MBA PIONEER 2024

QUANTITATIVE APTITUDE

DPP: 05

Probability 2

Q1 4 dice are thrown together. What is the probability of getting a sum of 20?

(A) $\frac{20}{1296}$ (B) $\frac{23}{1296}$

(C) $\frac{52}{1296}$ (D) $\frac{35}{1296}$

Q2 Bag A contains 'n' red balls and 'n' blue balls. While Bag B contains '2n' red balls and '2n' blue balls. A single ball is randomly taken out from bag A and put in bag B. Then a single ball is randomly taken out from bag B. What is the probability that the ball taken out from bag B is a red ball?

(A) $\frac{1}{4}$

(B) $\frac{2}{5}$

(C) $\frac{1}{2}$

(D) Insufficient data

Q3 A die is rolled thrice. What is the probability that one of the outcomes is equal to the sum of the other two?

(A) $\frac{1}{6}$ (B) $\frac{7}{36}$

(C) $\frac{13}{72}$ (D) $\frac{5}{24}$

Q4 Two identical unbiased dice are thrown at random. What is the probability that the product of the number on the two dice is even?

(A) $\frac{1}{4}$ (B) $\frac{1}{2}$

(C) $\frac{3}{4}$ (D) 1

Q5 There are 10 identical looking oranges that are randomly arranged in line. It is known that four of them aur spoiled. What is the probability that the second , fourth, fifth and ninth oranges are spoiled?

(A) $\frac{1}{4}$ (B) $\frac{4!}{10!}$

(C) $\frac{1}{210}$ (D) $\frac{1}{240}$

Q6 One card is taken out from a well shuffled pack of 52 cards. What is the probability that the card is either a face card or a black colour card or both?

(A) $\frac{6}{13}$ (B) $\frac{19}{26}$

(C) $\frac{21}{26}$ (D) $\frac{8}{13}$

Q7 Six friends are standing in a community feeding (langar) queue. All of them are of distinct height. What is the probability that all of them are standing neither in increasing nor in decreasing order of their height from left to right?

(A) $\frac{2518}{2520}$ (B) $\frac{359}{360}$

(C) $\frac{119}{120}$ (D) $\frac{719}{720}$

Q8 Rashi, Mahima, Anu and Priya are four students in a class of seven students. What is the probability that Rashi ranked higher than Mahima, Anu and Priya. If all the seven students secure different ranks?

(A) $\frac{1}{4}$ (B) $\frac{1}{(3!\ 4!)}$

(C) $\frac{1}{(4!)}$ (D) $\frac{2(4!)}{7!}$

Q9 Radhika was rolling a die. She noticed that the sum of the numbers appearing on the die after the first four throws was 20. What is the probability that none of the first four throws contained 6?

(A) $\frac{1}{36}$ (B) $\frac{1}{35}$
(C) $\frac{2}{35}$ (D) $\frac{1}{6}$

Q10 There are 10 identical toys kept in a box. The toys are numbered 1 through 10. Neha, Raj and Abhi pick one toy each with replacement. What is the probability that the number on the toy picked by Neha is not more than that of Raj and the number on Raj's toy is not more than that of Abhi?
(A) $\frac{7}{50}$ (B) $\frac{9}{10}$
(C) $\frac{11}{50}$ (D) $\frac{13}{50}$

Q11 There are two bags P and Q which contain some fruits. Bag P contains 3 mangoes and 4 oranges and bag Q contains 5 oranges. One fruit transferred from bag P to bag Q without seeing the fruit. Now two fruits are drawn from each bag. What is the probability of both the fruits that are drawn are oranges?
(A) $\frac{18}{19}$
(B) $\frac{11}{21}$
(C) $\frac{7}{9}$
(D) None of these

Q12 The probabilities that Radha, Seema and Geeta will finish the race in time are 0.3, 0.5 and 0.4 respectively. What is the probability that only two of them finish the race in time?
(A) 0.290 (B) 0.293
(C) 0.284 (D) 0.287

Q13 Six friends, Ronny, Bhailu, Mukund, Goli, Watson and Yunus are playing a game. Six chairs of different colors - red, blue, maroon, white, green and yellow are arranged in a row. All the friends are blindfolded and let to sit on the chairs in a random manner. If there is only one friend who sits on the chair whose color's name starts with the same alphabet with which his/her name starts, he/she will win the game. What is the probability that Goli will win the game?
(A) $\frac{5!}{6!}$ (B) $\frac{11}{180}$
(C) $\frac{13}{260}$ (D) $\frac{5}{6}$

Q14 Five identical fruits are kept in bags A, B and C. What is the probability that one bag has at least 4 fruits?
(A) $\frac{3}{7}$ (B) $\frac{1}{2}$
(C) $\frac{2}{3}$ (D) $\frac{3}{5}$

Q15 Three odd numbers have been selected from a set of first ten natural numbers. What is the probability that selected numbers are greater than at least two remaining numbers in the set
(A) 0.3 (B) 0.4
(C) 0.6 (D) 0.2

Q16 A biased coin is tossed 5 times. Probability of heads appearing on tossing the coin is half of the probability of tails appearing on it. Find the probability of exactly 3 tosses resulting in heads
(A) $\frac{25}{243}$ (B) $\frac{40}{243}$
(C) $\frac{1}{143}$ (D) $\frac{35}{143}$

Q17 India and Pakistan are playing an ODI series. It is known that on an average Pakistan wins 1 out of 6 matches against India. What is the minimum number of games that should be scheduled between India and Pakistan that Pakistan has more than 50% chance of winning at least one match?
(A) 2 (B) 3
(C) 4 (D) 5

Q18 There are 121 consecutive natural numbers starting from 1. What is the probability of selecting 3 natural numbers that are odd and in increasing AP?
(A) $\frac{11}{135}$ (B) $\frac{12}{65}$

(C) $\frac{61}{120}$ (D) $\frac{61}{135}$

Q19 A box of bulbs contains 20 bulbs, of which 5 are defective. If 3 bulbs are selected at random and removed from the box in succession without replacement, what is the probability that all three bulbs are defective?

(A) $\frac{1}{114}$ (B) $\frac{5}{19}$
(C) $\frac{4}{19}$ (D) $\frac{1}{6}$

Q20 In a society, 55% of the people consume coffee, 40% of people consume tea, and 20% of the people consume both tea and coffee. One person is selected at random. Find the probability that he consumes coffee if it is known that he consumes tea.

(A) $\frac{2}{3}$ (B) $\frac{1}{2}$
(C) $\frac{4}{5}$ (D) $\frac{1}{4}$

Q21 A four digit pin code is required to unlock a phone from the 9 available digits 1 to 9 without repetition of digits. What is the probability that the person guesses the right combination of digits?

(A) $\frac{1}{3024}$ (B) $\frac{24}{3024}$
(C) $\frac{31}{3024}$ (D) $\frac{3}{3024}$

Q22 India's three popular movie critics review a movie. Odds in favour of a positive review of the movie are 5 : 4, 3 : 2 and 6 : 5, respectively for three critics. find the probability that the majority gives a positive review for the movie.

(A) $\frac{3}{5}$ (B) $\frac{4}{5}$
(C) $\frac{5}{9}$ (D) $\frac{4}{9}$

Q23 Parag has bought a pack of 52 cards but 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 hearts. Find the probability of the missing card to be a heart.

(A) $\frac{11}{52}$ (B) $\frac{10}{51}$
(C) $\frac{12}{51}$ (D) $\frac{11}{50}$

Q24 If four dice are thrown simultaneously what is the probability that the sum of numbers is exactly 21?

(A) $\frac{4}{343}$ (B) $\frac{3}{274}$
(C) $\frac{5}{324}$ (D) $\frac{6}{243}$

Q25 In a test paper the probability of Nishi scoring a $\frac{100}{100}$ is $\frac{1}{5}$. In a examination of 6 test papers. What is the probability of Nishi scoring $\frac{100}{100}$ in two papers at least

(A) $\frac{1123}{3125}$ (B) $\frac{1223}{3125}$
(C) $\frac{1077}{3125}$ (D) $\frac{1177}{3125}$

Q26 In a tube light factory, machine A, B and C manufacture 30%, 35% and 35% of the total tube lights respectively. From their output 7%, 5% and 5% are defective tube lights respectively. A tubelight is drawn at random from the product. If tubelight drawn is defective, what is the probability that it is manufactured by machine B?

(A) $\frac{3}{11}$ (B) $\frac{5}{16}$
(C) $\frac{4}{15}$ (D) $\frac{6}{19}$

Q27 If A and B are natural numbers not more than 9, what is the probability that (A * B) is a perfect square?

(A) $\frac{3}{14}$ (B) $\frac{4}{25}$
(C) $\frac{17}{81}$ (D) $\frac{6}{31}$

Q28 An unbiased coin is tossed 12 times. What is the probability of getting at most 6 heads?

(A) $\frac{1255}{2048}$ (B) $\frac{1651}{2048}$
(C) $\frac{1}{2}$ (D) $\frac{1707}{2048}$

Q29 Odds against solving a question by A, B and C are $\frac{3}{4}$, $\frac{4}{5}$ and $\frac{5}{8}$ respectively. What is the

probability that the question will be solved?

(A) $\frac{1}{5}$ (B) $\frac{81}{116}$

(C) $\frac{253}{273}$ (D) $\frac{106}{213}$

Q30 A coin is tossed 13 times. find the probability of obtaining at least one head.

(A) $\left(\frac{1}{2}\right)^{13}$

(B) $\frac{2^{12}}{2^{13}}$

(C) $\frac{2^{12}-1}{2^{13}}$

(D) $\frac{2^{13}-1}{2^{13}}$

Answer Key

Q1	(D)
Q2	(C)
Q3	(D)
Q4	(C)
Q5	(C)
Q6	(D)
Q7	(B)
Q8	(A)
Q9	(B)
Q10	(C)
Q11	(B)
Q12	(A)
Q13	(B)
Q14	(A)
Q15	(B)
Q16	(B)
Q17	(C)
Q18	(C)
Q19	(A)
Q20	(B)
Q21	(A)
Q22	(A)
Q23	(D)
Q24	(C)
Q25	(C)
Q26	(B)
Q27	(C)
Q28	(A)
Q29	(C)
Q30	(D)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Probability = $\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Total number of cases = $6^4 = 1296$

Now on every dice, maximum we can get is 6 and minimum is 1

So $(6 - a) + (6 - b) + (6 - c) + (6 - d) = 20$

$a + b + c + d = 4$

Applying formula $n + r - {}^1C_{r-1}$

$4 + 4 - {}^1C_{4-1} = {}^7C_3 = 35$

Hence probability is $\frac{35}{1296}$

Correct Option is (D).

Video Solution:

Q2 Text Solution:

Bag A has 'n' red balls and 'n' blue balls while Bag B has '2n' red balls and '2n' blue balls.

Required probability = [P(ball out of bag A is a red ball)× P(ball out of bag B is a blue ball)] + [P(ball out of bag A is blue ball) × P(ball out of bag B is blue ball)]

$= \left[\frac{1}{2} \times \frac{(2n+1)}{(4n+1)}\right] + \left[\frac{1}{2} \times \frac{2n}{(4n+1)}\right]$

$= \left[\frac{1}{2} \times \frac{(4n+1)}{(4n+1)}\right]$

$= \frac{1}{2}$

Video Solution:

Q3 Text Solution:

The possible outcomes are as follows:

1–1–2 total ways = $\frac{3!}{2!} = 3$

1–2–3 total ways = 3! = 6

1–3–4 total ways = 3! = 6

1–4–5 total ways = 3! = 6

1–5–6 total ways = 3! = 6

2–2–4 total ways = $\frac{3!}{2!} = 3$

2–3–5. total ways = 3! = 6

2–4–6. total ways = 3! = 6

3–3–6. total ways = $\frac{3!}{2!} = 3$

Total favorable outcomes = 45

Required probability = $\frac{45}{6\times6\times6}$

$= \frac{45}{216}$

$= \frac{5}{24}$

Video Solution:

Q4 Text Solution:

Total number of outcomes = 6 × 6 = 36

The product of outcomes will be odd when the numbers appearing on dice are either 1, 3 or 5.

Therefore number of possible cases = 3 × 3 = 9

Then number of cases when product is even is = 36 – 9 = 27

Required probability = $\frac{27}{36} = \frac{3}{4}$

Video Solution:

Q5 Text Solution:

The number of ways in which the four spoiled oranges can be arranged in position = ${}^{10}C_4$ = $\frac{(10\times9\times8\times7)}{(4\times3\times2\times1)}$ = 210

Out of these 210 ways, there is only one way that they are in the second, fourth, fifth and ninth position because their positions are fixed.

Then Required probability = $\frac{1}{210}$

Video Solution:

Q6 Text Solution:

There are 12 face cards and 26 black cards. Out of 12 face cards 6 are black cards.

Therefore the number of favorable cases

= 12 + 26 – 6 = 32

Then Required probability $= \frac{32}{52} = \frac{8}{13}$

Video Solution:

Q7 Text Solution:

Total number of ways of arranging 6 friends in a queue = 6! = 720

Number of ways arranging friends either in increasing or in decreasing order from left to right = 2

Then Required probability $= \frac{(720-2)}{720}$

$= \frac{718}{720}$

$= \frac{359}{360}$

Video Solution:

Q8 Text Solution:

Note that in this problem,ranks of the other three students are not relevant.

A probability that Rashi is ranked higher than Mahima, Anu and Priya. Rashi, Mahima, Anu and Priya were the only four students, the probability that any one ranked first is the same and that is $\frac{1}{4}$.

Video Solution:

Q9 Text Solution:

20 can be obtained in the first 4 throws in the following ways.

(i) (6, 6, 6, 2) this can happen in 4 different ways.

(ii) (6, 6, 5, 3) this can happen = 12 different ways.

(iii) (6, 6, 4, 4) this can happen in = 6 different ways.

(iv) (6, 5, 5, 4) this can happen in = 12 different ways.

(v) (5, 5, 5, 5) this can happen in only one way.

Therefore the number of ways in which 20 can be obtained in is 4 + 12 + 6 + 12 + 1 = 35

Out of these, only one way does not contain 6.

Therefore, the Required probability is $\frac{1}{35}$.

Video Solution:

Q10 Text Solution:

If Neha's number is 1 then Raj's number can be anything from 1 to 10, and Abhi's number can be anything from 1 to 10.

Given that it is more than that of Raj.

Therefore total number of favorable cases = (10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1) = 55

Again if Neha's number is 2, in similar manner, the total number of favorable outcomes = (9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 2) = 45

And so on till Neha's number is 10

Then total count of all favorable cases = (55 + 45 + 36 + 28 + 21 + 15 + 10 + 6 + 3 + 1) = 220

Now each of them could have picked up a toy in 10 different ways.

Then the required probability = $\frac{220}{(10\times10\times10)}$

$= \frac{11}{50}$

Video Solution:

Q11 Text Solution:

Since the fruit is being transferred from bag P to bag Q. It can be a mango or an orange.

Case 1: If a mango is transferred, the bag P would contain 2 mangoes and 4 oranges. And bag Q would contain 1 mango and 5 oranges, after the transfer.

Probability of getting a mango transferred = $\frac{3}{7}$

Probability of selecting two oranges after the transfer (T_1) = $\frac{4}{6} * \frac{5}{6}$

Case 2: If an orange is transferred, the bag P would contain 3 mangoes and 3 oranges and bag Q contains 6 oranges.

Probability of getting an orange transfer = $\frac{4}{7}$

Probability of selecting two oranges after the transfer (T_2) = $\frac{3}{6} * \frac{6}{6}$

Then Required probability = $\frac{3}{7} * T_1 + \frac{4}{7} * T_2$

= $\frac{3}{7} * \frac{5}{9} + \frac{4}{7} * \frac{1}{2}$

= $\frac{11}{21}$

Video Solution:

Q12 Text Solution:

Required probability = P[Radha and Seema finished but not Geeta] + P[Seema and Geeta finished but not Radha] + P[Radha and Geeta finished but not Seema]

= (0.3 × 0.5 × 0.6) + (0.5 × 0.4 × 0.7) + (0.3 × 0.4 × 0.5)

= 0.09 + 0.14 + 0.06

= 0.290

Hence Option (A)

Video Solution:

Q13 Text Solution:

This is a question based on derangement. We have to find the number of cases when Goli sits on the green chair and none of her other friends sits on a chair such that his/her name's first alphabet is the same as that of the first alphabet of the chair's color. This implies that we have to derange 5 persons.

Total number of favorable cases = derangement of 5

Or, total number of favorable cases

$= = 5!\left(1-\frac{1}{1!}+\frac{1}{2!}+\frac{1}{3!}+\frac{1}{4!}+\frac{1}{5!}\right)=44$

Total number of cases = 6! = 720

Required probability = $\frac{44}{720}=\frac{11}{180}$

Video Solution:

Q14 Text Solution:

No. of ways when fruits are kept in bags, (1, 2, 2) = $\frac{3!}{2!}$ = 3 ways

No. of ways when fruits are kept in bags, (0, 0, 5) = $\frac{3!}{2!}$ = 3 ways

No. of ways when fruits are kept in bags, (1, 1, 3) = $\frac{3!}{2!}$ = 3 ways

No. of ways when fruits are kept in bags, (0, 2, 3) = 3! = 6 ways

No. of ways when fruits are kept in bags, (0, 1, 4) = 3! = 6 ways

Total number of possible outcomes = 3 + 3 + 3 + 6 + 6 = 21

No. of favorable outcomes = (0, 0, 5) = $\frac{3!}{2!}$ = 3 and (0, 1, 4) = 3! = 6.

so, 3 + 6 = 9 ways

Then the required probability = $\frac{9}{21}=\frac{3}{7}$

Video Solution:

Q15 Text Solution:

Total odd numbers in the set = 5

Total no. of ways in which three odd numbers can be chosen = $^5C_3$ = 10

Three numbers should be from 3,5,7 and 9, the chosen number would be greater than at least two remaining numbers in the set.

Total no. of favorable ways = $^4C_3$ = 4

Then required probability = $\frac{4}{10}$ = 0.4

Video Solution:

Q16 Text Solution:

Let the probability of appearing heads = x

Probability of appearing tails = 2x

Total probability = x + 2x = 3x

3x = 1

x = $\frac{1}{3}$

Probability of heads = $\frac{1}{3}$

Probability of tails = $\frac{2}{3}$

Selecting 3 tosses out of 5 = $^5C_3$ = 10

Probability that heads appears 3 times and tail appears 2 times = $\left[\left(\frac{1}{3}\right)^3 * \left(\frac{2}{3}\right)^2\right] \times^5 C_3$

Hence required probability = $^5C_3 * \frac{1}{27} * \frac{4}{9}$

= $\frac{40}{243}$

Video Solution:

Q17 Text Solution:

Probability that Pakistan wins = $\frac{1}{6}$

Probability that Pakistan losses = $\frac{5}{6}$

Following are the chances of Pakistan losing

Suppose 1 match is played than Pakistan chances = $\frac{5}{6}$= 83.33%

If two matches are played than Pakistan chances = $\frac{5}{6} * \frac{5}{6}$ = 69.44%

If three matches are played than Pakistan chances = $\frac{5}{6} * \frac{5}{6} * \frac{5}{6}$ = 57.87%

If four matches are played than Pakistan chances = $\frac{5}{6} * \frac{5}{6} * \frac{5}{6} * \frac{5}{6}$ = 48.22%

So Pakistan winning chances after the 4 matches = 100% – 48.22% = 51.78%

Hence a minimum of 4 matches are required to be scheduled.

Video Solution:

Q18 Text Solution:

In 121 natural numbers, 61 are odd and 60 are even numbers.

Let the numbers are of the form a, b, c.

If a is 1 and c is 3 then b can be selected in only one way that is 2.

If a is 1 and c is 5 then b can be selected in only one way that is 3.

If a is 1 and c is 7 then b can be selected in only one way that is 4.

If a is 2 and c is 4 then b can be selected in only one way that is 3.

Now we can see a pattern that either we can select two numbers from 61 odd numbers in $^{61}C_2$ ways

Or we can select two numbers from 60 even numbers in $^{60}c_2$ ways.

So total number of cases = $^{60}C_2 + ^{61}C_2$

= 3600

And favorable cases = $^{61}C_2$ = 1830

Required probability = $\frac{1830}{3600} = \frac{61}{120}$

Video Solution:

Q19 Text Solution:

Probability that the first bulb selected is defective = $\frac{5}{20}$

Probability that the second bulb selected is defective = $\frac{4}{19}$

Probability that the third bulb selected is defective = $\frac{3}{18}$

Hence the required probability = $\frac{5}{20} * \frac{4}{19} * \frac{3}{18}$

= $\frac{1}{114}$

Video Solution:

Q20 Text Solution:

Those who consume coffee = $\frac{55}{100} = \frac{11}{20} = \frac{1}{2}$

those who consume tea = $\frac{40}{100} = \frac{2}{5}$

and those who consume both tea and coffee = $\frac{20}{100} = \frac{1}{5}$

probability that any person consume coffee, if he consuming both coffee and tea, will be $\frac{\frac{1}{5}}{\frac{2}{5}} = \frac{1}{2}$

Hence the required answer is Option (B), $\frac{1}{2}$.

Video Solution:

Q21 Text Solution:

Suppose the four digit pin is of the form 'abcd'

In which digit 'a' can be selected in only 1 way out of the given 9 numbers. so probability of

selecting digit 'a' is $\frac{1}{9}$

Now, digit 'b' can be selected in one way out of the remaining 8 digits. so required probability is $\frac{1}{8}$

similarly probability for selecting 'c' $\frac{1}{7}$is and for 'd' it is $\frac{1}{6}$

Hence required probability for selecting the 4 digit pin correctly is $= \frac{1}{9} * \frac{1}{8} * \frac{1}{7} * \frac{1}{6} = \frac{1}{3024}$

Hence (A) is correct.

Video Solution:

Q22 Text Solution:

Positive review of movie by first critic = $\frac{5}{9}$

Positive review of movie by the second critic = $\frac{3}{5}$

Positive review of movie by the third critic = $\frac{6}{11}$

Case1: If first gives positive, second gives positive and third gives negative review then

Required probability = $\frac{5}{9} * \frac{3}{5} * \frac{5}{11} = \frac{5}{33}$

Case2: If first gives positive, second gives negative and third gives positive review then

Required probability = $\frac{5}{9} * \frac{2}{5} * \frac{6}{11} = \frac{4}{33}$

Case3: If first gives negative, second gives positive and third gives positive review then

Required probability = $\frac{4}{9} * \frac{3}{5} * \frac{6}{11} = \frac{8}{55}$

Case4: All favors

Then Required probability = $\frac{5}{9} * \frac{3}{5} * \frac{6}{11} = \frac{2}{11}$

Total probability = $\frac{5}{33} + \frac{4}{33} + \frac{8}{55} + \frac{2}{11}$

$= \frac{99}{165} = \frac{3}{5}$

Hence option (A) is correct.

Video Solution:

Q23 Text Solution:

Probability that missing card is a heart card = $\frac{13}{52} = \frac{1}{4}$

Probability that missing card is a club card = $\frac{13}{52} = \frac{1}{4}$

Probability that missing card is a diamond card = $\frac{13}{52} = \frac{1}{4}$

Probability that missing card is a spade card = $\frac{13}{52} = \frac{1}{4}$

Probability of drawing two heart cards given that one heart card is missing = $\frac{^{12}C_2}{^{51}C_2}$

Probability of drawing two heart cards given that one spade card is missing = $\frac{^{13}C_2}{^{51}C_2}$

Probability that drawing two heart cards given that one diamond card is missing = $\frac{^{13}C_2}{^{51}C_2}$

Probability that drawing two heart cards given that one club card is missing = $\frac{^{13}C_2}{^{51}C_2}$

By Bayes theorem,

The required probability

$= \frac{\left(\frac{^{12}C_2}{^{51}C_2}\right)}{\left(\frac{^{13}C_2}{^{51}C_2}\right) + \left(\frac{^{12}C_2}{^{51}C_2}\right) + \left(\frac{^{13}C_2}{^{51}C_2}\right) + \left(\frac{^{13}C_2}{^{51}C_2}\right)}$

$= \frac{66}{(78+66+78+78)}$

$= \frac{66}{300}$

$= \frac{11}{50}$

Video Solution:

Q24 Text Solution:

Total number of outcomes = $6^4 = 1296$

Required combinations for the sum being 21 are.

(6, 6, 6, 3), (6, 6, 5, 4), (6, 5, 5, 5).

Required number of arrangements for each case

(6, 6, 6, 3) = $\frac{4!}{3!} = 4$

$(6, 6, 5, 4) = \frac{4!}{2!} = 12$

$(6, 5, 5, 5) = \frac{4!}{3!} = 4$

Favorable outcomes = 20

Then Required probability = $\frac{20}{1296} = \frac{5}{324}$

Video Solution:

Q25 Text Solution:

Probability that Nishi scores $\frac{100}{100}$ in exactly two papers = ${}^6C_2 * = \left(\frac{1}{5}\right)^2 * \left(\frac{4}{5}\right)^4 = \frac{768}{3125}$

Probability that Nishi scores $\frac{100}{100}$ in exactly three papers = ${}^6C_3 * \left(\frac{1}{5}\right)^3 * \left(\frac{4}{5}\right)^3$

$= \frac{256}{3125}$

Probability that Nishi scores $\frac{100}{100}$ in exactly four papers = ${}^6C_4 * \left(\frac{1}{5}\right)^4 * \left(\frac{4}{5}\right)^2$

$= \frac{48}{3125}$

Probability that Nishi scores $\frac{100}{100}$ in exactly five papers = ${}^6C_5 * \left(\frac{1}{5}\right)^5 * \left(\frac{4}{5}\right)^1$

$= \frac{24}{15625}$

Probability that Nishi scores $\frac{100}{100}$ in exactly six papers = ${}^6C_6 * \left(\frac{1}{5}\right)^6 * \left(\frac{4}{5}\right)^0$

$= \frac{1}{15625}$

Required probability

$= \frac{768}{3125} + \frac{256}{3125} + \frac{48}{3125} + \frac{24}{15625} + \frac{1}{15625}$

$= \frac{5385}{15625}$

$= \frac{1077}{3125}$

Video Solution:

Q26 Text Solution:

Total tube lights manufactured by machine A = $\frac{3}{100}$

Total tube lights manufactured by machine B = $\frac{35}{100}$

Total tube lights manufactured by machine C = $\frac{35}{100}$

Tubelights defective by machine A = $\frac{7}{100}$

Tubelights defective by machine B = $\frac{5}{100}$

Tubelights defective by machine C = $\frac{5}{100}$

Required probability = probability that the tubelight manufactured by Machine B and turns out to be defective

$= \frac{\left(\frac{35}{100} * \frac{5}{100}\right)}{\left(\frac{30}{100} * \frac{7}{100}\right) + \left(\frac{35}{100} * \frac{5}{100}\right) + \left(\frac{35}{100} * \frac{5}{100}\right)}$

$= \frac{5}{16}$

Video Solution:

Q27 Text Solution:

As both A and B can take any value from 1 to 9.

So total number of cases will be 9 * 9 = 81

Favorable cases

A * B = 1 = (1, 1)

A * B = 4 = (1, 4), (2, 2), (4, 1)

A * B = 9 = (1, 9), (3, 3) (9, 1)

A * B = 16 = (2, 8), (4 * 4), (8, 2)

A * B = 25 = (5, 5)

A * B = 36 = (6, 6) (4, 9) (9, 4)

A * B = 49 = (7, 7)

A * B = 64 = (8, 8)

A * B = 81 = (9, 9)

Total favorable cases = 17

Required probability = $\frac{17}{81}$

Hence option (C) is correct.

Video Solution:

Q28 Text Solution:

At most 6 heads means if may have 0, 1, 2, 3, 4, 5, 6 heads out of 12 events.

Cases of at most 6 heads =

0 head + 1 head + 2 heads + 3 heads + 4 heads + 5 heads + 6 heads

$= {}^{12}C_0 + {}^{12}C_1 + {}^{12}C_2 + {}^{12}C_3 + {}^{12}C_4 + {}^{12}C_5 + {}^{12}C_6$

$= ({}^{12}C_0 + {}^{12}C_1 + {}^{12}C_2 + {}^{12}C_3 + \ldots\ldots\ldots + {}^{12}C_{12}) - ({}^{12}C_7 + {}^{12}C_8 + {}^{12}C_9 + \ldots\ldots\ldots + {}^{12}C_{12})$

$= ({}^{12}C_0 + {}^{12}C_1 + {}^{12}C_2 + {}^{12}C_3 + \ldots\ldots\ldots + {}^{12}C_{12}) - ({}^{12}C_5 + {}^{12}C_4 + \ldots\ldots\ldots + {}^{12}C_0)$

$= 2^{12} - (792 + 495 + 220 + 66 + 12 + 1)$

$= 4096 - 1586 = 2510$

Total possible cases $= 2^{12} = 4096$

Required probability $= \frac{2510}{4096} = \frac{1255}{2048}$

Hence option (A) is correct

Video Solution:

Q29 Text Solution:

Odds against A solve the question $= \frac{3}{4}$

Probability of question not solved by A $= \frac{3}{7}$

Odds against B solve the question $= \frac{4}{5}$

Probability of question not solved by B $= \frac{4}{9}$

Odds against C solve the question $= \frac{5}{8}$

Probability of question not solved by C $= \frac{5}{13}$

Now P (question will be solved) = 1 – P (no one solve the question)

$= 1 - \left(\frac{3}{7} * \frac{4}{9} * \frac{5}{13}\right)$

$= 1 - \frac{20}{273}$

$= \frac{253}{273}$

Hence option (C) is correct.

Video Solution:

Q30 Text Solution:

Total number of possible outcomes $= 2^{13}$

Probability of at least one head = 1 – (probability of no heads (all tails)

Probability of all tails $= \left(\frac{1}{2}\right)^{13}$

Required probability $= 1 - \left(\frac{1}{2}\right)^{13}$

$= \frac{(2^{13} - 1)}{2^{13}}$

Hence option (D) is correct.

Video Solution: