	3	2

A bag is chosen at random and two balls are drawn from it. They happen to be red and white. What is the probability that they came from the III bag. [6 marks] [ans:5/17]

9. (Set 2) Two groups are competing for the position on the Board of Directors of a corporation. The probabilities that the first and the second groups will win are 0.6 and 0.4 respectively. Further, if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3, if the second group wins. Find the probability that the new product was introduced by the second group. [6 marks]
10. (Set 3) There are three coins. One is a two headed coin(having head on both faces), another is a biased coin that comes up tails 25% of the times and the third is an unbiased coin. One of the three coins is chosen at

random and tossed, it shows head. What is the probability that it was from the two headed coin?

[6 marks]

2009 AI

11. On a multiple choice examination, with three possible answers (out of which only one is correct) for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing? [4 marks]

12. (Set 3) A man is known to speak the truth 3 out of 5 times. He throws a die and reports that it is a number greater than 4. Find the probability that it is actually a number greater than 4. [6 marks]

13. (Set 1) Coloured balls are distributed in three bags as shown in the table below:

Bag	Number of black balls	Number of white balls	Number of red balls
I	1	2	3
II	2	4	1
III	4	5	3

A bag is selected at random and then two balls are randomly drawn from the selected bag. They happen to be black and red. What is the probability that they came from bag I? [6 marks]

14. (Set 2) Coloured balls are distributed in three bags as shown in the table below:

Bag	Number of black balls	Number of white balls	Number of red balls
I	2	1	3
II	4	2	1
III	5	4	3

A bag is selected at random and then two balls are randomly drawn from the selected bag. They happen to be white and red. What is the probability that they came from bag II? [6 marks]

2009 Foreign

15. The probability that A hits a target is $\frac{1}{3}$ and the probability that B hit it is $\frac{2}{5}$. If each one A and B shoots at the target, What is the probability that a) the target is hit b) exactly one of them hits the target c) None hits the target (*part 'c' was not asked in the exam*)? [4 marks]

16. (Set 1) Two cards are drawn simultaneously (or successively without replacement) from a well shuffled pack of 52 cards. Find the mean and variance of the number of red cards. [6 marks]

17. (Set 2) A pair of dice is thrown 4 times . If getting a doublet is considered a success, find the mean and variance of the number of successes. [6 marks]

18. (Set 3) From a lot of 30 bulbs which includes 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the mean and variance of the number of defective bulbs. [6 marks]

2010 Delhi

19. (Set 1 & 2) On a multiple choice examination, with three possible answers (out of which only one is correct) for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing? [4 marks]

20. (All Sets)A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn at random and are found to both clubs. Find the probability of the lost card being of clubs.

21. (All Sets) OR From a lot of 10 bulbs which includes 3 defectives, a sample of 2 bulbs is drawn at random. Find the probability distribution of the number of defective bulbs. [6 marks]
22. (Set 3) There are two bags, Bag I and Bag II. Bag I contains 4 white and 3 red balls while another Bag II contains 3 white and 7 red balls. One ball is drawn at random from one of the bags and it is found to be white. Find the probability that it was drawn from Bag I. [4 marks]

2010 AI

23. A family has 2 children. Find the probability that both are boys, if it is known that i) at least one of the children is a boy. ii) the elder child is a boy. [4 marks]
24. A bag contains 4 balls. Two balls are drawn at random, and are found to be white. What is the probability that all balls are white? [6 marks]

2010 Foreign

25. An experiment succeeds twice as often it fails. Find the probability that in the next six trials, there will be at least 4 successes. [4 marks]
26. An urn contains 4 white and 3 red balls. Let X denote the number of red balls in a random draw of three balls. Find the mean and variance of X. [6 marks]
27. OR In answering a question on a multiple choice test, a student either knows the answer or guesses. Let $\frac{3}{5}$ be the probability that he knows the answer and $\frac{2}{5}$ be the probability that he guesses. Assuming that a student who guesses at the answer will be correct with probability $\frac{1}{3}$, what is the probability that the student knows the answer, given that he answered it correctly. [6 marks]

2010 Comptmt

28. Two cards are drawn simultaneously (without replacement) from a well – shuffled pack of 52 cards. Find the probability distribution of the number of aces. Also find the mean of the distribution. [6 marks]
29. In a class, 5% of the boys and 10% of the girls have an IQ of more than 150. In the class 60% of the students are boys and rest girls. If a student is selected at random and found to have an IQ of more than 150, find the probability that the student is a boy. [6 marks]

2011 Delhi

30. Probabilities of solving a specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that (i) the problem is solved (ii) exactly one of them solves the problem. [4 marks]
31. Suppose 5% of men and 0.25% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume that there are equal number of males and females. [6 marks]
32. Given three identical boxes I, II and III each containing two coins. In box I, both coins are gold coins, in box II, both are silver coins and in box III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also of gold? [6 marks]
33. A man is known to speak the truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six. [6 marks]

2011 Foreign

34. Find the mean number of heads in three tosses of a fair coin. [4 marks]
35. (Set 1) A factory has two machines A and B. Past record shows that machine A produced 60% items of the output and machine B produced 40% of items. Further 2% of the items produced by machine A and 1% produced by machine B were found defective All items are put into one stockpile and then one item is chosen at random from this and is found defective. What is the probability that it was produced by machine B? [6 marks]
36. (Set 2) Bag I contains 3 red and 4 black balls and bag II contains 4 red and 5 black balls. One ball is transferred from bag I to bag II and then a ball is drawn from bag II at random. The ball so drawn is found to be red in colour. Find the probability that the transferred ball is black. [6 marks]

37. (Set 3) There are three coins. One is a two headed coin(having head on both faces), another is a biased coin that comes up heads 75% of the times and the third is an unbiased coin. One of the three coins is chosen at random and tossed, it shows head. What is the probability that it was the two headed coin?

[6 marks]

BTJ