



15. A can solve 90% of the problems given in a book, and B can solve 70%. What is the probability that atleast one of them will solve a problem selected at random from the book?
16. A speaks the truth in 60% of the cases, and B in 90% of the cases. In what percentage of cases are they likely to contradict each other in stating the same fact?
17. A problem in mathematics is given to three students whose chances of solving it correctly are  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  respectively. What is the probability that only one of them solves it correctly?
18. An urn contains 4 red and 7 black balls. Two balls are drawn at random with replacement. Find the probability of getting: (i) 2 red balls (ii) 2 blue balls (iii) one red and one blue ball.
19. A can hit a target 4 times in 5 shots, B 3 times in 4 shots, and C 2 times in 3 shots. Find the probability that: (i) A, B, C all may hit (ii) B, C may hit and A may lose (iii) any two of A, B, and C will hit the target (iv) none of them will hit the target?
20. Two persons A and B throw a coin alternately till one of them gets a 'head' and wins the game. Find their respective probabilities of winning if A starts first.
21. A speaks the truth 8 times out of 10 times. A die is thrown. He reports that it was 5. What is the probability that it was actually 5?
22. In a bulb factory, machines A, B and C manufactures 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. A bulb is picked up at random from the total production and found to be defective. Find the probability that this bulb was produced by the machine A.
23. 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  $\frac{3}{10}$ ,  $\frac{1}{10}$ ,  $\frac{3}{5}$  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.
24. Two bags A and B contain 4 white 3 black balls and 2 white and 2 black balls respectively. From bag A two balls are transferred to bag B. Find the probability of drawing: (i) 2 white balls from bag B? (ii) 2 black balls from bag B? (iii) 1 white & 1 black ball from bag B?
25. In a bolt factory machines, A, B and C manufacture respectively 25%, 35% and 40% of the total bolts. Of their output 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from product. (i) What is the probability that the bolt drawn is defective? (ii) If the bolt is found to be defective find the probability that it is a product of machine B.
26. A letter is known to have come from either TATANAGAR or CALCUTTA. On the envelope just two consecutive letters TA are visible. What is the probability that the letter has come from: (i) Tata nagar (ii) Calcutta
27. Bag A contains 2 white and 3 red balls, and bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find probability that it was drawn from bag B.
28. Three urns A, B and C contain 6 red and 4 white; 2 red and 6 white; and 1 red and 5 white balls respectively. An urn is chosen at random and a ball is drawn. If the drawn ball is found to be red, Find the probability that the ball was drawn from the urn A.

29. A company has two plants to manufacture bicycles. The first plant manufactures 60% of the bicycles and the second plant, 40%. Also, 80% of the bicycles are rated of standard quality at the first plant and 90% of standard quality at the second plant. A bicycle is picked at random and found to be of standard quality. Find the probability that it comes from the second plant.

30. A factory has three machines, X, Y and Z, producing 1000, 2000 and 3000 bolts per day respectively. The machine X produces 1% defective bolts, machine Y produces 1.5% defective bolts and machine Z produces 2% defective bolts. At the end of the day, a bolt is drawn at random and it is found to be defective. Find the probability that this defective bolt has been produced by the machine X?

31. A random variable X has the following probability distribution:

$x_i$	-2	-1	0	1	2	3
$p_i$	0.1	$k$	0.2	$2k$	0.3	$k$

- (i) Find the value of  $k$                       (ii) Find mean of X                      (iii) Find variance of X.

32. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability distribution of number of successes.

33. 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.

34. 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:

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

- (i) Find the value of  $k$                       (ii) What is the probability that you will get admission in exactly 2 colleges?  
 (iii) Find the mean and variance of the probability distribution.

35. Find the probability distribution of the number of white balls drawn in a random draw of 3 balls without replacement from a bag containing 4 white and 6 red balls. Also find the mean and variance of the distribution.

36. A fair die is tossed twice. If the number appearing on the top is less than 3, it is a success. Find the probability distribution of number of successes.

37. The probability of hitting a target by A is  $\frac{1}{5}$ . If he fires 5 times, find the probability that he will hit atleast two times.

38. Two cards are drawn successively with replacement from a pack of 52 cards. Find the mean and variance of the number of kings.

39. A coin is tossed 4 times. Let X denote the number of heads. Find the mean and variance of X.

40. 3 defective bulbs are mixed with 7 good ones. Let X be the number of defective bulbs when 3 bulbs are drawn at random. Find the mean and variance of X.

41. An unbiased coin is tossed 8 times. Find, by using binomial distribution, the probability of getting atleast 3 heads.

42. The probability of a man hitting a target is  $\frac{1}{4}$ . How many times must he fire so that the probability of his hitting the target at least once is greater than  $\frac{2}{3}$ ?
43. Six coins are tossed simultaneously. Find the probability of getting:  
 (i) 3 heads      (ii) no head      (iii) atleast one head      (iv) not more than 3 heads
44. The probability that a student entering a university will graduate is 0.4. Find the probability that out of 3 students of the university:  
 (i) none will graduate      (ii) only one will graduate      (iii) all will graduate
45. A pair of dice is thrown 7 times. If getting a total of 7 is considered as success, Find the probability of:  
 (i) no success      (ii) 6 successes      (iii) atleast 6 successes      (iv) atmost 6 successes
46. Find the binomial distribution for which the mean and variance are 12 and 3 respectively.

## ANSWERS

1. (i)  $\frac{2}{3}, \frac{1}{2}$     (ii)  $\frac{5}{9}$     2.  $\frac{1}{6}$     3.  $\frac{5}{8}$     4. (i)  $\frac{2}{15}$     (ii)  $\frac{2}{15}$     5.  $\frac{1}{17}$     6.  $\frac{4}{19}$
7. (i)  $\frac{1}{221}$     (ii)  $\frac{4}{663}$     8.  $\frac{1}{4}$     9.  $\frac{2}{3}$     10.  $\frac{2}{5}$     11. (i) 0.18    (ii) 0.12    (iii) 0.42
- (iv) 0.28    (v) 0.72    (vi) 0.3    (vii) 0.6    12. yes    13. (i)  $\frac{1}{30}$     (ii)  $\frac{3}{10}$     (iii)  $\frac{2}{3}$     14.  $\frac{7}{15}$
15. 0.97    16. 42%    17.  $\frac{11}{24}$     18. (i)  $\frac{16}{121}$     (ii)  $\frac{49}{121}$     (iii)  $\frac{56}{121}$     19. (i)  $\frac{2}{5}$     (ii)  $\frac{1}{10}$     (iii)  $\frac{13}{30}$     (iv)  $\frac{1}{60}$
20.  $\frac{2}{3}, \frac{1}{3}$     21.  $\frac{4}{9}$     22.  $\frac{2}{5}$     23.  $\frac{9}{13}$     24. (i)  $\frac{5}{21}$     (ii)  $\frac{4}{21}$     (iii)  $\frac{4}{7}$     25. (i) 0.0345    (ii)  $\frac{28}{69}$
26. (i)  $\frac{7}{11}$     (ii)  $\frac{4}{11}$     27.  $\frac{25}{52}$     28.  $\frac{36}{61}$     29.  $\frac{3}{7}$     30. 0.1    31. (i) 0.1    (ii) 0.8    (iii) 2.16    32.

X	0	1	2	3	4
P(X)	$\frac{625}{1296}$	$\frac{500}{1296}$	$\frac{150}{1296}$	$\frac{20}{1296}$	$\frac{1}{1296}$

33.  $\frac{1}{9}$     34. (i)  $k = \frac{1}{8}$     (ii)  $\frac{1}{2}$     (iii)  $\frac{19}{8}, \frac{47}{64}$     35.

X	0	1	2	3
P(X)	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{3}{10}$	$\frac{1}{30}$

1. 20, 0.56

36.

X	0	1	2
P(X)	$\frac{4}{9}$	$\frac{4}{9}$	$\frac{1}{9}$

37.  $\frac{821}{3125}$     38.  $\frac{24}{169}$     39. 2, 1

40. 0.9, 0.49    41.  $\frac{219}{256}$     42. 4 times    43. (i)  $\frac{5}{16}$     (ii)  $\frac{1}{64}$     (iii)  $\frac{63}{64}$     (i)  $\frac{21}{32}$     44. (i) 0.216    (ii) 0.432    (iii) 0.064

45. (i)  $\left(\frac{5}{6}\right)^7$     (ii)  $35\left(\frac{1}{6}\right)^7$     (iii)  $\left(\frac{1}{6}\right)^5$     (iv)  $1 - \left(\frac{1}{6}\right)^7$     46.  $P(X=r) = {}^{16}C_r \left(\frac{3}{4}\right)^r \left(\frac{1}{4}\right)^{16-r}$ , where  $r=0,1,2,\dots,15$