MATHS

BOOKS - ARIHANT PUBLICATION

PROBABILITY

Part I Sample Question

1. Find the probability of obtaining a total of 9 in a single throw of two dice.

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2. 4 cards are drawn from a well-shuffled deck of 52 cards. What is the probability of obtaining 3 diamond cards?

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3. Let A and B be events with P(A)= $\frac{1}{4}, P(B) = \frac{3}{4}, P(A \cap B) = \frac{1}{4}$ find $P(A \cup B)^c$

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4. There are 25 tickets bearing numbers from 1 to 25. One ticket is drawn at random. Find the probability

that the number on it is a multiple of 5 or 6.

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

(i) $P(A \cap B)(ii) P(A/B)(iii) P(B/A)$

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6. Two dice are thrown. Find the probability of getting an even number on first die, if the outcomes on the two dice always exhibits a sum of 8.

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7. Given that, the two numbers appearing on throwing two dice are different. Find the probability of the events:

(i) The sum of numbers on the dice is 4.

(ii) The sum of numbers on the dice is not 4.

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Part Ii Sample Question

1. Find the probability of drawing a diamond card in each of the two consecutive draws from a well-shuffled

pack of cards, if the card drawn is not replaced after the first draw,

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2. A bag contains 19 tickets, numbered from 1 to 19. A ticket is drawn and then another ticket is drawn without replacement. Find the probability that both tickets will show even numbers.

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3. A bag contains 5 white, 7 red and 8 black ball. If four balls are drawn one by one without replacement, then

find the probability of getting all white balls.

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

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5. A bag contains 5 white and 4 red balls, a second bag has 4 white and 3 red balls, a third bag has 5 white and 4 red balls. A ball is randomly picked from the first

bag and put in the second, then another ball is picked at random from the second tag and put in the third. if now a ball is randomly picked from the third bag, what is the probability that it is white?

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6. if $P(A) = 0.4, P(B) = P, P(A \cup B) = 0.6$ and A and B are given to be independent events, find the value of P

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

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Part Iii Sample Question

1. Let bag A contains 4 black and 6 red balls and bag B contains 7 black and 3 red balls. A die is thrown. If 1 or 2 appears on it, then bag A is chosen, otherwise bag B.

If two balls are drawn at random (without replacement) from the selected bag, then find the probability of one of them being red and another black.

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2. A box contains 4 orange and 4 green balls, another box contains 3 orange and 5 groen balls, one of the two box is selected at random and a ball is drawn from the box, which is found to be orange. Find the probability that the ball is drawn from the first box.

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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 time and 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?

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4. 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% and 1% respectively are defective bolts. A bolt is drawn at random from the product and is found to be defective.

Find the probability that this is not manufactured by machine B.

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Part Iv Sample Question

1. A bag contains 2 black and 1 green balls. One ball is drawn at random and then put back in the box after noting its colour. The process repeated again. Let X denotes the number of green balls recorded in the two draws, describe X.

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2. 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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3. From a lot of 15 bulbs which include 5 defectives, a sample of 2 bulbs is drawn at random (without replacement). Find the probability distribution of the number of defective bulbs.

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

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5. An urn contains 4 white and 3 red balls. Let X be the number of red balls in a random draw of 3 balls. Find the mean and variance of X.

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6. Two numbers are selected at random (without replacement) from positive integers 2, 3, 4, 5, 6 and 7. Let X denote the larger of the two numbers obtained. Find the mean and variance of the probability distribution of X.

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Part V Sample Question

1. Five balls are drawn successively from a bag containing 8 black and 9 blue balls. Tell whether or not the trials of drawing balls are Bernoulli trials when

after each draw the ball drawn is

replaced.

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2. Five balls are drawn successively from a bag containing 8 black and 9 blue balls. Tell whether or not the trials of drawing balls are Bernoulli trials when after each draw the ball drawn is

not replaced in bag.

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3. If a fair coin is tossed 10 times, then find the probability of

exactly 6 heads.

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4. If a fair coin is tossed 10 times, then find the probability of

atleast 6 heads.

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5. If a fair coin is tossed 10 times, then find the probability of

atmost 6 heads.

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6. A factory produces bulbs. The probability that any one bulb is defective is 1/50 and they are packed in boxes of 10. From a single box, find the probability that

none of the bulbs is defective.

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7. A factory produces bulbs. The probability that any one bulb is defective is 1/50 and they are packed in boxes of 10. From a single box, find the probability that

exactly two bulbs are defective.

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8. A factory produces bulbs. The probability that any one bulb is defective is 1/50 and they are packed in boxes of 10. From a single box, find the probability that

more than 8 bulbs work properly.

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9. Four cards are drawn successively with replacement from a well-shuffled deck of 52 cards, What is the probability that

all the four cards are spades?

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10. Four cards are drawn successively with replacement from a well-shuffled deck of 52 cards, What is the probability that

only 2 cards are spades?

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11. If X-following a Binomial distribution with parameter n=6 and p, and if 4 P(X=4)=P(X=2) find p.

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12. A die is thrown thrice, getting an even number is considered a success. What is the mean and variance of the Binomial distribution?

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13. If X follows a Binomial distribution with mean 4 and variance 2, then find $P(X \geq 27)$.

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Part I Question For Practice Very Short Answer Type Questions

1. A bag contains 7 white and 9 black balls. If a ball is drawn at random, what is the probability that it is white?

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2. Write the probability of getting exactly two heads in a single toss of two unbiased coins.

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3. If a die is thrown twice in succession, then find the probability that the sum of numbers obtained is 8.

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4. Two dice are rolled in succession. Find the probability that the first dice shows atmost 3 and the second shows an odd number not less than 3.

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5. There are 6 red and 4 blue balls in a bag. Two balls are drawn at random without replacement. Find the probability that the balls are of different colours?

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6. Three dice are rolled. What is the probability that the same numbers will appear on all the dice?

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7. Find the probability of getting three heads, when four coins are tossed once?

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8. Write the probability that two persons have the same birthday (considering the relevant year not to be a leap year).

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9. A and B are two events with $P(A) = \frac{3}{8}$ and $P(A \cap B) = \frac{1}{4}$ find $P(A \cap B^c)$

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10. If $P(A) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{3}$ then what is the probability of $(A - B)$

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11. Events E and F are such that $P(\text{not}\, E \text{or not}\, F) = 025$, State whether E and F are mutually exclusive.

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12. The probability that atleast one of the two events A and B occurs is 0.6. If A and B occur simultaneously with probability 0.3, then evaluate $P(\overline{A}) + P(\overline{B})$.

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13. If $P(A) = 0.6$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$, then fimd the value of $P\left(\frac{B}{A}\right)$?

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14. If $P\left(\frac{A}{B}\right) > P(A)$ then prove that $P\left(\frac{B}{A}\right) > P(B)$

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15. If events A and B are not mutually exclusive and $P\left(\frac{A}{B}\right) = P\left(\frac{B}{A}\right)$ then prove that P(A)=P(B)

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16. A class consists of 25 boys and 15 girls. If a committee of 6 is to be chosen at random, find the probability that are exactly 3 boys in the committee

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Part I Question For Practice Short Answer Type Questions

1. If a leap year is selected at random, then what is the chance that it will contain 53 Tuesday?

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2. Two balls are drawn from a bag containing 6 red and 4 yellow balls. Find the probability that atleast one of the ball is yellow?

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3. If 8 person are to sit around a table what is the probability that X and Y don't sit together

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4. For two events A and B, if P(A) $= \frac{3}{4}$ and $P(B) = \frac{5}{8}$ Then show that $\frac{3}{8} \leq P(A \cap B) \leq \frac{5}{8}$

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5. If P(A)=0.8 P(B)=0.5 and $P\left(\frac{B}{A}\right)$ =0.4 then find the value of $P(A \cup B)$

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6. A fair die is rolled consider the following events A= {2,4,6} ,B={4,5} and C={3,4,5,6} Find

$P(A \cup B / C)$

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7. A fair die is rolled consider the following events A= {2,4,6} ,B={4,5} and C={3,4,5,6} Find

$P(A \cap B / C)$

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8. If A and B are two events such that $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cap B) = 0.2$, then find $P\left(\frac{A}{B^c}\right)$.

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9. A and B are two events. If $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{4}$, then find $P(A^c \cap B^c)$ and $P(A \cap B^c)$

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10. A and B are two events. If $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{4}$, then find $P\left(\frac{A}{B^c}\right)$.

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

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12. If A and B are two events such that $P(A)=\frac{1}{2}P(B)P(B)=\frac{1}{3}$ and $P(A\cap B)=\frac{1}{4}$ then find

$P\left(\overline{A}/B\right)$

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13. If $P(B) = \frac{3}{5}, P(A/B) = \frac{1}{2}$ and $P(A \cup B) = \frac{4}{5}$ then find $P(A \cup B) + P(A \cap B)$

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14. If A and B are two events such that $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$ then find

$P(B/A)$

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15. Two integers are selected at random from integers 1 to 11. If the sum is even, then find the probability that both the numbers are odd.

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16. 10% of the bulbs produced in a factory are of red colour and 2% are red and defective. If one bulb is picked up at random, then determine the probability of its being defective, if it is red.

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17. In a college, 70% students pass in Physics, 75% students pass in Mathematics and 10% students fail in both. One student is chosen at random. What is the probability that (1) he passes in Physics and Mathematics?

he passes in Physics, given that he passes in Mathematics?

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18. In a college, 70% students pass in Physics, 75% students pass in Mathematics and 10% students fail in both. One student is chosen at random. What is the

probability that (1) he passes in Physics and Mathematics?

he passes in Mathematics, given that he passes in Physics?

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19. In a college, 70% students pass in Physics, 75% students pass in Mathematics and 10% students fail in both. One student is chosen at random. What is the probability that (1) he passes in Physics and Mathematics?

he passes in Physics, given that he passes in Mathematics?

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20. 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, then what is the probability that it will be an easy question, given that it is a multiple choice questions?

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21. Assume that each born child is equally likely to be a boy or a girl. If a family has two children, then what is

the conditional probability that both are girls? given that

(i) the youngest is a girl.

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

atleast one is a girl?

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23. Assume that in a family, each child is equally likely to be a boy or a girl. A family with three children is chosen at random. Find the probability that the eldest child is girl, given that the family has atleast one girl.

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24. If E, F and G are events in sample space S, with G4 $\neq \phi$ then prove that

If E, F and G are events in sample space S, with G4 $\neq \phi$ then prove that

$$P((E \cup F)/G) - P(E/G) + P(F/G) - P(E \cap F/G)$$

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25. If E, F and G are events in sample space S, with G4 $\neq \phi$ then prove that

If E, F and G are events in sample space S, with G4 $\neq \phi$ then prove that

$E \subseteq F \rightarrow P(E/G) \leq P(F/G)$

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26. If $P(A) = 0.4$, $P(B/A) = 0.3$ and $P\left(\frac{B^c}{A^c}\right) = 0.2$. Find $P(B)$.

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27. The probability that student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing English examination is 0.75, what is the probability of passing the Hindi Examination?

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Part Ii Question For Practice Very Short Answer Type Questions

1. Two cards are drawn at random and without replacement from a pack of 52 playing cards. Find the probability that both the cards are black

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2. 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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3. If an event A is independent of it self, then what is $P(A)$?

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

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5. Events A and B are such that P(A) $= \frac{1}{2} P(B) = \frac{7}{12}$ and P(not A or not B) $= \frac{1}{4}$ state wheter A and B are independent

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6. A die is tossed thrice. Find the probability of getting an even number atleast once.

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Part Ii Question For Practice Short Answer Type Questions

1. A person draws three cards at random one after another from a pack of 52 cards. Find the probability that all these cards are spades.

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

$P(B/A)$

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3. Given two independent events A and B such that P(A) = 0.3 and P(B) = 0.6. Find

P(A or B).

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4. If A and B are independent events, then Prove that

$P(A) = P(A \cap B) + P(A \cap \overline{B})$

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5. If A and B are independent events, then Prove that

$$P(A \cup B) = P(A \cap B) + P\left(A \cap \overline{B}\right) + P\left(\overline{A} \cap B\right)$$

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

first ball is black and second ball is red.

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8. Two dice are thrown together. Let A be the event 'getting 6 on the first die and B be the event 'getting 2 on second die. Are the events A and B independent?

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

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11. Probability of solving specific problem independently by A and B are 1/2 and 1/3, respectively. If both try to solve the problem independently then find the probability that

the problem is solved.

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12. Probability of solving specific problem independently by A and B are 1/2 and 1/3, respectively. If both try to solve the problem independently then find the probability that

exactly one of them solves the problem.

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13. A can hit a target 4 times out of 5 times, B can hit the target 3 times out of 4 times and C can hit the target 2 times out of 3 times. They fire simultaneously. Find the probability that

any two out of A, B and C will hit the target.

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14. A can hit a targe: 4 times out of 5 times, B can hit the target 3 times out of 4 times and C can hit the target 2 times out of 3 times. They fire simultaneously.

Find the probability that

none of them will hit the target.

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15. The probabilities of two students A and B coming to the school in time are 3/7 and 5/7 respectively. Assuming that the events, 'A coming in time' and 'B coming in time' are independent, find the probability of only one of them coming to the school in time.

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16. A speaks truth in 60% of the cases, while B in 90% of the cases. In what per cent of cases, are they likely to contradict each other in stating the same fact?

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17. Three coins are tossed simultaneously. Consider the event E .three heads or three tails., F .atleast two heads. and G .atmost two heads.. Of the pairs (E, F), (E, G) and (F, G), which are independent or dependent events ?

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18. A and B throw a pair of dice alternately. A wins the game, if he gets a total of 6 and B wins, if she gets a total of 7. If A starts the game, then find the probability of winning the game by A in third throw of the pair of dice.

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Part Ii Question For Practice Long Answer Type Questions

1. Two dice are thrown together and the total score is noted. The events E, F and G are 'a total of 4', 'a total of 9 or more' and 'a total divisible by 5', respectively.

Calculate P(E), P(F) and P(G) and decide which pairs of events, if any are independent?

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2. If A and B are two independent events such that $P(\overline{A} \cap B) = \frac{2}{15}$ and $P(A \cap \overline{B}) = \frac{1}{6}$ then find P(A) and P(B)

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Part Iii Questions For Practice Short Answer Type Questions

1. A bag contains 4 white and 5 black balls. Another bag contains 9 white and 7 black balls. A ball is transferred from the first bag to the second bag and then a ball is drawn at random from the second bag. Find the probability that the ball drawn is white.

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2. Three machines E 1, E 2, and E 3, in a certain factory producing electric bulbs, produce 50%, 25% and 25 % respectively, of the total daily output of electric bulbs. It is known that 4% of the bulbs produced by each of machines E 1, and E 2, are defective and that 5% of

those produced by machine E 3, are defective. If one bulb is picked up at random from a day's production, then calculate the probability that it is defective.

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3. An urn contains m white and n black balls. A ball is drawn at random and is put back into the urn along with k additional balls of the same colour as that of the ball drawn. A ball is again drawn at random. Show that the probability of drawing a white ball does not depend on k

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4. Bag I contains 3 black and 2 white balls, bag II contains 2 black and 4 white balls. A bag and a ball is selected at random. Determine the probability of selecting a black ball.

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5. There are two bags, one of which contains 3 black and 4 white balls, while the other contains 4 black and 3 white balls. A die is thrown. It shows up 1 or 3, a ball is taken from the first bag, but it shows up any other number, a ball is chosen from the second bag. Find the probability of choosing a black ball.

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6. A bag A contains 2 white and 3 red balls and another bag B contains 4 white and 5 red balls. One ball is drawn at random from a bag chosen at random and it is found to be red. Find the probability that it was drawn from bag B.

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7. Suppose you have two coins which appear identical in your pocket. You know that, one is fair and one is 2 headed. If you take one coin out, toss it and get a

head, then what is the probability that it was a fair coin?

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Part Iii Questions For Practice Long Answer Type Questions

1. A bag contains 4 white, 3 black and 2 red balls, a second bag contains 5 blue, 3 white and 4 black balls, a third bag contains 2 green, 3 red and 5 white balls. A bag is selected at random and a ball is drawn from it. Find the probability that the ball is white, if the

probability of choosing the first bag is three times that of choosing the bag.

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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 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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3. Amanufacturer has three machine operators A, B and C. The first operator A produces 1% defective items, whereas the other two operators B and C produces 5% and 7% defective items, respectively. A is on the job for 50% of the time, B 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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4. A company has two plants to manufacture motorcycles. 70% motorcycles are manufactured at

the first plant, while 30% are manufactured at the second plant. At the first plant, 80% motorcycles are rated of standard quality, while at the second plant, 90% are rated of standard quality. A motorcycle, randomly picked up, is found to be standard quality. Find the probability that it has come out from the second plant.

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5. A bag contains 3 red and 7 black balls. Two balls are selected at random one-by-one without replacement. If the second selected ball happens to be red, then what

is the probability that the first selected ball is also red?

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6. 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 diamonds. Find the probability of the lost card being a diamond.

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7. Two groups are competing for the position on the board of directors of a corporation. The probability

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 introduce was by second group.

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8. A doctor is visit to a patient. From the past experience, it is known that the probabilities that he will come by train, bus, scooter or by other means of transport, are respectively $\frac{3}{10}, \frac{1}{5}, \frac{1}{10}$ and $\frac{2}{5}$ The probabilities that he will be late are $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{12}$ if

he comes by train, bus and scooter respectively, but if he comes by other means of transport, then he will not be late. When he arrives, he is late. What is the probability that he comes by train?

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9. In answering a question on a multiple choice test, a student either knows the answer or guesses. Let $\frac{3}{4}$ be the probability that he knows the answers and $\frac{1}{4}$ be the probability that he guesses. Assuming that a student who guesses the answer will be correct with probability $\frac{1}{4}$ What is the probability that the student knows the answer, given that he answered it correctly?

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10. Suppose a girl throws a die. If she gets a 5 or 6, she tosses a coin three times and notes the number of heads. If she gets 1, 2, 3 or 4, she tosses a coin once and notes whether a head or tail is obtained. If she obtained exactly one head, then what is the probability that she threw 1,2,3 or 4 with the die?

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11. A man is known to speak the truth 3 out of 5 times. He throws a die and reports that it is 1. Find the probability that it is actually 1.

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12. 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 (ie. if a healthy person is tested, then with probability 0.005, the test will imply he has the disease). If 0.1% of the population actually has the disease, then what is the probability that a person has disease, given that his test result is positive?

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13. By examining the chest X-ray, the probability that TB is detected when a person is actually suffering is 0.99. The probability of an healthy person diagnosed to have TB is 0.001. In à certain city, 1 in 1000 people suffers from TB. A person is selected at random and is diagnosed to have TB. What is the probability that he actually has TB?

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Part Iv Question For Practice Very Short Answer Type Questions

1. An urn contains 6 red and 3 black balls. Two balls are randomly drawn. Let X represents the number of black balls. What are the possible values of X?

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2. State whether the following probability distribution of a random variable or not.

X	3	2	1	0	-1
$P(X=x)$	0.3	0.2	0.4	0.1	0.05

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3. State whether the following is the probability distribution of a random variable or not.

X	-1	0	1	2
$P(X = x)$	0.6	0.1	0.2	-0.1

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4. State whether the following is the probability distribution of a random variable or not.

X	0	1	2
$P(X = x)$	0.3	0.3	0.4

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5. The probability distribution of a discrete random variable X is given below:

X	2	3	4	5
$P(X = x)$	$5/k$	$7/k$	$9/k$	$11/k$

The value of k is

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6. For the following probability distribution

X	1	2	3	4
P(X)	1/10	1/5	3/10	2/5

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Part Iv Question For Practice Short Answer Type Questions

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

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2. 3 defective bulbs are mixed up with 7 good ones. 3 bulbs are drawn at random. Find the probability distribution of defective bulbs.

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3. Three cards are drawn at random (without replacement) from a well-shuffled pack of 52 playing cards. Find the probability distribution of number of red cards. And, also find the mean of the distribution.

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4. Three cards are drawn successively with replacement from a well-shuffled pack of 52 cards. Find the probability distribution of the number of spades. Also, find the mean of the distribution.

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5. The probability distribution of a random variable X is given as under

$$p(X=x)=\begin{cases} kx^2 & x=123 \\ 2kx & x=456 \\ 0 & \text{otherwise} \end{cases}$$

where k is a constant. Calculate

E(X)

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6. The probability distribution of a random variable X is given as under

$$p(X=x)=\begin{cases} kx^2 & x=123 \\ 2kx & x=456 \\ 0 & \text{otherwise} \end{cases}$$

where k is a constant. Calculate

$E(X^2)$

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7. The probability distribution of a random variable X is given as under

$$p(X=x)=\begin{cases} kx^2 & x=123 \\ 2kx & x=456 \\ 0 & \text{otherwise} \end{cases}$$

where k is a constant. Calculate

$P(X \geq 4)$

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8. A biased die is such that $P(4) = \frac{1}{10}$ and other scores being equally likely. The die is tossed twice. If X is the 'number of four seen', then find the variance of the random variable X.

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9. In a meeting, $70\,\%$ of the members favour a certain proposal, $30\,\%$ being opposite. A member is selected at random and let $X = 0$, if he opposed and $X = 1$, if he is in favour. Find $E(X)$ and $V(X)$.

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10. Suppose 10000 tickets are sold in a lottery each for Rs. 1. First prize is of Rs. 3000, the second prize is of Rs. 2000 and third prize is of Rs. 500 each. If you buy one ticket, then what is your expectation.

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Part Iv Question For Practice Long Answer Type Questions

1. Two biased dice are thrown together. For the first die $P(6) = \frac{1}{2}$ the other scores being equally likely while for the second die $P(1) = \frac{2}{5}$ and the other

scores are equally likely. Find the probability distribution of the number of, "one's seen".

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2. Let X denotes the number of hours you study during a randomly selected school day. The probability that X can take the values x, has the following form, where is some unknown. constant.

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

Find the value of k

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3. Let X denotes the number of hours you study during a randomly selected school day. The probability that X can take the values x, has the following form, where is some unknown. constant.

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

what is the probability that you study

(a) atleast 2 h

(b) exactly 2 h

(c) atmost 2 h

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4. Find mean and variance of number of heads in three tosses of a fair coin.

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5. Out of a group of 30 honest people, 20 always speak the truth. Two persons are selected at random from the group. Find the probability distribution of the number of selected persons who speak the truth. Also, find the mean of the distribution.

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6. There are 5 cards numbered 1 to 5, one number on one card. Two cards are drawn at random without replacement. Let X denotes the sum of the numbers on two cards drawn. Find the mean and variance of X.

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7. Two numbers are selected at random (without replacement) from the first six positive integers. Let X denotes the larger of the two numbers obtained. Find the probability distribution of the random variable X and also find the mean of the distribution.

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Part V Question For Practice Very Short Answer Type Questions

1. A die is thrown 6 times. If getting an odd number is a success, then what is the probability of most 5 success?

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2. If the probability that a person is not a swimmer is 0.3, then find the probability that out of 5 persons 4 are swimmer.

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3. If eight coins are tossed together, then find the probability of getting exactly 3 heads.

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4. Find the probability of having atleast one head in 5 throws of a coin?

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5. A binomial distribution has mean 4 and variance 3. Write the number of trials.

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6. Find the probability that in 10 throws of a fair die, a score which is a multiple of 3 will be obtained in atleast 8 of the throws.

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Part V Question For Practice Short Answer Type Questions

1. An experiment succeede twice as often as it fails. Find the probability that in the next six trials there are

at least 4 success.

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2. 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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3. Ten eggs are drawn successively with one defective egg. replacement from a bag containing 10% defective

eggs. Find the probability that there is atleast one defective egg.

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4. On a multiple choice examination with three possible options 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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5. 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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6. How many times must a man toss a fair coin so that the probability of having at least one head is more then 80%?

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7. A person buys a lottery ticket in 50 lotteries in each of which his chance of winning a prize is 1/100. What is the probability that he will win a prize atleast once?

Watch Video Solution

8. A person buys a lottery ticket in 50 lotteries in each of which his chance of winning a prize is 1/100. What is the probability that he will win a prize exactly once?

Watch Video Solution

9. A person buys a lottery ticket in 50 lotteries in each of which his chance of winning a prize is 1/100. What is the probability that he will win a prize atleast twice?

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10. The probability that a bulb produced by a factory will fuse after 150 days of used is 0.05. Find the probability that out of 5 such bulbs

none is fuse.

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11. The probability that a bulb produced by a factory will fuse after 150 days of used is 0.05. Find the probability that out of 5 such bulbs

not more than one bulb is fuse.

Watch Video Solution

12. The probability that a bulb produced by a factory will fuse after 150 days of used is 0.05. Find the probability that out of 5 such bulbs

not more than one bulb is fuse.

Watch Video Solution

13. The probability that a bulb produced by a factory will fuse after 150 days of used is 0.05. Find the probability that out of 5 such bulbs

atleast one will fuse after 150 days of use.

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14. Five cards are drawn one by one with replacement from a well-shuffled deck of 52 cards. Find the probability that

all the five cards are diamonds.

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15. Five cards are drawn one by one with replacement from a well-shuffled deck of 52 cards. Find the probability that

only 3 cards are diamonds.

Watch Video Solution

16. Five cards are drawn one by one with replacement from a well-shuffled deck of 52 cards. Find the probability that

none is a diamond.

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17. Find the Binomial distribution, whose mean is 5 and variance is 2.5.

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18. For a Binomial distribution, the mean is 6 and the standard deviation is $\sqrt{2}$. Find the probability of getting 5 successes.

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Part V Question For Practice Long Answer Type Questions

1. The probability of a shooter hitting a target is $\frac{3}{4}$ Find the minimum number of times he must fire, so that the probability of hitting the target atleast once is greater than 0.999.

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2. An unbiased coin is tossed 4 times. Find the mean and variance of the number of heads obtained.

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3. From a lot of 15 bulbs which include 5 defectives, a sample of 4 bulbs is drawn one by one with replacement. Find the probability distribution of number of defective bulbs. Also, find the mean of the distribution.

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4. Find the probability distribution of number of doublets in four throws of a pair of dice. Find also the mean and the variance of the number of doublets.

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Odisha Bureau S Text Book Solutions Exercise 6 A

1. Two balls are drawn from a bag containing 5 white and 7 black balls. Find the probability od selecting 2 white balls if

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2. Two balls are drawn from a bag containing 5 white and 7 black balls. Find the probability of selecting 2 white balls if

the first ball is not replaced before drawing the second.

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3. Two cards are drawn from a pack of 52 cards, find the probability that

they are of different suits.

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4. Two cards are drawn from a pack of 52 cards, find the probability that

they are of different denomination.

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5. Do both parts of problem 2 if 3 cards drawn at random.

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6. Do both parts of problem 2 if 4 cards are drawn at random.

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7. A lot contains 15 items of which 5 are defective. If three items are drawn at random, find the probability that (i) all three are defective


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8. A lot contains 15 items of which 5 are defective. If three items are drawn at random, find the probability that

none of the three is defective. Do this problem directly.


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9. A pair of dice is thrown. Find the probability of getting a sum of at least 9 if 5 appears on at least one of the dice.

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10. A pair of dice is thrown. If the two numbers appearing are different , find the probability thet the sum of point is 8.

Watch Video Solution

11. A pair of dice is thrown. If the two numbers appearing are different , find the probability thet the sum of points exceeds 8.

Watch Video Solution

12. A pair of dice is thrown. If the two numbers appearing are different , find the probability thet 6 appears on one die.

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13. In a class 30% of the student fail in Mathematics, 20% of the student fail in English and 10% fail in both.If he has failed in English, what is the probability thet he has failed in Mathematics?

Watch Video Solution

14. In a class 30% of the student fail in Mathematics, 20% of the student fail in English and 10% fail in bothIf he has failed in Mathematics, what is the probability that he has failed in English

Watch Video Solution

15. In a class 30% of the student fail in Mathematics, 20% of the student fail in English and 10% fail in both.What is the probability that he has failed in both ?

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16. If A,B are two events such that P(A)=0.3, P(B)=0.4,P(AcupB)=0.6 Find

$P(A \mid B)$

Watch Video Solution

17. If A,B are two events such that P(A)=0.3, P(B)=0.4,P(AcupB)=0.6 Find

P(B | A)

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18. If A,B are two events such that P(A)=0.3, P(B)=0.4,P(AcupB)=0.6 Find

`P(A | B^c)

Watch Video Solution

19. If A,B are two events such that P(A)=0.3, P(B)=0.4,P(AcupB)=0.6 Find

`P(B | A^c)

Watch Video Solution

20. If A, B are events such that P(A)=0.6, P(B)=0.4 and $P(A \cup B) = 0.2$ then find

$P(A/B)$

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21. If A, B are events such that P(A)=0.6, P(B)=0.4 and $P(A \cup B) = 0.2$ then find

$P(B/A)$

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22. If A, B are events such that P(A)=0.6, P(B)=0.4 and $P(A \cup B) = 0.2$ then find

$P(A^c/B^c)$

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23. If A, B are events such that P(A)=0.6, P(B)=0.4 and $P(A \cup B) = 0.2$ then find

$P(B^c / A^c)$

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24. If A and B are independent events,show that

A^c and B^c are independent,

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25. If A and B are independent events,show that

A^c and B^c are independent,

Watch Video Solution

26. If A and B are independent events,show that A^c and B^c are independent,

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27. Two different digits are selected at random from the digits 1 through 9

If the sum is even, what is the probability that 3 is one of the digits selected?

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28. Two different digits are selected at random from the digits 1 through 9

If the sum is even, what is the probability that 3 is one of the digits selected?

Watch Video Solution

29. Two different digits are selected at random from the digits 1 through 9

If 3 is one of the digits selected, what is the probability that the sum is odd?

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30. Two different digits are selected at random from the digits 1 through 9

If 3 is one of the digits selected, what is the probability that the sum is even?

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31. If P (A) = 0.4,P (B | A)= 0.3 and $P(B^c \mid A^c) = 0.2$. find

P (A | B)

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32. If P(A)= 0.4, P(B/A)=0.3 and P(B^c / A^c) = 0.2 find

$P(B / A^c)$

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33. If $P(A) = 0.4$, $P(B / A) = 0.3$ and $P\left(\frac{B^c}{A^c}\right) = 0.2$. Find $P(B)$.

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34. If P(A)= 0.4, find

$P(A^c)$

Watch Video Solution

35. If P(A) = 0.4, P(B/A)=0.3 and P$\left(B^c / A^c\right)$ = 0.2 find $P(A \cup B)$

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36. If P(A)=0.6, P(B | A)= 0.5, find P $(A \cup B)$ if A, B are independent.

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37. Two cards are drawn in succession from a deck of 52 cards. What is the probability that both cards are of

denomination greater than 2 and less than 9?

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38. From a bag containing 5 black and 7 white balls, 3 balls are drawn in succession . Find the probability that

all three are of the same colour.

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39. From a bag containing 5 black and 7 white balls, 3 balls are drawn in succession . Find the probability

that

each colour is represented.

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40. A die is rolled until a 6 is obtained. What is the probability that

you end up in the second roll

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41. A die is rolled until a 6 is obtained. What is the probability that

you end up in the third roll.

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42. A person takes 3 tests in succession. The probability of his (her) passing the first test is 0.8. The probability of passing each successive test is 0.8 or 0.5 according as he passes or fails the preceding test. Find the probability of his (her) passing at least 2 tests.

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43. A person takes 4 tests in succession. The probability of his passing the first test is p, that of his passing each succeeding test is p or $\frac{p}{2}$ depending on

his passing or failing the preceding test, Find the probabilty of his passing

just three tests.

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44. A person takes 4 tests in succession. The probability of his passing the first test is p, that of his passing each succeeding test is p or $\frac{p}{2}$ depending on his passing or failing the preceding test, Find the probabilty of his passing

just three tests.

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45. Given that all three faces are different in a throw of three dice, find the probability that

at least one is a six

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46. Given that all three faces are different in a throw of three dice, find the probability that

the sum is 9.

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47. From the set of all families having three children, a family is picked at random

If the eldest child happens to be a girl, find the probability that she has two brothers.

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48. From the set of all families having three children, a family is picked at random

If one child of the family is a son. find the probablilty that he has two sisters.

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49. Three persons hit a target with probability $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively. If each one shoot at the target once,

find the probability that exactly one of them hits the target

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50. Three persons hit a target with probability $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively. If each one shoot at the target once,

if only one of them hits the target what is the probability that it was the first person ?

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Odisha Bureau S Text Book Solutions Exercise 6 B

1. A bag contains 5 white and 3 black marbles and a second bag contains 3 white and 4 black marbles. A bag is selected at random and a marble is drawn from it. Find the probability that it is white. Assume that either bag can be chosen with the same probability.

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2. A bag contains 5 white and 3 black balls, a second bag contains 4 white and 5 black balls, a third bag

contains 3 white and 6 black balls. A bag is selected at rendom and a ball is drawn. Find the probability that the ball is black.

Do the problem assuming that the probability of choosing each bag is same.

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3. A bag contains 5 white and 3 black balls, a second bag contains 4 white and 5 black balls, a third bag contains 3 white and 6 black balls. A bag is selected at rendom and a ball is drawn. Find the probability that the ball is black.

Do the problem assuming that the probability of

choosing the first bag is twice as much as choosing the second bag, which is twice as much as choosing the third bag.

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4. A and B play a game by alternately throwing a pair of dice. One who throws 8 wins the game. If A starts the game, find their chances of winning.

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5. A and B play a game by alternately throwing a pair of dice. One who throws 8 wins the game. If A starts

the game, find their chances of winning.

 Watch Video Solution

6. There are 6 white and 4 black balls in a bag. If four are drawn successively (and not replaced),find the probability that they are alternately of different colour.

 Watch Video Solution

7. Five boys and four girls randomly stand in a line. Find the probability that no two girls come together.

 Watch Video Solution

8. If you throw a pair of dice n times, find the probability of getting at least one doublet.[When you get identical members you call it a doublet. You can get a double in six ways: (1,1),(2,2),(3,3),(4,4),(5,5) and (6,6) , thus the probability of getting a doublet is $\frac{6}{36} = \frac{1}{6}$, so that the probability of not getting a doublet in one throw is $\frac{5}{6}$].

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9. Suppose that the probability that your alarm goes off in the morning is 0.9. If the alarm goes off, the

probability is 0.8 that you attend your 8 a.m. class. If the alarm does not go to off, the probability that you make your 8 a.m.class is 0.5. Find the probability that you make your 8 a.m. class.

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10. If a fair coin is tossed 6 times, find the probability that you get just one head.

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11. Can you generalize this situation? If a fair coin is tossed six times, find the probability of getting exactly

2 heads.

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Odisha Bureau S Text Book Solutions Exercise 6 C

1. There are 3 bags B_1, B_2 and B_3 having respectively 4 white, 5 black, 3 white, 5 black and 5 white, 2 black balls. A bag is chose at random and a ball is drawn from it. Find the probability that the ball is white.

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2. There are 25 girls and 15 boys in class XI and 30 boys and 20 girls in class XII. If a student chosen from a class, selected at random, happens to be a boy, find the probability that he has been chosen from class XII.

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3. Out of the adult population in a village 50% are farmers, 30% do business and 20% are service holders. It is known that 10% of the farmers, 20% of the business holders and 50% of service holders are above poverty line. What is the probability that a

member chosen from any one of the adult population, selected at random, is above poverty line?

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4. Take the data of Q3. If a member from any one of the adult population of the village, chosen at random, happens to be above poverty line, then estimate the probability that he is a farmer.

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5. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30%

chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

is a smoker

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6. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic

the probability that a cancer patient chosen from any one of the above types, selected at random,

is alcoholic

Watch Video Solution

7. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

chews gutka

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8. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

has no specific carcinogenic habits.

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Odisha Bureau S Text Book Solutions Exercise 6 D

1. State which of the following is the probability distribution of a random variable X with reasons to your answer

$X = x$	0	1	2	3	4
$p(x)$	0.1	0.2	0.3	0.4	0.1

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2. State which of the following is the probability distribution of a random variable X with reasons to your answer

$X = x$	0	1	2	3
$p(x)$	0.15	0.35	0.25	0.2

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3. State which of the following is the probability distribution of a random variable X with reasons to your answer

$X = x$	0	1	2	3	4	5
$p(x)$	0.4	R	0.6	R^2	0.7	0.3

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4. Find the probability distribution of number of doublets in four throws of a pair of dice. Find also the mean and the variance of the number of doublets.

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5. Four cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number of aces. Calculate the mean and variance of the number of aces.

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6. Find the probability distribution of

number of heads in three tosses of a coin.

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7. Find the probability distribution of number of heads in simultaneous tosses of four coins.

 Watch Video Solution

8. A biased coin where the head is twice as likely to occur as the tail is, tossed thrice. Find the probability distribution of number of heads.

 Watch Video Solution

9. From a box containing 32 bulbs out of which 8 are defective 4 bulbs are drawn at random successively

one after anoter with replacement. Find the probability distribution of the number of defective bulds.

Watch Video Solution

10. A random variable X has the following probability distribution

$X = x$	0	1	2	3	4	5
$p(x)$	0	R	$2R$	$3R$	$3R$	R

determine R

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11. A random variable X has the following probability distribution

$X = x$	0	1	2	3	4	5
$p(x)$	0	R	$2R$	$3R$	$3R$	R

determine $P(X < 4)$

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12. A random variable X has the following probability distribution

$X = x$	0	1	2	3	4	5
$p(x)$	0	R	$2R$	$3R$	$3R$	R

determine $P(X \geq 2)$

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13. A random variable X has the following probability distribution

$X=x$	0	1	2	3	4	5
$P(X)$	0	R	$2R$	$3R$	$3R$	R

Determine

(i)R

(ii) $P(X < 2)$

(iii) $P(X \geq 4)$

(iv) $P(2 \leq X \leq 5)$

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14. Find the mean and the variance of the number obtained on a throw of an unbiased coin.

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15. A pair of coins is tossed 7 times. Find the probability of getting

exactly five tails

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16. A pair of coins is tossed 7 times. Find the probability of getting

at least five tails

Watch Video Solution

17. A pair of coins is tossed 7 times. Find the probability of getting

at most five tails

Watch Video Solution

18. If a pair of dice is thrown 5 times then find the probability of getting three doublets.

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19. Four cards are drawn successively with replacement from a well-shuffled pack of 52 cards. What is the probability that :

all the four cards are diamonds

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20. Four cards are drawn successively with replacement from a well-shuffled pack of 52 cards. What is the probability that :

only two cards are diamonds

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21. Four cards are drawn successively with replacement from a well-shuffled pack of 52 cards. What is the probability that :

none of the cards is a diamond.

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22. In an examination there are twenty multiple choice question each of which is supplied with four possible answers. What is the probability that a candidate would score 80% or more in the answer to these questions ?

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23. A bag contains 7 balls of different colours. If five balls are drawn successively with replacement then what is the probability that none of the balls drawn is white ?

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24. Find the probability of throwing at teast 3 sixes in 5 throws of a dia.

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25. The probability that a student securing first division ia an examination is $\frac{1}{10}$. What is the probability that out of 100 students twenty pass in first division ?

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26. Sita and Gita throw a dia alternatively till one of them gets a 6 to win the game. Find their respective probability of winning if Sita starts first.

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27. If a random variable X has a binomial distribution B $\left(8, \frac{1}{2}\right)$ then find X for which the outcome is the most likely.

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Chapter Practice Very Short Type Questions

1. One card is drawn from a pack of 52 cards. Write the probability that the card drawn is either a king or a spade.

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2. Two dice are thrown simultaneously. Find the probability of getting a doublet.

3. A die has two faces each with number 1, three faces each with number 2 and one face with number 3. If die is rolled once, then determine I probability of not getting 3.

4. If $P(A) = \frac{7}{13}, P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$ then find $P\left(\frac{A}{B}\right)$

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5. Let E and F be the events with $P(E) = \frac{3}{5} P(F) = \frac{3}{10}$ and $P(E \cap F) = \frac{1}{5}$ find whether the events are independent or not

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6. State whether the following is the probability distribution of a random variable or not.

X	0	1	2
P(X)	0.1	0.4	0.5

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7. If X is a random variable taking values $X_1, X_2 \ldots X_n$ with probabilities $P_1, P_2 \ldots P_n$ respectively. Then, find Var (X).

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8. For the following probability distribution.

X	- 4	- 3	- 2	- 1	0
P(X)	0.1	0.2	0.3	0.2	0.2

$E(x)$ is equal to

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9. Find the variance of the Binomial distribution $B\left(5, \frac{1}{4}\right)$

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10. A coin is tossed 4 times. Find the mean and variance of the probability distribution of the number of heads.

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Chapter Practice Short Answer Type Questions

1. If P(A)=0.4 P(B)=0.8 and $P\left(\frac{B}{A}\right)$ =0.6 then find $P(A \cup B)$

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2. If A and B are two events such that $P(B)=\frac{3}{5}, P\left(\frac{A}{B}\right)=\frac{1}{2}$ and $P(A \cup B)=\frac{4}{5}$ then find P(A)

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3. If A and B are two events such that $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$ and $P\left(\frac{A}{B}\right) = \frac{1}{4}$ then find $P(A \cap B)$

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4. If $P(A) = \frac{3}{10}, P(B) = \frac{2}{5}$ and $P(A \cup B) = \frac{3}{5}$ then find $P\left(\frac{B}{A}\right) + P\left(\frac{A}{B}\right)$

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5. If A and B are two events such that $P(A) = \frac{3}{8}, P(B) = \frac{5}{8}$ and $P(A \cup B) = \frac{3}{4}$ then

find $P\left(\frac{A}{B}\right).P\left(\frac{B}{A}\right)$

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6. Two coins are tossed once. Find $P(E/F)$. Where E= tail appears on one coin and F=one coin shows head.

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7. Two coins are tossed once. Find $P(E/F)$. Where E:no tail appears and F: no head appears

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8. In a college, 30% students fail in Physics, 25% fail in Mathematics and 10% fail in both. One student is chosen at random. Find the probability that she fails in Physics, if she failed in Mathematics.

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9. Two dice are thrown. If it is known that the sum of numbers on the dice was less than 6, then find the probability of getting a sum 3.

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10. Two events E and F are indendent if $P(E) = 0.3$ and $P(E \cup F)$ =0.5 then find $P\left(\frac{E}{F}\right) - P\left(\frac{F}{E}\right)$

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11. Given that the events A and B are such that $P(A) = \frac{1}{2}, P(A \cup B) = \frac{3}{5}$ and $P(B) = P$ find p if the are

multually excusive

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12. Given that the events A and B are such that $P(A) = \frac{1}{2}, P(A \cup B) = \frac{3}{5}$ and $P(B) = P$ find p if the are

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13. Let A and B be the independent events with $P(A) = 0.3$ and $P(B) = 0.4$ find

$P(A \cap B)$

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14. Let A and B be the independent events with $P(A) = 0.3$ and $P(B) = 0.4$ find

$P(A \cup B)$

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15. Let A and B be the independent events with $P(A) = 0.3$ and $P(B) = 0.4$ find

$P(A/B)$

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16. Let A and B be the independent events with $P(A) = 0.3$ and $P(B) = 0.4$ find

$P(B/A)$

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17. A box contains 3 orange balls, 3 green balls and 2 blue balls. Three balls are drawn at random from the box without replacement. Find the probability of drawing 2 green balls and one blue ball.

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18. In a group of students, there are 3 boys and 3 girls, 4 students are to be selected at random from the group. Find the probability that either 3 boys and I girl or 3 girls and 1 boy are selected.

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19. P speaks truth in 70% of the cases and Q in 80% of the cases. In what per cent of cases are they likely to agree in stating the same fact? Do you think, when they agree, means both are speaking truth?

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20. A bag contains 5 red, 7 green and 4 white balls. 3 balls are drawn one after another without replacement. Find the probability that

the balls are white, green and green, respectively.

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21. A bag contains 5 red, 7 green and 4 white balls. 3 balls are drawn one after another without replacement. Find the probability that

out of 3 balls, one is white and 2 is green.

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22. A and B appears for an interview for two posts. The probability of A's selection is $\frac{1}{3}$ and that of B's selection is 2/5 Find the probability that

only one of them is selected.

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23. A and B appears 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

none is selected.

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24. Two dice are tossed. Find whether the following two events A and B are independent A=(x, y):x+y=11 and B=(x, y): x $\neq$ 5, where (x, y) denotes a typical sample point.

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25. A bag contains (2n+1) coins. It is known that n of these coins have a head on both sides whereas the rest of the coins are fair. A coin is picked up at random from the bag and is tossed. If the probability that the toss results in a head is $\frac{31}{42}$ then determine the value of n.

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26. A box contains 2 gold and 3 silver coins. Another box contains 3 gold and 3 silver coins. A box is is chosen at random and coin drawn from it. If the selected coin is a gold coin, then find the probability that it was drawn from second box.

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27. There are two bags, bag I and bag II. Bag I contains 2 white and 4 red balls and bag II contains 5 white and 3 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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28. Two cards are drawn successively with replacement from a well-shuffled pack of 52 cards. Find the probability distribution of number of diamonds.

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29. Find the probability distribution of number of doublets in three tosses of a pair of dice.

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30. The random variable X has a probability distribution P(X) of the following form, where k is some number

$$P(X) = \begin{array}{ll} k & \text{if } X = 0 \\ 2k & \text{if } X = 1 \\ 3k & \text{if } X = 2 \\ 0 & \text{otherwise} \end{array}$$

Determine the value of k

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31. The random variable X has a probability distribution P(X) of the following form, where k is some number

$$P(X) = \begin{matrix} k & \text{if } X = 0 \\ 2k & \text{if } X = 1 \\ 3k & \text{if } X = 2 \\ 0 & \text{otherwise} \end{matrix}$$

Find $P(X < 2)$, $P(X \leq 2)$ and $P(X \geq 2)$

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32. The random variable X can take only the values 0,1,2. If P(X=0)= P(X=1)=p and $E(X^2)$ = E(X), then find the value of p.

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33. For the following probability distribution, determine standard deviation of the random variable

X.

X	2	3	4
P(X)	0.2	0.5	0.3

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34. Find the probability of throwing almost 2 sixes in 6 throws of a single die.

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Chapter Practice Long Answer Type Questions

1. Bag I contains 3 red and 4 black balls and bag II contains 5 red and 6 black 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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2. Three bags contains a number of red and white balls as follows. Bag I :3 red balls, Bag II: 2 red balls and 1 white ball and Bag III: 3 white balls. The probability that bag i will be chosen and a ball is selected from it is i/6, where i=1,2,3. What is the probability that

a red ball will be selected?

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3. Three bags contains a number of red and white balls as follows. Bag I :3 red balls, Bag II: 2 red balls and 1 white ball and Bag III: 3 white balls. The probability that bag i will be chosen and a ball is selected from it is i/6, where i=1,2,3. What is the probability that a white ball will be selected?

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4. Suppose we have four boxes A, B,C,D containing coloured marbles as given below

Boxes	Marble colour		
	Red	White	Black
A	1	6	3
B	6	2	2
C	8	1	1
D	0	6	4

one of the boxes has been selected at random and a single marble drawn from it if the marble is red what is the probability that it was drawn from box A?

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5. Suppose we have four boxes A, B,C,D containing coloured marbles as given below

Boxes	Marble colour		
	Red	White	Black
A	1	6	3
B	6	2	2
C	8	1	1
D	0	6	4

one of the boxes has been selected at random and a single marble drawn from it if the marble is red what is the probability that it was drawn from box B?

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6. Suppose we have four boxes A, B,C,D containing coloured marbles as given below

Boxes	Marble colour		
	Red	White	Black
A	1	6	3
B	6	2	2
C	8	1	1
D	0	6	4

one of the boxes has been selected at random and a single marble drawn from it if the marble is red what is the probability that it was drawn from box C?

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7. A factory has two machines A and B. Past record shows that machine A produced 60% of items of output and machine B produced 40% of items.

Further, 2% of items, produced by machine A and 1% produced by machine B were defective. All the items are put into a stockpile and then one item is chosen at random from this and this is found to be defective. What is the probability that it was produced by machine B?

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8. 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 Care 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 machine A.

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9. There are three coins. One is a two tailed coin (having tail on both faces) another is a biased coin that comes up heads 60% of the times and third is an unbiased coln. One of the three coins is chosen at random and tossed and it shows tail. What is the probability that it is a two tailed coin.

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10. 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 these are equal number of males and females)

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11. A man is known to speak 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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12. Let d_1, d_2 and d_3 be three mutually exclusive diseases. Let S be the set of observable symptoms of these diseases. A doctor has the following information from a random sample of 5000 patients, 1800 had diseases d_1 2100 had diseases d_2 and the other had diseases d_3 . 1500 patients with disease d_1 1200 patients with disease d_2 and 900 patients with disease d_3 showed the symptom. Which of the diseases is the patient most likely to have?

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13. A crime is committed by one of two suspects A and B initially, there is equal evidence against both of them. In further investigation at the crime scene. It is found that the guilty party had a blood type found is 20% of the population. If the suspect A does match this blood type, whereas the blood type of suspect B is unknown, then find the probability that A is the guilty party.

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14. A letter is known to have come either from LONDON or CLIFTON. On the envelope just two

consecutive letters ON are visible. What is the probability that the letter has come from

LONDON

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15. A letter is known to have come either from LONDON or CLIFTON. On the envelope just two consecutive letters ON are visible. What is the probability that the letter has come from

CLIFTON?

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16. 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 of 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 deviaton (SD) of X.

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17. From a box containing 32 bulbs out of which 8 are defective 4 bulbs are drawn at random successively one after anoter with replacement. Find the

probability distribution of the number of defective bulds.

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