MATHS

BOOKS - BETTER CHOICE PUBLICATION

PROBABILITY

Solved Examples Section 1 Multiple Choice Question

1. If A and B are independent events and if $P(A) = \frac{1}{2}, P(B) = \frac{2}{5}, then$P(A cap B)` is

equal to :

A. 0

B. $\frac{1}{2}$

C. not defined

D. 1

Answer: C

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2. If A and B are two events such that $A \cap B \neq \phi, P\left(\frac{A}{B}\right) = P\left(\frac{B}{A}\right)$. Then.

A. $A \subset B \text{but} A \neq B$

B. B=A

C. $A \cap B = \phi$

D. $P(A) = P(B)$

Answer: D

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3. Two events A and B are said to be independent if

A. A and B are mutually exlusive

B. $P(A'B') = [1 - P(A)][1 - P(B)]$

C. $P(A) = P(B)$

D. $P(A) + P(B) = 1$

Answer: B

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4. The probability of obtaining an even prime number on each die, when a pair of dice is rolled is:

A. 0

B. $\frac{1}{3}$

C. $\frac{1}{12}$

D. $\frac{1}{36}$

Answer: D

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5. If A and B are two events such that $A \subset B$ and $P(B) \neq 0$, then which of the following is correct?

A. $P(A/B) = \dfrac{P(B)}{P(A)}$

B. $P(A/B) < P(A)$

C. $P(A/B) \geq P(A)$

D. None of these

Answer: C

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6. The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is:

A. 1

B. 2

C. 5

D. $\frac{8}{3}$

Answer: B

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7. If A and B are any two events such that : $P(A) + P(B) - P(A \text{ and } B) = P(A)$`, then

A. $P(B/A) = 1$

B. $P(A/B) = 1$

C. $P(B/A) = 0$

D. $P(A/B) = 0$

Answer: B

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Solved Examples Section Ii Short Answer Type Question

1. Compute $P(A \mid B)$,if $P(B) = 0.5$ and $P(A \cap B) = 0.32$

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2. Given that E and F are events such that $P(E) = 0.6, P(F) = 0.3$ and $P(E \cap F) = 0.2$ find $P(E \mid F)$ and $P(F \mid E)$

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3. If $P(A) = 0.8, P(B) = 0.5$ and $P(B/A) = 0.4$, find

(i) $P(A \cap B)$

(ii) $P(A/B)$

(iii) $P(A \cup B)$

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4. Evaluate $P(A \cup B)$, if $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$.

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5. If $P(A) = \frac{6}{11}, P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$ find :

(i) $P(A \cap B)$

(ii) $P(A/B)$ and

(iii) $P(B/A)$

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6. Determine $P(E \mid F)$ if A coin is tossed three times, where : E : at least two heads , F :

at most two heads

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7. Determine $P(E \mid F)$ Mother, father and son line up at random for a family picture :E : son on one end, F : father in middle

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8. A black and a red dice are rolled :Find the conditional probability of obtaining a sum

greater than 9, given that the black die resulted in a 5.

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9. A fair die is rolled . Consider events $E = \{1, 3, 5\}, F = \{2, 3\}$ and $G = \{2, 3, 4, 5\}$. Find

(i) $P(E/F)$ and $P(F/E)$

(ii) $P(E/G)$ and $P(G/E)$

(iii) $P(E \cup F/G)$ and $P(E \cap F/G)$

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10. An instructor has a question bank consisting of 300 easy True / False questions, 200 difficult True / False questions, 500 easy multiple choice questions and 400 difficult multiple choice questions. If a question is selected at random from the question bank, what is the probability that it will be an easy question given that it is a multiple choice question?

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11. Consider the experiment of throwing a die, if a multiple of 3 comes up, throw the die again and if any other number comes, toss a coin. Find the conditional probability of the event 'the coin shows a tail', given that 'at least one die shows a 3'.

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Solved Examples Section Iii

1. The events A and B are given to be independent . Find P(B), If it is given that $P(A) = 0.35$ and $P(A \cup B) = 0.60$

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2. Given two independent events A and B such that $P(A) = 0.3$, and $P(B) = 0.6$ Find: P(A and not B)

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3. If A and B are two events such that $P(A) = \frac{1}{4}, P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$, find P (not A and not B) .

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4. A fair coin and an unbiased die are tossed. Let A be the event 'head appears on the coin' and B be the event '3 on the die'. Check whether A and B are independent events or not.

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5. A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, 'the number is even,' and B be the event, 'the number is red'. Are A and B independent?

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6. One card is drawn at random from a well shuffled deck of 52 cards. In which of the following cases are the events E and F

independent ?E : ‘the card drawn is a spade’ F : ‘the card drawn is an ace’

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Solved Examples Section Iv

1. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that both balls are red.

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2. There are three urns A,B and C . Urn A contains 4 white balls and 5 blue balls . Urn B contains 3 white balls and 4 blue balls . Urn C contains 3 white balls and 6 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 ?

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3. In a hostel, 60% of the students read Hindi news paper, 40% read English news paper and 20% read both Hindi and English news papers. A student is selected at random. Find the probability that she reads neither Hindi nor English news papers.

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4. Probability of solving 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 solve the problem .

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5. A problem in Mathematics is given to three students Dayanand, Ramesh and Naresh and whose chances of solving it are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ respectively, what is the probability that the problem will be solved ?

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6. 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.

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Solved Examples Section V

1. An urn contains 5 red and 5 black balls. A ball is drawn at random, its colour is noted and is returned to the urn. Moreover, 2 additional balls of the colour drawn are put in the urn and then a ball is drawn at random. What is the probability that the second ball is red?

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2. A bag 'A' contains 8 white and 7 black balls, while the other bag 'B' contains 5 white and 4 black balls . A ball is transferred (without noticing its colour) from the bag 'A' to the bag 'B' . Then a ball is drawn from bag 'B'. Find the probability that the ball drawn is white .

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3. A bag contains 10 white and 3 black balls, white another bag contains 3 white and 5

black balls. Two balls are drawn from the first bag and put into the second and then a ball is drawn from the latter. What is the probability that it is white ball ?

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4. A laboratory blood test is 99% effective in detecting a certain disease when it is in fact, present. However, the test also yields a false positive result for 0.5% of the healthy person tested (i.e. if a healthy person is tested, then,

with probability 0.005, the test will imply he has the disease). If 0.1 percent of the population actually has the disease, what is the probability that a person has the disease given that his test result is positive ?

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5. Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in

hostel attain A grade and 20% of day scholars attain A grade in their annual examination. At the end of the year, one student is chosen at random from the college and he has an A grade, what is the probability that the student is a hostlier?

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6. In answering a question in a multiple choice test a student either knows the answer or guesses. Let $\frac{3}{4}$ be the probability that he

knows the answer and $\frac{1}{4}$ be the probability that he guesses. Assuming that a student who guesses at the answer will be correct with probability $\frac{1}{4}$. What is the probability that a student knows the answer, given that he answered it correctly ?

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7. A manufacturer has three machine operators A, B and C. The first operator A produces 1% defective items, where as the

other two operators B and C pro duce 5% and 7% defective items respectively. A is on the job for 50% of the time, B is on the job for 30% of the time and C is on the job for 20% of the time. A defective item is produced, what is the probability that it was produced by A?

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8. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are

0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver?

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9. Suppose a girl throws a die. If she gets a 5 or 6, she tosses a coin three times and notes the numbers of heads. If she gets 1,2,3, or 4, she tosses a coin once and notes whether a head or a tail is obtained. If she attained

exactly one head what is the probability that she threw 1,2,3, or 4 with the die?

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10. 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 introduced was by the second group.

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11. 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 both diamonds. Find the probability of the lost card being a diamond.

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Solved Examples Section Vi

1. Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as : number greater than 4

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2. Find the probability distribution of number of heads in two tosses of a coin

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3. A coin is biased so that the head is 3 times as likely to occur as tail. If the coin is tossed twice, find the probability distribution of number of tails.

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4. Two cards are drawn (without replacement) from a well shuffled deck of 52 cards. Find

probability distribution table and mean of number of kings.

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5. Two cards are drawn successively with replacement from a well-shuffled deck of 52 cards. Find the probability distribution of the number of aces.

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6. From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the probability distribution of the number of defective bulbs.

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7. Find the mean number of heads in three tosses of a fair coin.

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8. In a meeting, 70% of the members favour and 30% oppose a certain proposal. A member is selected at random and we take $X = 0$ if he opposed, and $X = 1$ if he is in favour. Find $E(X)$ and $Var(X)$.

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9. Let X denote the sum of the numbers obtained when two fair dice are rolled. Find the variance and standard deviation of X.

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10. Two dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X.

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11. A class has 15 students whose ages are 14, 17, 15, 14, 21, 17, 19, 20, 16, 18, 20, 17, 16, 19 and 20 years. One student is selected in such a manner that each has the same chance of

being chosen and the age X of the selected student is recorded. What is the probability distribution of the random variable X? Find mean, variance and standard deviation of X.

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12. Two numbers are selected at random (without replacement) from the first six positive integers. Let X denote the larger of the two numbers obtained. Find E(X).

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Solved Examples Section Vii

1. A die is thrown 6 times . If 'getting an odd number' is a success, what is the probability of

(i) 5 successes ?

(ii) at least 5 successes ?

(iii) at most 5 successes ?

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2. There are 5% defective items in a large bulk of items. What is the probability that a sample of 10 items will include not more than one defective item?

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3. A bag consists of 10 balls each marked with one of the digits 0 to 9. If four balls are drawn successively with replacement from the bag,

what is the probability that none is marked with the digit 0?

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4. A pair of dice is thrown 4 times. If getting a doublet is considered a success then find the probability of exactly 2 successes.

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5. The probability that a bulb produced by a factory will fuse after 150 days of use is 0·05. Find the probability that out of 5 such bulbs: (i) none (ii) not more than one (iii) more than one (iv) at least one will fuse after 150 days of use.

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6. Five cards are drawn successively with replacement from a well-shuffled deck of 52

cards. What is the probability that none is a spade?

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7. It is known that 10% of certain articles manufactured are defective. What is the probability that in a random sample of 12 such articles, 9 are defective?

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8. On a multiple choice examination with three possible answers for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing ?

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9. Find the probability of throwing at most 2 sixes in 6 throws of a single die.

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10. In an examination, 20 questions of true-false type are asked. Suppose a student tosses a fair coin to determine his answer to each question. If the coin falls heads, he answers 'true', if it falls tails, he answers 'false'. Find the probability that he answers at least 12 questions correctly.

11. Suppose X has a binomial distribution $B\left(6, \frac{1}{2}\right)$. Show that $X = 3$ is the most likely outcome .

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12. A person buys a lottery ticket in 50 lotteries, in each of which his chance of winning a prize is $\frac{1}{100}$. What is the probability that he will win a prize exactly once.

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Assignment Section I Multiple Choice Question

1. In a box containing 100 bulbs, 10 are defective. The probability that out of a sample of 5 bulbs none is defective is :

A. 10^{-1}

B. $\left(\frac{1}{2}\right)^5$

C. $\left(\frac{9}{10}\right)^5$

D. $\left(\frac{9}{10}\right)$

Answer: C

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2. In rolling of two fair six faced dice, the probability of getting total 7 is :

A. 0

B. $\frac{1}{6}$

C. $\frac{5}{36}$

D. 1

Answer: B

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3. If $P(A) = \frac{1}{3}, P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{6}$ then $P(A' \cap B')$ is

A. $\frac{1}{3}$

B. $\frac{1}{2}$

C. $\frac{5}{6}$

D. $\frac{1}{6}$

Answer: A

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4. If $P(A) = \frac{6}{11}, P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{-1}{11}$ then $P(A \cap B)$ is

A. $\frac{3}{11}$

B. $\frac{4}{11}$

C. $\frac{5}{11}$

D. None of these .

Answer: B

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5. If A and B are two independent events , where $P(A) = 0.3, P(B) = 0.4.$, then $P(A \cup B)$ is

A. 0.7

B. 0.1

C. 0.12

D. None of these .

Answer: C

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6. If $P(A) = 0.2, P(B) = 0.4, P(A \cup B) = 0.6$, then $P(A/B)$ is equal to

A. 0.8

B. 0.5

C. 0.3

D. 0

Answer: D

7. A fair die is rolled. Consider events A = {2,4,6} , B = {1,3} and C = {2,3,5,6}, Find p(A/B) and P(B/A).

8. A coin is tossed 4 times. If getting a tail is a success, then the probability of 3 successes is :

A. $\frac{1}{4}$

B. $\frac{1}{6}$

C. $\frac{1}{8}$

D. None of these .

Answer: A

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Assignment Section Ii Short Answer Type Question

1. If $P(A) = \frac{2}{13}, P(B) = \frac{3}{13}$ and $P(A \cap B) = \frac{1}{13}$ then find $P(A/B)$.

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2. If $P(A) = 0.3, P(B) = 0.6$ and $P(B/A) = 0.5$, find $P(A/B)$.

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3. A pair of fair dice is thrown. Find the probability that the sum is 10 or greater if 5 appears on the first dice .

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4. A die is thrown three times :

E : 4 appears on the third toss .

F : 6 and 5 appear repectively on first two torses.

Find $P(E/F)$.

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5. Assume that each born child is equally likely to be a boy or a girl. If a family has two children, what is the conditional probability that both are girls given that the youngest is a girl.

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6. A family has two children. What is the probability that both the children are boys

given that at least one of them is a boy ?

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7. Findthe probability of getting king card when a card is drawn frm well shuffled pack 52 cards.

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8. Two coins are tossed once, where

(i) E : tail appears on one coin, F : one coin

shows head

(ii) E : no tail appears, F : no head appears

Determine $P(E/F)$.

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9. One card is drawn from a well-shuffled pack of 52 cards. E is the event "the card drawn is a king or queen" and F is the event " the card drawn is a queen or an ace ". Then find the probability of the conditional event E/F .

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10. A bag contains 3 red and 7 black balls. Two balls are selected at random without replacement . If the second selected is given to be red, what is the probability that the first selected is also red ?

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Assignment Section Iii

1. If $P(A) = 0.38, P(B) = 0.5$ find $P(A \cup B)$ if A and B are independent events .

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2. Let A and B are independent events with $P(A) = 0.3$ and $P(B) = 0.4$ find

(i) $P(A \cap B)$

(ii) $P(A \cup B)$

(iii) $P(A/B)$

(iv) $P(B/A)$

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3. Given two independent events A,B such that $P(A) = 0.3, P(B) = 0.6$ find :

(i) P(A and B)

(ii) P(A and not B)

(iii) P(A or B)

(iv) neither (A nor B)

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4. If A and B are independent events . Find P(B), if $P(A) = 0.40$ and $P(A \cup B) = 0.70$

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5. For two events A and B, let $P(A) = 0.4$ and $P(B) = p$ and $P(A \cup B) = 0.6$

(i) Find p, so that A and B are independent events.

(ii) Find p, so that A and B are matually exclusive events .

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6. If $P(A) = \frac{1}{2}, P(B) = \frac{7}{12}p$ (not A or not B)= $\frac{1}{4}$

State whether A and B are independent .

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7. An unbiased die is thrown twice. Let the event A be 'odd number on the first throw' and B the event 'odd number on the second throw'. Check the independence of the events A and B.

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8. A die is thrown. If E is the event 'the number appearing is a multiple of 3' and F be the event 'the number appearing is even' then find whether E and F are independent ?

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9. Three coins are tossed simultaneously. Consider the event E 'three heads or three

tails', F 'at least two heads' and G 'at most two heads'. Of the pairs (E,F), (E,G) and (F,G), which are independent? which are dependent?

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10. A coin is tossed thrice . In which of the following cases are the events E and F independent ?

(i) E : "the first throw results in head" . F : "the last throw results in tail" .

(ii) E : "the number of heads is two" . F : "the

last throw results in head" .

(iii) E : " the number of heads is odd" . F : " the number of tails is odd" .

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Assignment Section Iv

1. An urn contains 4 red and 7 blue 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.

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2. An urn contains 6 red and 4 blue balls . Two bolls are drawn at random with replacement . Find the probability of getting

2 red balls

(ii) 2 blue balls

(iii) one red and one blue ball .

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3. An urn contains 10 black and 5 white balls. Two balls are drawn from the urn one after the other without replacement. What is the probability that both drawn balls are black?

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4. 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 ?

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5. A bag contains 3 red and 5 black balls and 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 .

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6. There are three urns A,B and C . Urn A contains 4 white balls and 5 blue balls . Urn B

contains 3 white balls and 4 blue balls . Urn C contains 3 white balls and 6 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 ?

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7. In bag A , there are 5 white and 8 red balls, in bag B, 7 white and 6 red balls and in bag C, 6 white and 5 red balls. One ball is taken out a

random from each bag. Find the probability that all the three balls are of the same colour.

8. Three cards are drawn successively, without replacement from a pack of 52 well shuffled cards. What is the probability that first two cards are kings and the third card drawn is an ace?

9. Three groups of children contain respectively 3 girls and 1 boy , 2 girl and 2 boys , 1 girl and 2 boys . One child is selected at random from each group.The chance that the three selected children consists of one girl and 2 boys is

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10. A and B appeared for an interview. The probability of their selection is $\frac{1}{3}$ and $\frac{1}{4}$

respectively. Find the probability that both selected

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11. Rishav and Mahesh appeared for an interview. The probability of their selection is $\frac{1}{3}$ and $\frac{1}{5}$ respectively . Find the probability .

(i) both selected

(ii) only one of them selected

(iii) neither of them selected .

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12. A and B appeared for an interview. The probability of their selection is $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that both selected

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13. The probability of A solving a problem is '(2)/(7)' and that of B solving it is $\frac{3}{7}$. What is the probability that

(i) at least one of them will solve the problem

?

(ii) Only one of them will solve the problem ?

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14. A problem is given to three students, whose chances of solving it are : $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{2}$ respectively. Find the probability that exactly one of them may solve it.

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15. A speaks truth in 70% of the cases and B in 80% of the cases. In what percent of cases are they likely to agree in stating the fact ? Do you think, when they agree mean both are speaking truth ?

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16. The probability of hitting a plane by an anti-aircraft gun in 4 shots is $\frac{2}{5}, \frac{3}{10}, \frac{1}{5}$ and $\frac{1}{10}$ respectively . What is the probability gun hits the plane ?

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17. 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.

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Assignment Section V

1. One bag contains 5 white and 6 black balls. Another bag contains 7 white and 3 black balls. One ball at random is transferred from the first bag to the second bag and then a ball is drawn from the second bag . Find the probability that the ball drawn is white .

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2. A bag contains 4 yellow and 5 red balls and another bag contains 6 yellow and 3 red balls .

A ball is drawn from the first bag and without seeing its colour, it is put into the second bag . Find the probabilty that if now a ball is drawn from the second bag, it is yellow in colour .

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3. There are two bags I and II . Bag I contains 3 white and 2 red balls and Bag II contains 5 white and 4 red balls. One ball is drawn at random from one of the bags and is found to

be red. Find the probability that it was drawn from bag II .

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4. 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. The ball so drawn is found to be red in colour. Find the probability that the transferred ball is black

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5. A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls. One of the two bags is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from the first bag.

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6. Bag I contains 3 red and 4 black balls while another Bag II contains 5 red and 6 black balls.

One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from Bag II.

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7. A person has undertaken a construction job. The probabilities are 0·65 that there will be strikes 0·80, that the construction job will be completed on time if there is no strike, and 0·32 that the construction job will be completed on time if there is a strike.

Determine the probability that the construction job will be completed on time.

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8. Bag I contains 3 red and 4 black balls while another Bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from Bag II.

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9. Suppose that the reliability of a HIV test is specified as follows: Of people having HIV, 90% of the test detect the disease but 10% go undetected. Of people free of HIV, 99% of the test are judged HIV–ive but 1% are diagnosed as showing HIV+ive. From a large population of which only 0.1% have HIV, one person is selected at random, given the HIV test, and the pathologist reports him/her as HIV+ive. What is the probability that the person actually has HIV?


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10. In a bolt factory, three machines A, B and C manufacturers 25, 35 and 40 percent of the total bolts . Of their output 5, 4 and 2 percent are defective respectively. A bolt is drawn at random and found to be defective. Find the probability that it was manufactured by machine B.

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11. Give 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 ?

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12. A motorcycle manufacturing company has two plants A and B. Plant A produces 70% of motorcycle and plant B produces 30% . At plant A, 80 of motorcycles are rated as of standard quality and at plant B, 90% of the motorcycles are rated as of standard quality . A motorcycle is chosen at random and is found to be of standard quality . What is the chance that it has come from plant A ?

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13. A bag B_1 contains one red and one white marble and bag B_2 contains 3 red and one white marble. A bag is chosen by a toss of a coin and one marble is drawn at random from the box chosen. Given that a red marble is obtained, what is the probability that the marble was drawn from bag B_1 ?

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14. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000

truck drivers . The probability of an accident involving a scooter, car and a truck is $\frac{1}{100}, \frac{3}{100}$ and $\frac{3}{20}$ respectively . One of the insured persons meets with an accident. What is the probability that he is a (i) scooter driver (ii) car driver and (iii) truck driver ?

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15. 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.

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16. If P(A) = 0 , P(B) = 1/3 then find P(B/A) .

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Assignment Section Vi

1. Find the probability distribution of number of doublets in three throws of a pair of dice.

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2. Find the probability distribution of the number of sixex in two tosses of a die .

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3. Find the probability distribution of number of times getting a 5 or a 6 in two tosses of a die .

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4. Find the probability distribution of the number of times a total of 9 " appears in two tosses of two dice .

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5. Find the probability distribution of number of heads in four tosses of a coin.

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6. A coin is tossed 5 times . X is the number of heads of observed . Find the probability distribution of X .

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7. Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the

(i) number of queens

(ii) number of aces

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8. Two cards are drawn simultaneously without replacement from a well shuffled deck of 52 cards. Find the probability distribution of the

(i) number of kings

(ii) number of queens .

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9. Find the probability distribution of white balls drawn when 3 balls are drawn one by one without replacement from a bag containing 4 white and 6 red balls .

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10. A bag contains 2 white , 3 red and 4 blue balls. Two balls are drawn at random from the bag . If the random variable X denotes the number of white balls among the two balls drawn, describe the probability distribution of X :

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11. Three cards are drawn successively with replacement from well- shuffled deck of 52

cards. A random variable X denotes the number of spades in three cards. Determine the probability distribution of X .

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Assignment Section Vii

1. Find the mean number of heads in three tosses of a fair coin.

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2. Two cards are drawn successively with repalcement from a well-shuffled pack of 52 cards. Find the probability distribution of the number of kings and hence find the mean of the distribution .

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3. Two cards are drawn simultaneously (without replacement) from a well-shuffled pack of 52 cards . Find the mean and variance of the number of red cards .

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4. Two dice are thrown simultaneously and getting a number "less than 3 " is consider a success`. Obtain the mean and variance of the number of successes .

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5. Two bad eggs are mixed accidentally with 10 good ones. Three eggs are drawn at random

without replacement from this lot . Find the mean and variance for the number of bad eggs .

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6. A die tossed twice . Getting a number greater than 4 is considered a success . Find the variance of the probability distribution of the number of successes .

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Assignment Section Viii

1. A coin is tossed 5 times . What is the probability of getting at least 3 heads ?

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2. Six coins are tossed simultaneously . What is the probability of getting 3 heads.

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3. A pair of dice is thrown 3 times. If getting a doublet is considered a success, find the probability of 2 successes .

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4. A pair of dice is thrown 7 times . If getting a total 7 is considered a success, what is the probability of :

(i) no success

(ii) 6 successes

(iii) at least 6 successes and

(iv) at most 6 successes ?

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5. In large collection of plants , 3 out of 5 are daffodils and the rest are tulips . If they planted at random . Calculate the probability that in a row of five plants

(i) all are daffodils

(ii) at least four are daffodils

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6. Determine the Binomial Distribution for each which the mean is 4 and standard deviation is $\sqrt{3}$.

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7. A bag contains 5 white , 7 red and 8 black balls . If four balls are drawn one by one with replacement, what is the probability that :

(i) all are white ?

(ii) only 3 are white ?

(iii) none is white ?

(iv) at least three are white ?

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8. Five dice are thrown simultaneously . If the occurrence of an even number in a single die is considered a success, find the probability of at most 3 successes .

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9. Ten eggs are drawn successively with replacement from a lot containing 10% detective eggs . Find the probability that there is exactly one defective egg .

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10. There are 20% chances for a worker of an industry to suffer from an occupational disease, 50 workers were selected at random and examined for the occupational disease.

Find the probability that :

(i) only one worker is found suffering from the disease

(ii) more than 3 are suffering from the disease and

(iii) none is suffering from the disease .

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11. Three coins are tossed simultaneously. Find the probability of getting atleast one tail.

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12. Find the probability that in a family of 4 children there will be :

(i) atleast 1 boy

(ii) atleast 1 boy and 1 girl

Assume that the probability of a male birth is $\frac{1}{2}$.

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13. If there are two children in a family,find the probability that there is atleast one girl in a

family.

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14. Suppose X has a binomial distribution $B\left(4, \frac{1}{3}\right)$. Find the most likely outcome .

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15. If a fair coin is tossed 10 times, find the probability of exactly zero heads

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Previous Year Board S Questions For Practice Multiple Choice Question

1. The mean of binomial distribution is 3 and its variance is $\frac{3}{2}$. The number if trails is :

A. 2

B. 6

C. 12

D. 9

Answer: B

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2. If $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$ then find $P(A \cup B)$.

A. $\frac{11}{26}$

B. $\frac{26}{11}$

C. $\frac{5}{13}$

D. $\frac{2}{5}$

Answer: A

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3. A die is tossed twice. The probability of getting a doublet is

A. $\frac{1}{2}$

B. $\frac{1}{6}$

C. $\frac{1}{3}$

D. None of these

Answer: C

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4. A die is thrown once, the probability of getting a number less than 3 is

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $\frac{1}{6}$

D. 0

Answer: A

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Previous Year Board S Questions For Practice

1. If $P(A) = \frac{5}{7}, P(B) = \frac{3}{7}$ and $P(A \cup B) = \frac{6}{7}$, then find

(i) $P(A \cap B)$

(ii) $P(B/A)$

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2. If $P(A) = \frac{1}{5}, P(B) = \frac{3}{10}$ and $P(A \cap B) = \frac{3}{25}$, then find

(i) $P(A/B)$

(ii) $P(A \cup B)$

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3. If $P(A/B) = \frac{2}{5}, 2P(A) = P(B) = \frac{5}{9}$, find

(i) $P(A \cap B)$

(ii) $P(A \cup B)$

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4. If A and B are two independent events such that $P(A \cup B) = 0.6$ and $P(A) = 0.2$ find P(B).

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5. If $P(A) = 0.5, P(A \cup B) = 0.7$, find P(B) .

Here A and B are independent events .

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6. If $P(A) = 0.2, P(A \cup B) = 0.5,$ find P(B).

Here A and B are independent events .

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7. A problem is given to three students, whose chances of solving it are : $\frac{1}{3}, \frac{1}{5}$ and $\frac{1}{6}$ respectively. Find the probability than exactly one of them may solve it.

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8. A problem is given to three students, whose chances of solving it are $\frac{1}{5}, \frac{1}{7}$ and $\frac{1}{3}$ respectively .

find the probability that exactly one of them may solve the problem .

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9. Two bags contain 6 red and 4 black, 2 red and 6 black balls. One ball is drawn at random from one of the bags and found to be red.

Find the probability that it is drawn from the second bag .

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10. An unbiased coin is thrown thrice. If the random variable X denotes the number of heads obtained, describe the probability distribution of X .

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11. A coin is tossed 4 times. X is the number of heads observed. Find the probability distribution of X .

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12. Two cards are drawn (without replacement) from a well shuffled deck of 52 cards. Find probability distribution table and mean of number of kings.

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13. Four dice are thrown simultaneously. If the occurrence of 2, 4 or 6 in single die is considered a success, find the probability of at least three successes.

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14. In four throws with a pair of dice, what is probability of throwing doublet at least twice .

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15. Find the probability distribution of number of doublets in three throws of a pair of dice.

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16. A problem is given to three students whose chances of solving it are $\frac{1}{3}, \frac{1}{2}$ and $\frac{1}{6}$ respectively.

What is the probability that at least one of them may solve it ?

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17. A problem of mathematics is given to three students whose chances of solving it are $\frac{1}{3}, \frac{1}{4}$ and $\frac{1}{5}$ and respectively. What is the probability that the problem will be solved .

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18. one bag contains 6 white and 5 black balls. Another bag contains 5 white and 3 black balls. One ball at random is transferred from the first bag to the second bag and then a ball

is drawn from the second bag. Find the probability that the ball drawn is white .

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19. A bag 'A' contains 5 red and 7 blue balls, while the other bag 'B' contains 7 red and 4 blue balls. A ball is transferred (without noticing its colour) from the bag 'A' to the bag 'B' . Then a ball is drawn from bag 'B' . Find the probability that the ball drawn is blue .

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20. Let E and F be events with $P(E) = \frac{3}{5}, P(F) = \frac{3}{10}$ and $P(E \cap F) = \frac{1}{5}$. Are E and F independent?

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21. A die is thrown twice and the sum of the numbers appearing is observed to be 6. What is the conditional probability that the number 4 has appeared at least once?

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22. A die is thrown. If E is the event 'the number appearing is a multiple of 3' and F be the event 'the number appearing is even' then find whether E and F are independent ?

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23. Given that the two numbers appearing on throwing two dice are different. Find the

probability of the event 'the sum of numbers on the dice is 4'.

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24. If a fair of coin is tossed 10 times, find the probability of :

(i) exactly six heads

(ii) at least six heads .

(iii) at most six heads

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25. In a single throw of three dice, determine the probability of getting

(i) a total of 5

(ii) a total of at most 5

(iii) a total of at least 5 .

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26. In a single throw of two dice, find the probability of total of 9 or I 0.

Watch Video Solution

27. In a single throw of two dice, find the probability of total of 9 or 11

Watch Video Solution

28. Five dice are thrown simultaneously . If the occurence of $1, 3$ or 5 in a single die in consider a success, then find the probability of at least three successes.

Watch Video Solution

29. Ten coins are thrown simultaneously . Find the probability of getting

(i) at least 7 heads

(ii) at least 8 heads.

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30. An unbiased die is thrown twice. Let the event A be 'odd number on the first throw' and B the event 'odd number on the second throw'. Check the independence of the events A and B.

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31. Find the probability of getting 5 exactly twice in 5 throws of a die .

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32. A die is tossed thrice. Find the probability of getting an odd number at least once.

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33. Find the probability distribution of the number of tails when three coins are tossed simultaneously.

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34. A coin is biased so that the head is 3 times as likely to occur as tail. If the coin is tossed twice, find the probability distribution of number of tails.

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35. A problem is given to three children whose chances of solving the problem are $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{1}{6}$

What is the probability

(i) at least one of them solve it ?

(ii) only one of them solve it correctly ?

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36. In a tape recorder factory, three machines A, B and C produced 50%, 30% and 20% of

total production. The percentage of the defective output of these machines are 3%, 4% and 5% respectively. A tape recorder is selected randomly and found to be defective, find the probability that it is produced by machine A.

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37. 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. The ball so drawn is found to be red in colour. Find the probability that the transferred ball is black

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38. Let a pair of dice be thrown and the random variable X be the sum of the numbers that appear on the two dice. Find the mean (or expectation) of X.

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39. Anurn contains 25 balls of which 10 balls bear a mark X and the remaining 15 bear a mark 'Y' . A ball is drawn at random from the urn, its mark is noted down and it is replaced . If 6 balls are drawn in this way, find the probability that

(i) all will bear X mark .

(ii) not more than 2 will bear 'Y' mark .

at least one ball will bear 'Y' mark .

(iv) the number of balls with 'X' mark and 'Y' mark will be equal .

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40. There are two bags I and II . Bag I contains 4 white and 3 red balls and bag II contains 6 white and 5 red balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag II.

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41. A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls.

One of the two bags is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from the first bag.

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42. Find the probability distribution of number of heads in two tosses of a coin

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43. Find the mean and variance of the number obtained on a throw of an unbiased die.

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