MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

PROBABILITY

Solved Examples And Exercises

1. Find the probability that in a random arrangement of the letters of the word UNIVERSITY the two I's do not come together.

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2. In a hand at Whist, what is the probability that four kings are held by a specified player?

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3. A bag contains 8 red, 3 white and 9 blue balls. If three balls are drawn at random, determine the probability that (i) all three balls are blue balls (ii) all the balls are of different colours.

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4. The letter of word CLIFTON are placed at random in a row. What is the chance that two vowels come together?

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5. The face cards are moved from a full pack. Out of the remaining 40 cards, 4 are drawn at random. What is the probability that they belong to different suits?

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6. Five cards are drawn from a pack of 52 cards. What is the chance that these 5 will contain: (i)just one ace (ii)at least one ace?

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7. A and B throw a pair of dice. If A throws 9, find B's chance of throwing a higher number.

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8. A class consists of 10 boys and 8 girls. Three students are selected at random. What is the probability that the selected group has (i) all boys? (ii) all girls? (iv) at least one girl? (v) at most one girl?

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9. A box contains 6 red marbles numbered 1 through 6 and 4 white marbles numbered from 12 through 15. Find the probability that a marble

drawn is (i) white (ii) white and odd numbered (iii) even numbered (iv) red or even numbered.

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10. 20 cards are numbered from 1 tro 20. One card is drawn at random. What is the probability that the nnumbe on the cards ids: (i) a multiple of 4 ? (ii) not a multiple of 4? (iii) Odd? (iv) greater than 12? (v) divisible by 5? (vi) not a multiple of 6?

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11. A card is drawn at random from a pack of 52 cards. Find the probability that the card drawn is; (i) a black king (ii) either a black card or a king (iii) black and a king (iv) a jack, queen or a king (v) neither a hear nor king (vi) spade or an ace (vii) neither an ace nor a king (viii) a diamond card (ix) not a diamond card (x) a black card (xi) not an ace (xii) not a black card.

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12. A bag contains 7 white, 5 black and 4 red balls. If two balls are drawn at random, find the probability that: (i) both the balls are white (ii) one ball is black and the other red (iii) both the balls are of the same colour.

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13. If n persons are seated on a round table, what is the probability that two named individuals will be neighbours?

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14. There are 4 letters and 4 addressed envelopes. Find the probability that all the letters are not dispatched in right envelopes.

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15. Each coefficient in the equation $ax^2 + bx + c = 0$ is determined by throwing an ordinary six faced die. Find the probability that the equation will have real roots.

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16. Prove that

$$a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a+b+c)\left\{(a-b)^2 + (b-c)^2 + (c-a)^2\right\}$$

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17. Three squares of Chess board are selected at random. Find the probability of getting 2 squares of one colour and other of a different colour.

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18. In a single throw of three dice, find the probability of getting a total of 17 or 18.

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19. A bag contain 8 red and 5 white balls. Three balls are drawn at random. Find the probability that: (i)All the three balls are white. (ii)All the three balls are red. (iii)One ball is red and two balls are white.

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20. If a person visits his dentist, suppose the probability that he will have his teeth cleaned is 0.48, the probability that the will have cavity filled is 0.25, probability that he will have a tooth extracted is 0.20, the probability that he will have teeth cleaned and cavity filled is 0.09, the probability that he will have his teeth cleaned and a tooth extracted is 0.12, the probability that he will have as cavity filled and tooth extracted is 0.07, and the probability that he will have his teeth cleaned, cavity filled , and

tooth extracted s 0.03. What is the probability that a person visiting his dentist will have at least one of these things done ot him?

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21. A die has two faces each with number 1, three faces each with number 2 and one face with number 3. If the die rolled once, determine (i)$P(1)$ (ii) $P(1 \text{ or } 3)$ (iii) $P(\text{not} 3)$

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22. In a town of 6000 people 1200 are over 50 years old and 2000 are female. It is known that 30% of the females are over 50 years. What is the probability that a random chosen individual from the town either female or over 50 year?

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23. An integer is chosen at random from the numbers ranging from 1 to 50. What is the probability that the integer chosen is a multiple of 2 or 3 or 10?

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24. A basket contains 20 apples and 10 oranges out of which 5 apple and 3 orange are defective. If a person takes out 2 at random what is the probability that either both are apples or both are good?

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25. Two cards are drawn from a pack of 52 cards. What is the probability that either both are red or both are kings?

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26. Let A, B, C be three events such that $P(A) = 0.3, P(B) = 0.4, P(C) = 0.8, P(A \cap B) = 0.88, P(A \cap C) = 0$

If $P(A \cup B \cup C) \geq 0.75$, then show that $0.23 \leq P(B \cap C) \leq 0.48$.

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27. A and B are two non-mutually exclusive events. If $P(A) = \frac{1}{4}, P(B) = \frac{2}{5}$ and $P(A \cup B) = \frac{1}{2}$, find the values of $P(A \cap B)$ and $P\left(A \cup \overline{B}\right)$

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28. If E and F are events such that $P(E) = \frac{1}{4}, P(F) = \frac{1}{2}$ and $P(E \text{ and } F) = \frac{1}{8}$, find (i) $P(E \text{ or } F)$, (ii) $P(-E \text{ and } -F)$.

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29. Give $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$. Find $P(A \text{ or } B)$, if A and B are mutually exclusive events.

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30. $AandB$ are two mutually exclusive events of an experiment. If $P(\neg A) = 0.65, P(A \cup B) = 0.65 and P(B) = p,$ find the value of p.

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31. Probability that a truck stopped at a road block will have faulty brakes or badly worn tires are 0.3 and 0.24, respectively. Also, the probability is 0.38 that a truck stopped at the roadblock will have faulty brakes and or badly working tires. What is the probability that a truck stopped at this road block will have faulty brakes as well as badly worn tires?

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32. One number is chosen from numbers 1 to 200. Find the probability that it is divisible by 4 or 6?

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33. A, B, C are three mutually exclusive and exhaustive events associated with a random experiment. Find $P(A)$, it being given that $P(B) = \frac{3}{2}P(A) and P(C) = \frac{1}{2}P(B)$.

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34. Four candidates A, B, C, D have applied for the assignment to coach a school cricket team. If A is twice as likely to be selected as B, and B and C are given about the same chance of being selected, while C is twice as likely to be selected as D, what are the probability that (i) C will be selected ? (ii) A will not be selected?

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35. A card is drawn from a deck of 52 cards. Find the probability of getting a king or a heart or a red card.

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36. Four cards are drawn at a time from a pack of 52 playing cards. Find the probability of getting all the four cards of the same suit.

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37. An urn contains 9 red, 7 white and 4 black balls. If two balls are drawn at random, find the probability that: (i) both the balls are red,(ii) one ball is white (iii) the balls are of the same colour (iv) one is white and other red.

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38. One card is drawn from a pack of 52 cards, each of the 52 cards being equally likely to be drawn. Find the probability that the card drawn is: an ace(ii) redÂ (iii) either red or king (iv) red and a king.

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39. Suppose each child born is equally likely to be a boy or a girl. Consider the family with exactly three children. List the eight elements in the sample space whose outcome are all possible gender of three children. Write each of the following evens as a set and find its probability: The event that exactly one child is girl.

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40. Three dice are thrown together. Find the probability of getting a total of at least 6.

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41. One urn contains two black balls (labelled B1 and B2) and one white ball. A second urn contains one black ball and two white balls (labelled W1 and W2). Suppose the following experiment is performed. One of the two urns is chosen at random. Next a ball is randomly chosen from the urn. Then a second ball is chosen at random from the same urn without replacing the first ball. Write the sample space showing all possible outcomes. What is the probability that two black balls are chosen? What is the probability that two balls of opposite colour are chosen?

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42. A coin is tossed. If head comes up, die is thrown but if tail comes up, the coin is tossed again. Find the probability of obtaining: (i) two tails (ii) head and number 6 (iii) head and an even number,

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43. Two dice are thrown simultaneously: Find the probability of its occurrence is (1)The sum as a prime number (2) A total of at least 10 (3) A doublet of even number (4) A multiple of 2 on one dice and a multiple of 3 on the other dice. (5) A multiple of 3 as the sum

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44. Three coins are tossed once. Find the probability of getting: all heads (ii) at least two heads (iii) at most two heads (iv) no heads (v) exactly one tail (vi) exactly 2 tails (vii) a head on first coin.

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45. In a lottery of 50 tickets numbered 1 to 50, two tickets are drawn simultaneously. Find the probability that: (a) both the tickets drawn have prime numbers. (b) none of the tickets drawn has prime number. (c) one ticket has prime number.

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46. Four cards are drawn at random from a pack of 52 playing cards. Find the probability of getting all the four cards of the same suit.

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47. A sample space consists of 9 elementary event $E_1, E_2, E_3 \ldots . E_8, E_9$ whose probabilities are $P(E_1) = P(E_2) = 0.08$, $P(E_3) = P(E_4) = 0.1$, $P(E_6) = P(E_7) = 0.2$, $P(E_8) = P(E_9) = 0.07$. Suppose $A = \{E_1, E_5, E_8\}$, $B = \{E_2, E_5, E_8, E_9\}$. Compute $P(A)$, $P(B)$ and $P(A \cap B)$. Using the addition law of probability, find $P(A \cup B)$. List the composition of the event $A \cup B$, and calculate, $P(A \cup B)$ by adding the probabilities of the elementary events. Calculate $P(\overline{B})$ from $P(B)$, also calculate $P(\overline{B})$ directly from the elementary events of $\overline{B}$.

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48. In a random sampling three items are selected from a lot. Each item is tested and classified as defective (D) or non-defective (N). Write the sample space of this experiment.

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49. A box contains 1 white and 3 identical black balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.

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50. An experiment consists of rolling die until a 2 appears. (i)How many elements of the sample space correspond to the event that 2 appears on the k^{th} roll of the die? (ii)How many element of the sample space correspond to the event that 2 appears not later than the k^{th} roll of the die?

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51. From a group of 2 boy and 3 girls, two children are selected at random. Describe the events. A = both selected children are girls. B= the selected group consists of one boy and one girl. C= at least one boy is selected. Which pairs (s) of events is (are) mutually exclusive?

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52. From a group of 2 boys and 3 girls, two children are selected. Find the sample space associated to this random experiment.

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53. Consider the experiment in which a coin is tossed repeatedly until a head comes up. Describe the sample space.

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54. A pair of dice is rolled. If the outcome is a doublet, a coin is tossed. Determine the total number of elementary events associated to this experiment.

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55. A die is thrown twice. Each time the number appearing on it is recorded. Describe the following events: A= both numbers are odd. B= both numbers are even. C= sum of the numbers is less that 6. Also, find $A \cup B, A \cap B, A \cup C, A \cap C$. Which pairs of events are mutually exclusive?

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56. A card is picked up from a deck of 52 playing cards. What is the sample space of the experiment? What is the event that the chosen card is black faced card?

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57. In a large metropolitan area, the probabilities are 0.87,0.36,0.30 that a family (randomly chosen for a sample survey) owns a colour televise set, a black and white television set, or both kinds of sets. What is the probability that a family owns either any one or both kinds of sets?

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58. If $AandB$ are mutually exclusive events such that $P(A) = 0.35 and P(B) = 0.45$, find $P(A \cup B)$ (ii) $P(A \cap B)$ (iii) $P\left(A \cap B'\right)$ (iv) $P\left(A' \cap B'\right)$

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59. A die is loaded in such a way that a way that each odd number is twice as likely to occur as each even number. Find P(G), where G is the event that a number greater than 3 occurs on a single roll of the die.

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60. A team of medical students doing internship have to assist during surgeries at a city hospital The probabilitiies of surgeries rated as very complex, complex, routine simple or very simple are 0.15, 0.20, 0.31, 0.26, 0.08. Find the probabilities that a particular surgery will be rated a) complex or very comples b)neither very complex nor very simple c)routine or complex d) routine or simple

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61. Suppose an integer from 1 through 1000 is chosen at random, find the probability that the integer is a multiple of 2 or a multiple of 9.

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62. Let A ,B ,C be three events. If the probability of occurring exactly one event out of A and B is $1-x$, out of B and C is $1-2x$, out of C and A is $1-x$ and that of occurring three events simultaneously is x^2 , then

prove that the probability that at least one out of A, B, C will occur is greater than 1/2 .

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63. For the three events A, B and C, P(exactly one of the events A or B occurs) $=P$(exactly one of the events B or C occurs) $=P$(exactly one of the events C or A occurs) $=p$ and P(all the three events occur simultaneously) $=p^2$, where $0<p<\frac{1}{2}$. Then, find the probability of occurrence of at least one of the events A, B and C.

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64. A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is atleast one ball of each colour.

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65. A bag contains tickets numbered 1 to 30. Three tickets are drawn at random from the bag. What is the probability that the maximum number on the selected tickets exceeds 25?

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66. A bag contains 50 tickets numbered 1, 2, 3, .., 50 of which five are drawn at random and arranged in ascending order of magnitude $(x_1 < x_2 < x_3 < x_4 < x_5)$ find the probability that$x_3 = 30$.

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67. Find the probability that the birth days of six different persons will fall in exactly two calendar months.

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68. Twelve balls are distributed among three boxes, find the probability that the first box will contains three balls.

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69. What is the probability that in a group of (i)2 people, both will have the same birth-day? (ii)3 people, at least two will have the same birth-day? Assuming that there are 365 days in a year and no one has his/her birth day on 29th February.

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70. Three dice are thrown simultaneously. Find the probability that: (i)all of them show the same face. (ii)all show distinct faces. (iii)two of them show the same face.

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71. The letters of $SOCIETY$ are placed at random in a row. What is the probability that three vowels come together?

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72. If n biscuits are distributed among N beggars, find the chance that a particular beggar will get $r(<n)$ biscuits.

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73. Six new employees, two of whom are married to each other, are to be assigned six desks that are lined up in a row. If the assignment of employees to desks is made randomly, what is the probability that the married couple will have nonadjacent desks?

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74. Find the probability that in a random arrangement of the letters of the word 'UNIVERSITY' the two I's come together.

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75. A typical PIN (personal identification number) is a sequence of any four symbols chosen from the 26 letters in the alphabet and the ten digits. If all PINs are equally likely, what is the probability that a randomly chosen PIN contains a repeated symbol?

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76. A word consist of 9 letters; 5 consonants and 4 vowels. Three letters are chosen at random. What is the probability that more than one vowel will be selected?

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77. If the letters of the word ASSASSINATION are arranged at random. Find the probability that (i)Four S's come consecutively in the word. (ii)Two I's and two N's come together. (iii)All A's are not coming together. (iv)No two A's are coming together.

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78. In a lottery, a person choses six different natural numbers at random from 1 to 20, and if these six numbers match with the six numbers already fixed by the lottery committee, he wins the prize. What is the probability of Winning the prize in the game. [Hint order of the numbers is not important.]

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79. If the letters of the word ALGORITHM are arranged at random in row what is the probability that the letters GOR must remain together as a unit?

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80. A card is drawn from an ordinary pack of 52 cards and a gambler bets that, it is a spade or an ace. What are the odds against his wining this bet?

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81. Five marbles are drawn from a bag which contains 7 blue marbles and 4 black marbles. What is the probability that: (i)all will be blue? (ii)3 will be blue and 2 black?

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82. Find the probability that when a hand of 7 cards is dealt from a well-shuffled deck of 52 cards, it contains (i) all 4 kings (ii) exactly 3 kings (iii) at least 3 kings.

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83. Four persons are to be chosen at random from a group of 3 men, 2 women and 4 children. Find the probability of selecting: (i)1man 1woman and 2 children (ii)Exactly 2 children (iii) 2 women

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84. A box contains 10 bulbs, of which just three are defective. If a random sample of five bulbs is drawn , find the probabilities that the sample contains: Exactly on defective bulb. Exactly two defective bulbs. No defective bulbs.

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85. A five digit number is formed with the digits 1,2,3,4,5 without repetition. Find the probability that the number is divisible by 4.

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86. A coin is tossed. If it shows head, we draw a ball from a bag consisting of 3 red and 4 black balls; if it shows tail, we throw a die. What is the sample associated to this experiment?

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87. An experiment consists rolling a die then tossing a coin once if the number on the die is even. If the number n the die is odd, the coin is tossed twice. Write the sample space for this experiment.

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88. The numbers 1,2,3 and 4 are written separately on four slips of paper. The slips are then put in a box and mixed thoroughly. A person draws tow slips from the box, one after the other, without replacement. Describe the sample space for the experiment.

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89. A coin is tossed. If the result is a head, a die is thrown. If the die shows up an even number, the die is thrown again. What is the sample space for this experiment.

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90. A coin is tossed once. Write its sample space.

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91. If a coin is tossed two times, describe the sample space associated to this experiment.

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92. If a coin is tossed three times (or three coins are tossed together), then describe the sample space for this experiment.

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93. Write the sample space for the experiment of tossing a coin four times.

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94. Two dice are thrown. Describe the sample space of this experiment.

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95. What is the total number of elementary events associated to the random experiment off throwing three dice together?

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96. A coin is tossed and then a die is rolled only in case a head is shown on the coin. Describe the sample for this experiment.

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97. A coin tossed and then a die is thrown. Describe the sample space for this experiment.

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98. An experiment consists of tossing a coin and then tossing it second time if head occurs. If tail occurs on the first toss, then a die is tossed once. Find the sample space.

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99. A coin is tossed. If it shows tail, we draw a ball from a box which contains 2 red 3 black balls; if it shows head we throw a die. Find the sample space of this experiment.

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100. A coin is tossed repeatedly until a tail comes up for the first time. Write the sample space for this experiment.

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101. A box contains 1 red and 3 black balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.

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102. A bag contains 4 identical red balls and 3 identical black balls. The experiment consists of drawing one ball, then putting it into the bag and again drawing a ball. What are the possible outcomes of the experiment?

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103. An experiment consists of boy –girl composition of families with 2 children. i. What is the sample space if we are interested in knowing whether it is a boy or girl in the order of their births? ii. What is the sample space if we are interested in the number of boys in a family?

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104. There are three coloured dice of red, white and black colour. These dice are placed in a bag. One die is drawn at random from the bag and rolled, its colour and the number on its uppermost face is noted describe the sample space for this experiment.

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105. 2 boys and 2 girls are in room P and 1 boy 3 girls are in room Q. write the sample space for the experiment in which a room is selected and then a person.

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106. A bag contains one white and one red ball. A bal is drawn from the bag. If the bal drawn is white it is replaced in bag and again a ball is drawn. otherwise, a die is tossed. Write he sample space for this experiment.

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107. An experiment consists of rolling a die and then tossing a coin once if the number on the die is even. If the number on the die is odd the coin is tossed twice. Write the sample space for this experiment.

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108. A die is thrown repeatedly until a six comes up. What is the sampe space for this experiment.

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109. An experiment involves rolling a pair of dice and recording the numbers that come up. Describe the following events. $A =$ the sum is greater than 8, $B =$ 2 occurs on either die, $C =$ the sum is at least 7 and a multiple of 3. Also, find $A \cap B,\ B \cap C\ and\ A \cap C$. Are : i. A and B mutually exclusive? ii. B and C mutually exclusive? iii. A and C mutually exclusive?

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110. Two dice are thrown and the sum fo the numbers which come up on the dice is noted. Let us consider the following events: $A =$ The sum is

even, $B =$ The sum is multiple of 3, $C =$ The sum is less than 4, $D =$ The sum is greater than 11.

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111. A coin is tossed. Find the total number of elementary events and also the total number events associated with the random experiment.

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112. List all events associated with the random experiment of tossing of two coins. How many of them are elementary events?

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113. Three coins are tossed once. Describe the following events associated with this random experiment: $A =$ Getting three heads, $B =$ Getting

two heads and one tail, $C =$ Getting three tails $D =$ Getting a head on the first coin. i. Which pairs of events are mutually exclusive?

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114. In a single throw of a die describe the following events: $A =$ Getting a number less than 7.

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115. In a single throw of a die describe the following events: $B =$ Getting a number greater than7

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116. In a single throw of a die describe the following events: $C =$ Getting a multiple of 3

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117. In a single throw of a die describe the following events: $D =$ Getting a number less than 4.

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118. In a single throw of a die describe the following events: Getting an even number greater than 4

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119. In a single throw of a die describe the following events: $F =$ Getting a number not less than 3.

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120. In a single throw of a die describe the following events: $A \cup B,\ A \cap B,\ B \cap C,\ E \cap F,\ D \cap F \text{ and } F$

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121. Three coins are tossed. Describe (i) Two events which are mutually exclusive (ii) Three events which are mutually exclusive and exhaustive (iii) Two events which are not mutually exclusive (iv) Two events which are mutually exclusive but not exhaustive

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122. Find the probability of getting a head in a toss of an unbiased coin.

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123. In a simultaneous toss of two coins, find the probability of getting: 2 heads

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124. In a simultaneous toss of two coins, find the probability of getting: exactly one head

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125. In a simultaneous toss of two coins, find the probability of getting: exactly 1 tails

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126. In a simultaneous toss of two coins, find the probability of getting: exactly one tail

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127. In a simultaneous toss of two coins, find the probability of getting: no tails.

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128. A die is thrown. Find the probability of getting: an even number

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129. A die is thrown. Find the probability of getting: a number greater than or equal to 3

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130. A die is thrown. Find the probability of getting: a number more than 6

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131. A die is thrown. Find the probability of getting: a prime number.

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132. A die is thrown. Find the probability of getting: a number less than or equal to 4

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133. A die is thrown. Find the probability of getting: a number less than or equal to 6

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134. On her vacations Veena visits four cities A, B, C and D in a random order. What is the probability that she visits: a. A before B? b. A before B and B before C? c. A first and B last? d. A either first or second? e. A just before B?

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135. Tickets numbered from 1 to 20 are mixed up together and then a ticket is drawn at random. What is the probability that the ticket has a number which is a multiple of 3 or 7?

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136. Find the probability that a leap year, selected at random, will contain 53 Sundays.

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137. What is the probability that a number selected from the number 1,2,3.....25, is prime number, when each of the given numbers is equally likely to be selected?

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138. A fair coin with 1 marked on one face and 6 coin the other and a fair die are both tossed, fid the probability that the sum of numbers that turn up is i. 3 ii. 12.

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139. A die has two faces each with number 1, three faces each with number 2 and one face with number 3. If die rolled once determine:

i. P(2) ii. P(1 or 3) iii. P(not 3)

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140. What is the probability tht a randomly chosen two digit integer is a multiple of 3?

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141. A box contains 10 rd marbles, 20 blue marbles and 30 green marbles. Five marbles are drawn from the box, what is the probability that i. al will be blue? ii. at least one will be green?

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142. In a lottery 10,000 tickets are sold and ten equal prizes are awarded,. What is the probability of not getting a prove if you buy i. 1 ticket ii. two tickets iii. 10 tickets.

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143. The number lock of a suitcase has 4 wheels, each labelled with ten digits i.e. from 0 to 9. The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase.

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144. Out of 100 students two sections of 40 and 60 students are formed. If you and your friends are among the 100 students, what is the probability that i. You both enter the same section? ii. You both enter the different section?

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145. In a single throw of three dice, determine the probability of getting i. total of 5 ii. total of at most 5 ii. a total of at least 5.

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146. If the letters of the word ATTRACTION are written down at random, find the probability that i. all the T 's occur together

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147. Out of 9 outstanding students in a college, there are 4 boys and 5 girls. A team of four students is to be selected for a quiz programme. Find the probability that two are boys and two are girls.

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148. In a lot of 12 Microwave ovens, there are 3 defective units. A person has ordered 4 of these units and since each is identically packed, the selection will be random. What is the probability that

i. all 4 units are good.

ii. Exactly 3 units are good,

iii. at least 2 units are good.

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149. In a really race there are give teams, A, B, C, D and E i. What is the probability that A, B, and C finish first, second and third respectively.

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150. The odds in favours of an event are 3:5. Find the probability of occurrence of this event.

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151. A letter is chosen at random from the word ASSASSINATION. Find the probability that letters is i. a vowel ii. a consonant.

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152. If 4-digits numbers greater than or equal to 5000 are randomly formed form the digits 0, 1, 3, 5 and 7 what is the probability of forming number divisible by 5 when i. the digits may be repeated.

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153. Three letters are dictated to three person and an envelope is addressed to each of them, the letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that at least one letter is in its proper envelope.

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154. In how many ways, can three girls can three girls and nine boys be seated in two vans, each having numbered seats, 3 in the and 4 at the back? How many seating arrangements are possible if 3 girls should sit together in a back row on adjacent seats? Now, if all the seating

arrangements are equally likely, what is the probability of 3 girls sitting together in a back row on adjacent seats?

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155. Five persons entered the lift cabin on the ground floor of an 8-floor house. Suppose that each of them independently and with equal probability can leave the cabin at any floor beginning with the first. Find out the probability of all five persons leaving at different floors.

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156. Which of the following cannot be valid assignment of probability for elementary events or outcomes of samples space $S = \{w_1, w_2, w_3, w_4, w_5, w_6, w_7\}$: Elementary events w_1 w_2 w_3 w_4 w_5 w_6 w_7 i. 0.1 0.01 0.05 0.03 0.01 0.2 0.6 ii. $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ iii. 0.7 0.6 0.5 0.4 0.3 0.2 0.1 iv. $\frac{1}{14}$ $\frac{2}{14}$ $\frac{3}{14}$ $\frac{4}{14}$ $\frac{5}{14}$ $\frac{6}{14}$ $\frac{15}{14}$

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157. A die is thrown. Find the probability of getting :a prime number.

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158. A die is thrown. Find the probability of getting : $2 \text{ or } 4$

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159. A die is thrown. Find the probability of getting : a multiple of 2 or 3.

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160. Three coins tossed together. Find the probability of getting: i. Exactly two heads ii. At least to heads iii. At lest one head and one tail.

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161. What is the probability that an ordinary year that 53 Sundays?

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162. What is the probability that a leap year has 53 Sundays and 53 Mondays?

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163. In a single throw of three dice, find the probability of getting the same number on all the three dice.

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164. Two unbiased dice are thrown. Find the probability that the total of the numbers on the dice is greater than 10.

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165. In shuffling a pack of 52 playing cards, four are accidently dropped; find the chance that the missing cards should be one from each suit.

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166. From a deck of 52 cards, four cards are drawn simultaneously find the chance that they will be the four honours of the same suit.

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167. Tickets numbered from 1 to 20 re mixed up together and then a ticket is drawn at random. What is the probability that the ticket has a number which is a multiple of 3 or 7?

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168. A bag contains 6 red, 4 white and 8 blue balls. If three balls are drawn at random, find the probability that one is red, one is white and one is blue.

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169. A bag contains 6 red, 4 white and 8 blue balls. If three balls are drawn at random find the probability that ii. one all is black and the other red

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170. A bag contains 6 red, 4 white and 8 blue balls. If three balls are drawn at random, find the probability that: i. one is red and two are white ii. two are blue and one is red iii. one is red.

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171. There are four men and six women on the city councils. If one council member is selected for a committee at random, how likely is that it is a women?

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172. A box contains 100 bulbs 20 of which are defective. 10 bulbs are selected for inspection. Find the probability that: i. all 10 are defective ii. all 10 are good ii. at least one is defective iv. none3 is defective.

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173. Find the probability that in a random arrangement of the letters of the word SOCIAL vowel come together.

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174. The letters of the word FORTUNATES are arranged at random in a row. What is the chance that the two T come together.

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175. A committee of two persons is selected from two men and two women. What is the probability that the committee will have two men?

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176. If odds in favour of an event be 2:3 find the probability of occurrence of this event.

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177. Two balls are drawn at random from a bag containing 2 white, 3 red, 5 green and 4 black balls, one by one without, replacement. Find the

probability that both the balls are of different colours.

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178. Two unbiased dice were thrown. Find the probability that neither a doublet nor a total of 10 will appear.

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179. A bag contains 5 red, 6 where and 7 black balls. Two balls are drawn at random. what is the probability that both balls are red or both are black?

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180. If a letter is chosen at random from the English alphabet, find the probability that the letter chosen is (i) a vowel, and (ii) a cansonant.

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181. In a lottery, a person chooses six different numbers at random from 1 to 20 and if these six numbers match with six numbers already fixed by the lottery committee, he wins the prize. What is the probability of winning the prize in the game?

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182. Two dice are thrown. Find the odds in favour of getting the sum i. 4 ii. 5 iii. what are the odds against getting the sum 6?

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183. A box contains 10red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn at random. From the box, what is the probability that i. all are blue? ii. at least one is green?

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184. What are the odds is favour of getting a spade if a card is drAwn from a well shuffled deck of cards? What are the odds in favour of getting a king?

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185. Five cards are drawn from a well shuffled pack of 52 cards. Find the probability that all the five cards are hearts.

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186. A bag contains tickets numbered from 1 to 20. Two tickets are drawn. find the probability that i. both the tickets have prime numbers on them ii. on one there is a prime number and on the other there is a multiple of 4.

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187. An urn contains 7 white, 5 black and 3 red balls. Two balls are drawn at random. Find the probability that i. both the balls red ii. one ball is red and the other is black iii. one ball is white.

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188. The probability that at least one of the event A and B occurs is 0.6. If A and B occur simultaneously with probability 0.2, then find $P(A) + P(B)$.

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189. Check whether the following probabilities $P(A) and\, P(B)$ are consistently defined: $P(A) = 0.5,\ P(B) = 0.7,\ P(A \cap B) = 0.6$

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190. Check whether the following probabilities $P(A) and\, P(B)$ are consistently defined: $P(A) = 0.5, P(B) = 0.4, P(A \cup B) = 0.8$

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191. Events E and F are such that $P(\text{not}\ \text{E}\ \text{or}\ \text{not}\ \text{F}) = 0.25$ State whether E and F are mutually exclusive.

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192. The probability of two events A and B are 0.25 and 0.50 respectively. The probability of their simultaneous occurrences 0.14. Find the probability that neither A nor B occurs.

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193. Find the probability of getting an even number on the firs tide or a total of 8 in as single throw of two dice.

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194. A die is thrown twice. What is the probability that at least one of the two throws comes up with the number 3?

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195. A drawer contains 50 bolts and 150 nuts. Half of the bolts and half of the nuts are rusted. If one item is chosen at random, what is the probability that it is rusted or a bolt?

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196. In an essay competition, the odds in favour of competitors P, Q, R S are 1:2, 1:3, 1:4, and 1:5 respectively. Find the probability that one then win the competitions.

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197. Two dice are thrown together. What is the probability that the sum of the numbers on the two faces si neither divisible by 3 nor by 4?

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198. Two dice are thrown together .What is the probability that the sum of the number on the two faces is divisible by 3 nor 4 ?

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199. The probability that a person will get an electric contract is $\frac{2}{5}$ and the probability that they will not get plumbing contracts $\frac{4}{7}$. if the probability of getting at least one contract is $\frac{2}{3}$, what is the probability that he will get both?

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200. The probability that a student will receive A, B, C or D grade or 0.40, 0.3, 0.1 and 0.10 respectively. Find the probability that a student will receive. i. B or C grade ii. at most C grade.

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201. The probability that a patient visiting a dentist will have a tooth extract is 0.06, the probability that he will have a cavity filled is 0.2 and the probability that he will have a tooth extracted as well as cavity filled is 0.03. what is the probability of that a patient has either a tooth extracted or a cavity filled?

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202. Probability that Hameed passes in Mathematics is and the probability that he passes in English is If the probability of passing both courses is what is the probability that Hameed will pass in at least one of these subjects?

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203. Find the probability of at most two tails or at least two heads in a toss of three coins.

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204. From the employees of a company 5 persons are elected to represent them n the managing committee of the company. Particulars of the five persons are as follows: S. No. Person Age (in years) 1 2 3 4 5 Male Male Female Female Male 30 33 46 28 41

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205. In class XI of a school 40% of the students study Mathematics and 30% study Biology. 10% of the class study both mathematics and biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology or both.

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206. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. find the probability that: i. Both Anil an Ashima will not qualify the exam ii. At least one of them will not quality the exam iii. Only one of them will qualify the exam.

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207. In a class of 60 students 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NS. If one of these students is selected at random, find the probability that: i. The student opted for NCC or NSS ii. The student has opted NSS or NCC.

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208. Four candidates A, B, C, D have applied for the assignment to coach a school cricket team. If A is twice as likely to be selected as B, and B and C are given about the same chance of being selected, while C is twice as likely to be selected as D, what are the probability that (i) C will be selected ? (ii) A will not be selected?

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209. are two candidates seeking admission in I.I.T. The probability that P is selected is 0.5 and the probability that both are selected is at most 0.3. Prove that the probability of being selected is at most 0.8

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210. If $A \, and \, B$ mutually exclusive events associated with a random experiment such that $P(A) = 0.4 \, and \, P(B) = 0.5,$ then find: $P(A \cup B)$

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211. If $A \, and \, B$ mutually exclusive events associated with a random experiment such that $P(A) = 0.4 \, and \, P(B) = 0.5,$ then find: $P(A \cap B)$

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212. If $A \, and \, B$ mutually exclusive events associated with a random experiment such that $P(A) = 0.4 \, and \, P(B) = 0.5,$ then find: $P(A \cap B)$

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213. If $A \, and \, B$ mutually exclusive events associated with a random experiment such that $P(A) = 0.4 \, and \, P(B) = 0.5,$ then find: $P(A \cap B)$

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214. $A \, and \, B$ are two events such that $P(A) = 0.54, \; P(B) = 0.69 \, and \, P(A \cap B) = 0.3.$ Find $P(A \cup B)$

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215. $A \, and \, B$ are two events such that $P(A) = 0.54, \; P(B) = 0.69 \, and \, P(A \cap B) = 0.3.$ Find : $P(A \cap B)$

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216. $A \text{ and } B$ are two events such that $P(A) = 0.54,\ P(B) = 0.69 \text{ and } P(A \cap B) = 0.3.$ Find; $P(A \cap B)$

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217. If $A \text{ and } B$ are two events associated with a random experiment such that $P(A) = 0.3,\ P(B) = 0.4$ and $P(A \cup B) = 0.,$ find $P(A \cap B)$

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218. If $A \text{ and } B$ are two events associated with a random experiment such that $P(A) = 0.5,\ P(B) = 0.3$ and $P(A \cap B) = 0.2,$ find $P(A \cup B)$

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219. If $A \text{ and } B$ are two events associated with a random experiment such that $P(A \cup B) = 0.8,\ P(A \cap B) = 0.3 \text{ and } P(A) = 0.5$, find $P(B)$

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220. In an entrance test that is graded on the basis of two examinations, the probability of a randomly chosen student passing the first examination is 0.8 and the probability of passing the second examination is 0.7. The probability of passing at least one of them is 0.95. What is the probability of passing both?

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221. A box contains 30 bolts and 40 nuts. Half of the bolts and half of the nuts are rusted. If two items are drawn at random, what is the probability that either both are rusted or both are bolts?

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222. An integer is chosen at random from first 200 positive integers. Find the probability that the integer is divisible by 6 or 8.

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223. Given two mutually exclusive events A and B such that $P(A) = 1/2$ and $P(B) = 1/3$, find $P(A \text{ or } B)$

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224. There are three events A, B, C one of which must and only one can happen; The odds are 8 to 3 against A, 5 to 2 against B; find the odds against C.

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225. A card is drawn at random from a well shuffled deck of 2 cards. Find the probability of its being a spade or a king.

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226. In a single throw of two dice, find the probability that neither a doublet nor a total of 9 will appear.

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227. A natural number is chosen at random from amongst first 500. What is the probability that the number so chosen is divisible by 3 or 5?

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228. A card is drawn from a deck of 52 cards. Find the probability of getting an ace or a spade card.

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229. The probability that a 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 the English examination is 0.75. What is the probability of passing the Hindi examination?

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230. One number is chosen from numbers 1 to 100. Find the probability that it is divisible by 4 or 6?

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231. From a well shuffled deck of 52 cards, 4 cards are drawn at random. What is the probability that all the drawn cars are of the same colour.

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232. 100 students appeared for two examinations. 60 passed the first, 0 passed the second and 30 passed both. Find the probability that a student selected at random has passed at least one examination.

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233. A box contains 10 white, 6 red and 10 black balls. A ball is drawn at random from the box. What is the probability that the ball drawn is either white or red?

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234. The probability that a person will travel by plane is $\frac{3}{5}$ and that he will travel by train is $\frac{1}{4}$. What is the probability that he (she) will travel by plane or train?

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235. Two cards are drawn from a well shuffled pack of 2 cards. Find the probability that either both are black or both are kings.

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236. Three numbers are chosen at random from numbers 1 to 30. Write the probability that the chosen number are consecutive.

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237. persons are sitting in a row. Two of them are selected. Write the probability that they are together.

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238. If a single letter is selected at random from the word PROBABILITY, then the probability that it is a vowel is

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239. Find the probability that a leap year will have 53 Friday or 53 Saturdays.

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240. Three dice are thrown simultaneously. What is the probability of getting 15 as the sum?

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241. If the letters of the word MISSISSIPPI are written down at random in a row, what is the probability that four S' s come together.

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242. What is the probability that the 13th days of a randomly chosen months is Friday?

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243. Three of the six vertices of a regular hexagon are chosen the random. What is the probability that the triangle with these vertices is equilateral.

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244. If $E\,and\,E_2$ are independent evens, write the value of $P(E_1 \cup E_2) \cap (E_c1 \cap Ec_2)$.

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245. If $A\,and\,B$ are two independent events such that $P(A \cap B) = \frac{1}{6}$ a n d\$P\left(A' \cap B'\right) = \frac{1}{3}$, then write the values of $P(A)and\,P(B)$

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246. Three digit numbers are formed using the digits 0,2,4,6,8. A number is chosen at random out of these numbers what is the probability that this number has the same digits? a. $\frac{1}{16}$ b. $\frac{16}{25}$ c. $\frac{1}{645}$ d. $\frac{1}{25}$

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247. One card is drawn from a pack of 2 cards. The probability that it is the card of a king or spade is

a. 1/26

b. 3/26

c. 4/13

d. 3/13

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248. Two dice are thrown together. The probability that a lest one will show its digit greater than 3 is

a. 1/4

b. 3/4

c. 1/2

d. 1/8

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249. Two dice are thrown simultaneously. the probability of obtaining a total score of 5 is a. 1/18 b. 1/12 c. 1/9 d. none of these

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250. Two dice are thrown simultaneously. the probability of obtaining total score of seven is a. 5/36 b. 6/36 c. 7/36 d. 8/36

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251. The probability of getting total of 10 in a single throw of two dice is

a. 1/9 b. 1/12 c. 1/6 d. 5/36

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252. A card is drawn at random from a pack of 100 cards numbered 1 to 100. The probability of drawing a number which is a square is a. 1/5

b. 2/5 c. 1/10 d. none of these

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253. A bag contains 3 red, 4 white and 5 blue balls. All balls are different two balls are drawn at random. the probability that they are of different colour is a. 47/66 b. 10/33 c. 1/3 d. 1

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254. Two dice are thrown together. The probability that neither they show equal digits nor the sum of their digits is 9 will be a. 13/1 b. 13/18 c. 1/9 d. 8/9

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255. Four persons are selected at random out of 3 men, 2 women and 4 children. The probability that there are exactly 2 children in the selection is a. 11/21 b. 9/21 c. 10/21 d. none of these

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256. The probabilities of happening of two events A and B are 0.25 and 0.50 respectively. If the probability of happening of A and B together is 0.14, then probability that neither A nor B happen is a. 0.39 b. 0.2 c. 0.11 d. none of these

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257. A die is rolled, then the probability that a number 1 or 6 may appear is a. 2/3 b. /6 c. 1/3 d. 1/2

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258. Six boys and six girls sit in a row randomly. The probability that al girls sit together is a. 1/122 b. 1/112 c. 1/102 d. 1/132

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259. The probabilities of three mutually exclusive events A, B and C are given by 2/3,1/4 and 1/6 respectively. The statement. a. is true b. is false c. nothing can be said d. could be either

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260. If $\frac{(1-3p)}{2}, \frac{(1+4p)}{3}, \frac{(1+p)}{6}$ are the probabilities of three mutually excusing and exhaustive events, then the set of all values of p is a. $(0, 1)$ b. $\left(-\frac{1}{4}, \frac{1}{3}\right)$ c. $\left(0, \frac{1}{3}\right)$ d.

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261. A pack of cards contains 4 aces, 4 kings, 4 queens and 4 jacks. Two cards are drawn t random. the probability that at least one of them is an ace is a. 1/5 b. 3/16 c. 9/20 d. 1/9

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262. If three dice are throw simultaneously, then the probability of getting a score of 5 is a. 5/216 b. 1/6 c. 1/36 d. none of these

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263. One of the two events must occur. If the chance of one is 2/3 of the other, then odds in favour of the other are a. 1:3 b. 3:1 c. 2:3 d. 3:2

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264. Find the probability that a leap year will have 53 Friday or 53 Saturdays.

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265. A person write 4 letters and addresses 4 envelopes. If the letters are placed in the envelopes at random, then the probability that all letters are not placed in the right envelopes, is a. 1/4 b. 11/24 c. 15/24 d. 23/24

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266. A and B are two events such that $P(A) = 0.25 \, and \, P(B) = 0.50$. The probability of both happening together is 0.14. The probability of both A and B not happening is a. 0.39 b. 0.25 c. 0.11 d. none of these

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267. If the probability of A to fall in an examination is $\frac{1}{5}$ and that of B is $\frac{3}{10}$. then, the probability that either A or B fails is a. 1/2 b. 11/2 c. 19/50 d. none of these

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268. A box contains 10 good articles and 6 defective articles. One item is drawn at random. the probability that it is either good or has a defect, is

a. 64/64 b. 49/64 c. 40/64 d. 24/64

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269. Three integers are chosen at random from the first 20 integers. The probability that their product is even is a. 2/19 b. 3/29 c. 17/19 d. 4/19

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270. Out of 30 consecutive integers, 2 are chosen at random. the probability that their sum is odd, is a. 14/29 b. 16/29 c. 15/29 d. 10/29

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271. A bag contains 5 black balls, 4 white balls and 3 red balls. If a ball is selected randomwise the probability that it is black or red ball is a. 1/3 b. 1/4 c. /12 d. 2/3

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272. Two dice are thrown simultaneously. the probability of getting a pair of aces is a. 1/36 b. 1/3 c. 1/6 d. none of these

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273. An urn contains 9 balls two of which are rd, three blue and four black. Three balls are drawn at random. the probability that they are of the same colour is a. 5/84 b. 3/9 c. 3/7 d. 7/17

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274. Five persons entered the lift cabin on the ground floor of an 8 floor house. Suppose that each of them independently and with equal probability can leave the cabin at any floor beginning with the first, then the probability of al 5 persons leaving at different floor is a. $\frac{{}^7P_5}{7^5}$ b. $\frac{7^5}{{}^7P_5}$ c. $\frac{6}{{}^6P_5}$ d. $\frac{{}^5P_5}{5^5}$

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275. A box contains 10 good articles and 6 defective articles. One item is drawn at random. the probability that it is either good or has a defect, is a. 64/64 b. 49/64 c. 40/64 d. 24/64

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276. A box contains 6 nails and 10 nuts. Hal of the nails and half of the nuts are rusted. If one item is chosen at random, the probability that it is rusted or is a nail. a. 3/16 b. 5/16 c. 11/16 d. 14/16

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277. If S is a sample space, then $P(A) = \frac{1}{3}P(B)$ and $S = A \cup B$ where A and B are two mutually exclusiv then $P(A) =$ (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) $\frac{3}{8}$

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278. A mapping is select at random from the set of all the mappings of the set $A = \{1, 2, n\}$ into itself. Find the probability that the mapping selected is an injection.

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279. Six boys and six girls sit in a row randomly. Find the probability that (i) the six girls sit together, (ii) the boys and girls sit alternately.

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280. Without repetition of the numbers, four digit numbers are formed with the numbers $0, 2, 3, 5$. The probability of such a number divisible by 5 is

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Others

1. An urn contains twenty white slips of paper numbered from 1 through 20, ten red slips of paper numbered from 1 through 10, forty yellow slips of paper numbered form 1 through 40 and ten blue slips of paper numbered from 1 through 10. If these 80 slips of paper are thoroughly shuffled so that each slip has the same probability of being drawn. find the probabilities of drawing a slip of paper that is

(i) blue or white (ii) number 1, 2, 3 4, or 5 (iii) red or yellow and numbered 1, 2,3 or 4. (iv) numbered 5, 15, 25, or 35. (v) white and numbered higher than 12 or yellow and numbered higher than 26.

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

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3. Figure shows three events A, B, C and also the probabilities of the various intersections (for instance $P(A \cap B) = 0.07$) determine

$P(A)$

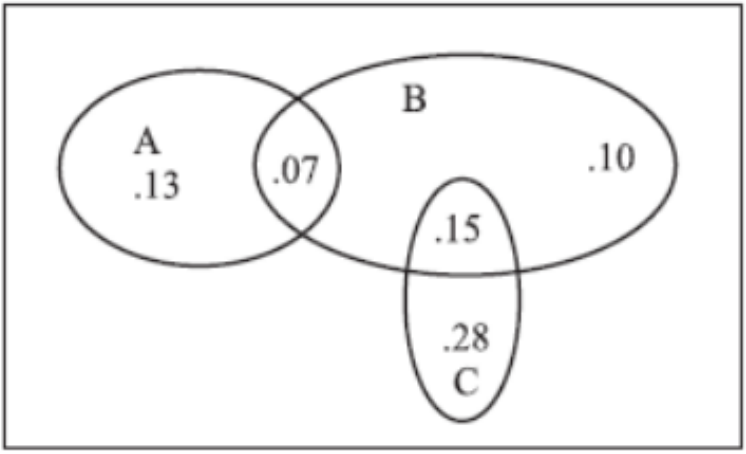
(ii) $P(B \cap C)$

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

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

(v) $P(B \cap C)$

(vi) probability of exactly on the three events.



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4. Two dice are thrown. The events A, B, C, D, E and F are described as follows: $A =$ Getting an even number on the first die $B =$ Getting an odd number n the first die $C =$ Getting at most 5 as sum of the numbers on the two dice $D =$ Getting the sum of the numbers on the dice greater than 5 but less than 10 $E =$ Getting at least 10 as the sum of the numbers on the dice $F =$ Getting an odd number on one if the dice. i. Describe the following events : A and B, B or C, B and C, A and E, A or F, A and F ii. State true or false: a. A and B are mutually exclusive b. A and B are mutually exclusive and exhaustive events. c. A and C are mutually exclusive events. d. C and D are mutually exclusive and exhaustive events. e. C, D and E are mutually exclusive and exhaustive events. f. A and B are mutually exclusive events.

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5. The numbers 1,2,3 and 4 are written separately on four slips of paper. The slips are then put in a box and mixed thoroughly. A person draws two slips from the box, one after the other without replacement. Describe the

following events. $A =$ The number on the first slip is larger than the one on the second slip. $B =$ the number on the second slip is greater than 2 $C =$ the sum of het numbers on the two slips is 6 or 7 $D =$ the number on the second slips is twice that on the first slip. Which pair (s) of from events is (are) mutually exclusive?

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6. If A, B, C are three mutually exclusive and exhausitive events of an experiment such that $3P(A) = 2P(C), \ then \ P(A)$ is equal to a. $\frac{1}{11}$ b. $\frac{2}{11}$ c. $\frac{5}{11}$ d. $\frac{6}{11}$

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7. If A and B are mutually exclusive events then a. $P(A) \leq P(B)$ b. $P(A) \geq P(B)$ c. `P(A)

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8. Three numbers are chosen from 1 to 20. The probability that they are to consecutive is a. $\frac{186}{190}$ b. $\frac{187}{190}$ c. $\frac{188}{190}$ d. $\frac{18}{{}^{20}C_3}$

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