



INDIAN SCHOOL AL WADI AL KABIR

Department of Mathematics, 2023-2024

Worksheet: Probability

Grade: XII

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Section A (1marks)

1. If  $P(A) = \frac{2}{5}, P(B) = \frac{1}{3}$ , then find  $P(\bar{A} \cap \bar{B})$ , given A and B are independent events.  
(a)  $\frac{2}{5}$  (b)  $\frac{3}{5}$  (c)  $\frac{2}{15}$  (d)  $\frac{1}{5}$
2. Two dice are thrown together. Let A be the event 'getting 6 on the first die' and B be the event 'getting 2 on the second die'. Then events A and B are \_\_\_\_\_.  
(a) mutually exclusive (b) independent (c) mutually exhaustive (d) none of these
3. A bag contains 4 white, 3 red and 5 black balls. If four balls are drawn one by one without replacement, find the probability of getting all white balls.  
(a)  $\frac{1}{495}$  (b)  $\frac{1}{2}$  (c)  $\frac{2}{3}$  (d) 0
4. The probabilities 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, then the probability that the problem is solved is equal to \_\_\_\_\_.  
(a)  $\frac{1}{84}$  (b)  $\frac{59}{84}$  (c)  $\frac{1}{28}$  (d)  $\frac{1}{168}$
5. How many times must a man toss a fair coin, so that the probability of having at least one head is more than 80%?  
(a) 1 (b) 2 (c) 3 (d) 4  
Ans: 1) a 2) b 3) a 4) b 5) c

Section B (3marks)

6. Three persons A, B and C apply for a job of manager in a private company. Chance of their selection are in the ratio 1: 2: 4. The probabilities that A, B and C can introduce changes to improve profits of the company are 0.8, 0.5 and 0.3 respectively. If the changes do not take place, find the probability that it is due to the appointment of C. Ans:  $\frac{7}{10}$
7. A and B throw a die alternatively till one of them gets a '6' and wins the game. Find their respective probabilities of winning, if A starts first. (Ans:6/11)
8. In a game, a man wins ₹ 5 getting a number greater than 4 and loses ₹ 1 other wise, when a fair die is tossed. The man decided to throw a die thrice but to quit as and when he gets a number greater than 4. Find the expected value of the amount he withdrawn. Ans: 2.11
9. A bag contains 4 balls. Two balls are drawn at random (without replacement) and are found to be white. What is the probability that all balls in the bag are white? Ans:  $\frac{3}{5}$

10.	Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number of aces. Hence find the mean of the distribution. Ans: $\frac{2}{13}$																
11.	A committee of 4 students is selected at random from a group consisting 8 boys and 4 girls. Given that there is at least one girl on the committee. Calculate the probability that there are exactly two girls on the committee. Ans: $\frac{168}{425}$																
12.	A discrete random variable X has the following probability distribution: <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>X</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>P(X)</td> <td>k</td> <td>2k</td> <td>2k</td> <td>3k</td> <td>K<sup>2</sup></td> <td>2k<sup>2</sup></td> <td>7k<sup>2</sup>+k</td> </tr> </tbody> </table> <p>Find the value of k and find the mean. Ans: <math>k = \frac{1}{10}</math>; Mean = 3.66</p>	X	1	2	3	4	5	6	7	P(X)	k	2k	2k	3k	K <sup>2</sup>	2k <sup>2</sup>	7k <sup>2</sup> +k
X	1	2	3	4	5	6	7										
P(X)	k	2k	2k	3k	K <sup>2</sup>	2k <sup>2</sup>	7k <sup>2</sup> +k										
13.	A can hit a target 4 times in 5 shots, B 3 times in 4 shots and C 2 times in 3 shots. Calculate the probability that (i) A, B, C all may hit (ii) none of them will hit the target. Ans: (i) $\frac{2}{5}$ , (ii) $\frac{1}{60}$																
<b>Section C (4marks) Case study-based questions</b>																	
14.	In a group activity class, there are 10 students whose ages are 16, 17, 15, 14, 19, 17, 16, 19, 16 and 15 years. One student is selected at random such that each has equal chance of being chosen and age of the student is recorded. On the basis of the above information, answer the following questions: i) Find the probability that the age of the selected student is a composite number. ii) Let X be the age of the selected student. What can be the value of X? iii) Find the probability distribution of random variable X and hence find the mean age. iv) A student was selected at random and his age was found to be greater than 15 years. Find the probability that his age is a prime number. (Ans: i) 0.6 ii) 14,15,16,17,19 iii) Mean =16.4 years iv) 2/3 )																
15.	A shopkeeper sells three types of flower seeds A <sub>1</sub> , A <sub>2</sub> and A <sub>3</sub> . They are sold as a mixture where the proportions are 4 : 4 : 2 respectively. The germination rates of the three types of seeds are 45%, 60% and 35%. Based on the above information, answer the following questions: i) What is the probability of a randomly chosen seed to germinate? ii) What is the probability that the randomly selected seed is of type A <sub>1</sub> , given that it germinates? (Ans: i) 0.49 ii) 18/49)																

**SECTION D (5 marks)**

16.	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? <b>Ans:</b> $\frac{2}{3}$
17.	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. <b>Ans:</b> $\frac{1}{3}$
18.	In a certain college, 4% of boys and 1% of girls are taller than 1.75 meters. Furthermore, 60% of the students in the college are girls. A student is selected at random from the college and is found to be taller than 1.75 meters. Find the probability that the selected student is a girl. <b>Ans:</b> $\frac{3}{11}$
19.	A letter is known to have come either from 'TATA NAGAR' or from 'CALCUTTA'. On the envelope, just two consecutive letters 'TA' are visible. What is the probability that the letter came from 'TATA NAGAR'? <b>Ans:</b> $\frac{7}{11}$
20.	Three numbers are selected at random (without replacement) from first six natural numbers. Let X denote the largest of the three numbers obtained. Find the probability distribution of X. Also find the mean. <b>Ans:</b> Mean = $\frac{21}{4}$
21.	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 correctly? <b>Ans:</b> $\frac{9}{11}$
22.	In a factory which manufactures bolts, machines A, B and C manufacture respectively 30%, 50% and 20% of the bolts. Of their outputs 3, 4, 1 percent respectively are defective bolts. A bolt is drawn from the product and is found to be defective. Find the probability that this is <b>not</b> manufactured by machine B <b>Ans:</b> $\frac{11}{31}$

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