MATHS

BOOKS - PSEB

PROBABILITY

Example

1. If $P(A) = \dfrac{7}{13}, P(B) = \dfrac{9}{13}$ and $P(A \cap B) = \dfrac{4}{13}$, evaluate $P(A \mid B)$

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2. 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 ?

3. Ten cards numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is more than 3, what is the probability that it is an even number?

4. In a school, there are 1000 students, out of which 430 are girls. It is known that out of 430, 10% of the girls study in class XII. What is the probability that a student chosen randomly studies in Class XII given that the chosen student is a girl?

5. A die is thrown three times. Events A and B are defined as below: A : 4 on the third throw B : 6 on the first and 5 on the second throw Find the probability of A given that B has already occurred.

6. 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?

7. Consider the experiment of tossing a coin. If the coin shows head, toss it again but if it shows tail, then throw a die. Find the conditional probability of the event that the die shows a number greater than 4, given that there is at least one tail.

8. 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?

9. 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?

10. 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 ?

11. 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.

12. 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?

13. Prove that if E and F are independent events, then so are the events E and F'.

14. f A and B are two independent events, then the probability of occurrence of at least one of A and B is given by $= 1 - P(A')P(B')$

15. 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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16. 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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17. 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 ?

18. 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?

19. 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.

20. A doctor is to visit 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 $\frac{1}{4}, \frac{1}{3}, \frac{1}{12}$, 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?

21. 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.
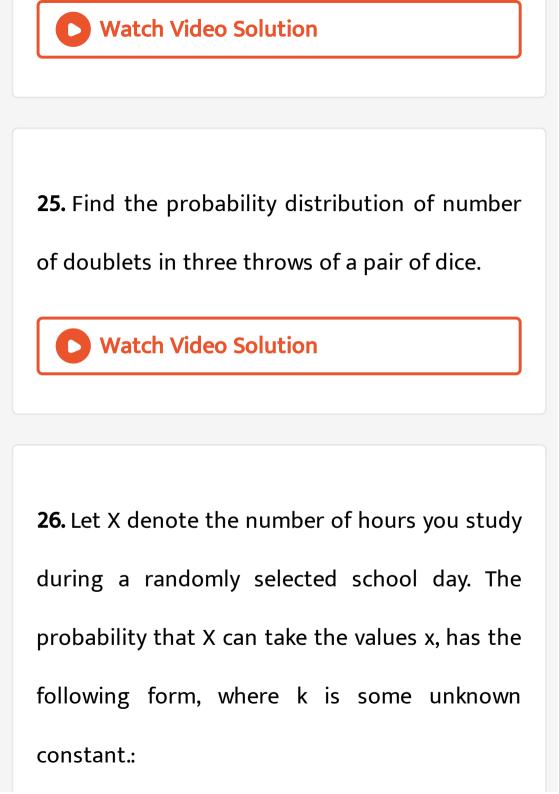
22. A person plays a game of tossing a coin thrice. For each head he is given Rs 2 by the organiser of the game and for each tail he has to give Rs 1.50 to the organiser. Let X denote the amount gained or lost by the person. Show that 'X' is a random variable and exhibit it as a function on the sample space of the experiment.

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

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

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

26. Let X denote 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 k is some unknown constant.:

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

Find the value of k.

27. Let X denote 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 k is some unknown constant.:

$$P(X = x) = \begin{cases} 0.1 & \text{if} & x = 0 \\ kx & \text{if} & x = 1 \text{ or } 2 \\ k(5 - x) & \text{if} & x3 \text{ or } 4 \\ 0 & & otherwise \end{cases}$$

What is the probability that you study at least two hours ? Exactly two hours? At most two hours?

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28. 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.

29. Find the variance of the number obtained on a throw of an unbiased die.

30. Two cards are drawn simultaneously (or successively without replacement) from a well shuffled pack of 52 cards. Find the mean, variance and standard deviation of the number of kings.

31. If a fair coin is tossed 10 times, find the probability of: exactly six heads

32. If a fair coin is tossed 10 times, find the probability of: at least six heads

33. If a fair coin is tossed 10 times, find the probability of: at most six heads

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34. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. Find the probability that there is at least one defective egg.

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35. Coloured balls are distributed in four boxes as shown in the figure

Box	Colour			
	Black	White	Red	Blue
I	3	4	5	6
II	2	2	2	2
III	1	2	3	1
IV	4	3	1	5

A box is selected at random and then a ball is randomly drawn from the selected box. The colour of the ball is black, what is the probability that ball drawn is from the box III?

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36. Find the mean of the Binomial distribution

$$B\left(4, \left(\frac{1}{3}\right)\right)$$

37. The probability of a shooter hitting a target is $\frac{3}{4}$. How many minimum number of times must he/she fire so that the probability of hitting the target at least once is more than 0.99?
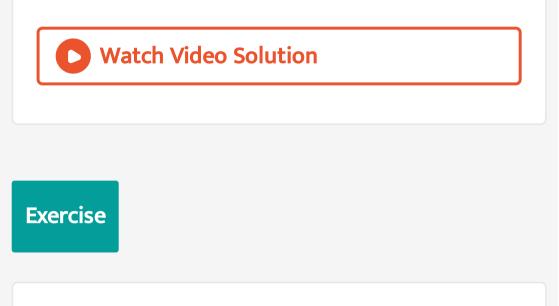
38. A and B throw a die alternatively till one of them gets a '6' and wins the game. Find their respective probabilities of winning, if A starts first.

39. If a machine is correctly set up, it produces 90% acceptable items. If it is incorrectly set up, it produces only 40% acceptable items. Past experience shows that 80% of the set ups are correctly done. If after a certain set up, the

machine produces 2 acceptable items, find the probability that the machine is correctly setup.

Exercise

1. 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 $P(F \mid E)$

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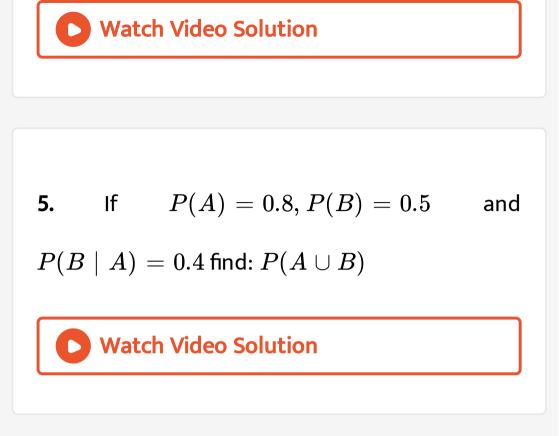
$P(A \cap B) = 0.32$

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

$P(B \mid A) = 0.4$ find: $P(A \cap B)$

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4. If $P(A) = 0.8, P(B) = 0.5$ and
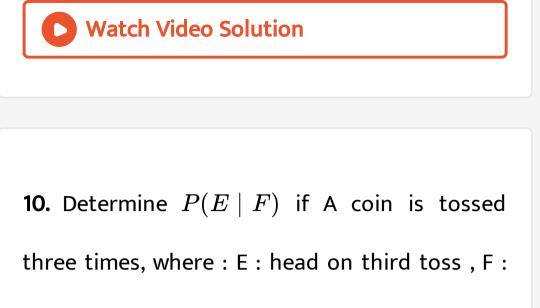
$P(B \mid A) = 0.4$ find: $P(A \mid B)$

5. If $P(A) = 0.8, P(B) = 0.5$ and

$P(B \mid A) = 0.4$ find: $P(A \cup B)$

6. Evaluate $P(A \cup B)$ if $P(A) = P(B) = \dfrac{5}{13}$ and $P(A \mid B) = \dfrac{2}{5}$

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

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

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

10. Determine $P(E \mid F)$ if A coin is tossed three times, where : E : head on third toss , F : heads on first two tosses

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

12. Determine $P(E \mid F)$: if A coin is tossed three times, where : E : at most two tails , F : at least one tail

13. Determine $P(E \mid F)$ if two coins are tossed once, where : E : tail appears on one coin, F : one coin shows head

14. Determine $P(E \mid F)$ if two coins are tossed once, where : E : no tail appears, F : no head appears

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15. Determine $P(E \mid F)$ if A die is thrown three times, where : E : 4 appears on the third toss, F : 6 and 5 appears respectively on first two tosses

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16. 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

17. 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.

18. A black and a red dice are rolled: Find the conditional probability of obtaining the sum 8, given that the red die resulted in a number less than 4.

19. A fair die is rolled. Consider events $E = \{1, 3, 5\}$, $F = \{2, 3\}$, and $G = \{2, 3, 4, 5\}$ find : $P(E \mid F)$ and $P(F \mid E)$

20. A fair die is rolled. Consider events $E = \{1, 3, 5\}$, $F = \{2, 3\}$, and $G = \{2, 3, 4, 5\}$ find : $P(E \mid G)$ and $P(G \mid E)$

21. A fair die is rolled. Consider events $E = \{1, 3, 5\}$, $F = \{2, 3\}$, and $G = \{2, 3, 4, 5\}$ find : $P(E \cup F \mid G)$ and $P(E \cap F \mid G)$

22. 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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23. 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 at least one is a girl?

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24. 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?

25. 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'.

26. 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'.

27. If $P(A) = \dfrac{1}{2}$, $P(B) = 0$ then $P(A \mid B)$ is :

A. 0

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

C. not defined

D. 1

Answer:

28. If A and B are events such that $P(A \mid B) = P(B \mid A) \neq 0$ then:

A. $A \subset B$

B. $A = B$

C. $A \cup B \neq \phi$

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

Answer:

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29. If $P(A) = \dfrac{3}{5}, P(B) = \dfrac{1}{5}$ find $P(A \cap B)$ if

A and B are independent events.

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30. 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.

31. A box of oranges is inspected by examining three randomly selected oranges drawn without replacement. If all the three oranges are good, the box is approved for sale, otherwise, it is rejected. Find the probability that a box containing 15 oranges out of which 12 are good and 3 are bad ones will be approved for sale.

32. 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.
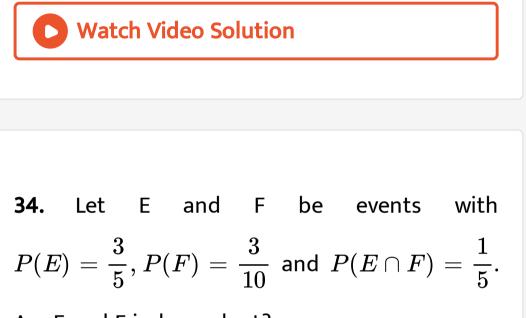
33. A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, 'the number is

even,' and B be the event, 'the number is red'.

Are A and B independent?

34. Let E and F be events with $P(E) = \dfrac{3}{5}, P(F) = \dfrac{3}{10}$ and $P(E \cap F) = \dfrac{1}{5}$.

Are E and F independent?

35. Given that the events A and B are such that

`P(A) = 1/2, P(A cup B)=3/5 and P(B)ੌ .Find p if

they are mutually exclusive

36. Given that the events A and B are such that

$$P(A) = \frac{1}{2}, P(A \cup B) = \frac{3}{5} \quad \text{and} \quad P(B) = p$$

.Find p if they are independent.

37. Let A and B be independent events with

$P(A) = 0.3$ and $P(B) = 0.4$ Find: $P(A \cap B)$

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38. Let A and B be independent events with

$P(A) = 0.3$ and $P(B) = 0.4$ Find: $P(A \cup B)$

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39. Let A and B be independent events with

$P(A) = 0.3$ and $P(B) = 0.4$ Find: $P(A \mid B)$

40. Let A and B be independent events with

$P(A) = 0.3$ and $P(B) = 0.4$ Find: $P(B \mid A)$

41. If A and B are two events such that

$P(A) = \dfrac{1}{4}, P(B) = \dfrac{1}{2}$ and $P(A \cap B) = \dfrac{1}{8}$

find $P(\neg A$ and $\neg B)$

42. If $P(A) = \dfrac{1}{2}$, $P(B) = \dfrac{7}{12}$ and $P(\neg A \text{ or } \neg B) = \dfrac{1}{4}$, then A and B are independent events.

43. Given two independent events A and B such that $P(A) = 0.3$, and $P(B) = 0.6$ Find: $P(A$ and B)

44. 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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45. 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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46. Given two independent events A and B such that $P(A) = 0.3$, and $P(B) = 0.6$ Find:

P(neither Anor B)

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

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48. 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.

49. 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 is red.

50. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that one of them is black and other is red.

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51. Probability of solving specific problem independently by A and B are $\dfrac{1}{2}$ and $\dfrac{1}{3}$ respectively. If both try to solve the problem

independently, find the probability that the problem is solved.

52. Probability of solving specific problem independently by A and B are $\dfrac{1}{2}$ and $\dfrac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that exactly one of them solves the problem.

53. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting : a spade

54. 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 black' F : 'the card drawn is a king'

55. 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 king or queen' F : 'the card drawn is a queen or jack'.

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56. 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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57. 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. If she reads Hindi news paper, find the probability that she reads English news paper.

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58. 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. If she reads English news paper, find the probability that she reads Hindi news paper.

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

A. 0

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

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

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

Answer:

60. Two events A and B will be independent, if:

A. A and B are mutually exclusive

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

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

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

Answer:

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61. 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?

62. 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.

63. 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?

64. In answering a question in a multiple choice test a student either knows the answer or guesses. Let $\dfrac{3}{4}$ be the probability that he knows the answer and $\dfrac{1}{4}$ be the probability that he guesses. Assuming that a student who guesses at the answer will be correct with probability $\dfrac{1}{4}$. What is the probability that a student knows

the answer, given that he answered it correctly ?

65. 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 ?

66. There see three coins,one is a two headed coin (having head on both the faces),another is a biased coin that comes up heads 75% of the time and the third is anunbiased coin.One of the three coins is choosen at random and tossed.Of it shows head,what is probability that it was the two headed coin?

67. 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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68. A factory has two machines A and B. Past record shows that machine A produced 60% of the items of output and machine B produced 40% of the items. Further, 2% of the items produced by machine A and 1% produced by machine B were defective. All the items are put into one stockpile and then one item is chosen at random from this and is found to be defective. What is the probability that it was produced by machine B?

69. 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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70. 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?

71. 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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72. 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.

73. Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is

A. $\frac{4}{5}$

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

C. $\frac{1}{5}$

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

Answer:

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

B. $P(A \mid B) < P(A)$

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

D. ਇਹਨਾਂ ਵਿੱਚੋਂ ਕੋਈ ਵੀ ਨਹੀਂ

Answer:

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75. An urn contains 5 red and 2 black balls. Two balls are randomly drawn. Let X represent the number of black balls. What are the possible values of X? Is X a random variable ?

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76. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed 6 times. What are possible values of X?

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

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78. Find the probability distribution of number of tails in the simultaneous tosses of three coins.

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

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80. 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

81. Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as : six appears on at least one die.

82. 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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83. 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.

84. The random variable X has a probability distribution P(X) of the following form, where k is some number : $P(x) = \{(k, , \text{if,}$

$x = 0), (2k, , \text{if,} x = 1), (3k, , \text{if,}$

$x = 2), (0, , , ,) :\}$ Determine the value of k.

85. The random variable X has a probability distribution P(X) of the following form, where k is some number : $P(x) = \{(k, , \text{if}, x = 0), (2k, , \text{if}, x = 1), (3k, , \text{if}, x = 2), (0, , , ,) :\}$ find $P(X < 2), P(X \leq 2), P(X \geq 2)$.

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

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

88. 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).

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

90. 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.

91. 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 $Var(X)$.

92. 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. $\dfrac{8}{3}$

Answer:

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93. Suppose that two cards are drawn at random from a deck of cards. Let X be the number of aces obtained. Then the value of E(X) is:

A. $\dfrac{37}{221}$

B. $\dfrac{5}{13}$

C. $\dfrac{1}{13}$

D. $\dfrac{2}{13}$

Answer:

94. A die is thrown 6 times. If 'getting an odd number' is a success, what is the probability of 5 successes?

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97. A pair of dice is thrown 5 times. If getting a doublet is considered a success then find the probability of exactly 2 successes.

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98. 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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99. Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that all the five cards are spades?

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100. Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that only 3 cards are spades?

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101. Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that none is a spade?

102. 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 none will fuse after 150 days of use.

103. 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

not more than one will fuse after 150 days of use.

104. 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 more than one will fuse after 150 days of use.

105. 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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106. 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?

107. 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.

108. 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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109. A person buys a lottery ticket in 50 lotteries, in each of which his chance of winning

a prize is $\dfrac{1}{100}$. What is the probability that he will win a prize at least once.

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

111. A person buys a lottery ticket in 50 lotteries, in each of which his chance of winning a prize is $\dfrac{1}{100}$. What is the probability that he will win a prize at least twice?

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112. Find the probability of getting 5 exactly twice in 7 throws of a die.

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

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114. 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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115. 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. $\left(\dfrac{1}{2}\right)^5$

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

D. $\dfrac{9}{10}$

Answer:

116. The probability that a student is not a swimmer is $\dfrac{1}{5}$. Then the probability that out of five students, four are swimmers is:

A. $(5_C)_4 \left(\dfrac{4}{5}\right)^4 \left(\dfrac{1}{5}\right)$

B. $\left(\dfrac{4}{5}\right)^4 \left(\dfrac{1}{5}\right)$

C. $(5_C)_1 \left(\dfrac{1}{5}\right) \left(\dfrac{4}{5}\right)^4$

D. ਇਹਨਾਂ ਵਿੱਚੋਂ ਕੋਈ ਵੀ ਨਹੀਂ

Answer:

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117. A and B are two events such that $P(A) \neq 0$.

Find $P(B \mid A)$,if : A is a subset of B

118. A and B are two events such that $P(A) \neq 0$

. Find $P(B \mid A)$,if : $A \cap B = \phi$

119. 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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120. In a family, with two children, the probability of both children are girls is:

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121. Suppose that 5% of men and 0.25% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume that there are equal number of males and females.

122. Suppose that 90% of people are right-handed. What is the probability that at most 6 of a random sample of 10 people are right-handed?

123. An urn 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 all will bear 'X' mark.

124. An urn 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 not more than 2 will bear 'Y' mark.

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125. An urn 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 at least one ball will bear 'Y' mark.

126. An urn 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 the number of balls with 'X' mark and 'Y' mark will be equal.
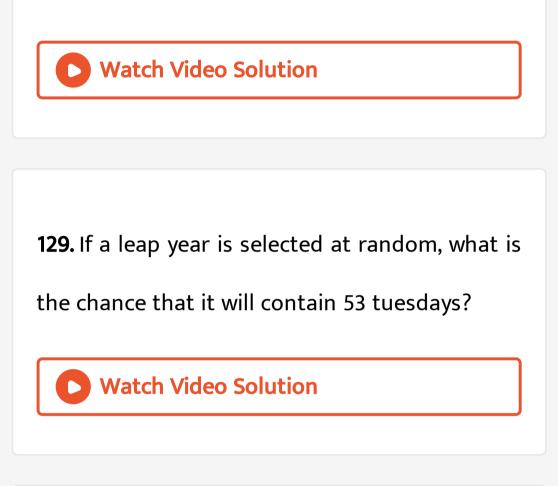
127. In a hurdle race, a player has to cross 10 hurdles. The probability that he will clear each hurdle is $\dfrac{5}{6}$. What is the probability that he will knock down fewer than 2 hurdles?
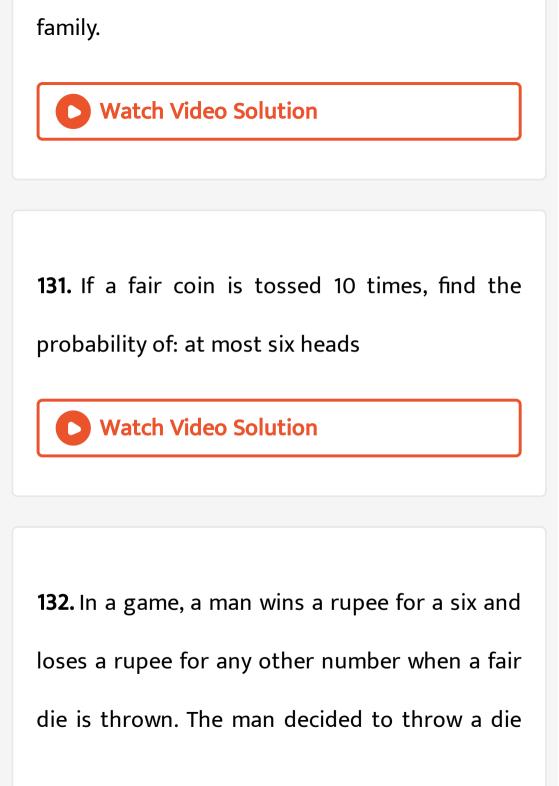
128. A die is thrown again and again until three sixes are obtained. Find the probability of

obtaining the third six in the sixth throw of the die.

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129. If a leap year is selected at random, what is the chance that it will contain 53 tuesdays?

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

family.

131. If a fair coin is tossed 10 times, find the probability of: at most six heads

132. In a game, a man wins a rupee for a six and loses a rupee for any other number when a fair die is thrown. The man decided to throw a die

thrice but to quit as and when he gets a six. Find the expected value of the amount he wins / loses.

133. Assume that the chances of a patient having a heart attack is 40%. It is also assumed that a meditation and yoga course reduce the risk of heart attack by 30% and prescription of certain drug reduces its chances by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that

after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient followed a course of meditation and yoga?

134. If each element of a second order determinant is either zero or one, what is the probability that the value of the determinant is positive? (Assume that the individual entries of the determinant are chosen independently, each value being assumed with probability $\frac{1}{2}$)

135. An electronic assembly consists of two subsystems, say, A and B. From previous testing procedures, the following probabilities are assumed to be known : $P(A$ fails $) = 0.2, P($B fails alone $) = 0.15, P(A$ and B fail $) = 0.15$ Evaluate the following probabilities: P(A fails | B has failed)

136. An electronic assembly consists of two subsystems, say, A and B. From previ ous testing procedures, the following probabilities are assumed to be known : $P(A$ fails $)$ $= 0.2, P(B$ fails alone $) = 0.15, P(A$ and B fail $) = 0.15$ Evaluate the following probabilities: P(A fails alone)

137. 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

138. If A and B are two events such that $P(A) \neq 0$ and $P\left(\dfrac{B}{A}\right) = 1$, then

A. $A \subset B$

B. $B \subset A$

C. $B = \phi$

D. $A = \phi$

Answer:

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139. If $P\left(\dfrac{A}{B}\right) > P(A)$, then which of the following is correct : :

A. $P(B \mid A) < P(B)$

B. $P(A \cap B) < P(A) \cdot P(B)$

C. $P(B \mid A) > P(B)$

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

Answer:

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140. If A and B are any two events such that :

$P(A) + P(B) - P(A$ and B) = P(A)`, then

A. $P(B \mid A) = 1$

B. $P(A \mid B) = 1$

C. $P(B \mid A) = 0$

D. $P(A \mid B) = 0$

Answer:

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