Ultimate kcet crash course 2026

Maths

probability, permutation and combination

DPP: 1

Q1 There are 100 pages in a book. If a page of the book is opened at random, the probability that the number on the page is two digit number made up with the same digit is

(A) 8/100 (B) 9/100

(C) 1/10 (D) 8/10

Q2 A pair of dice is thrown. If the two numbers appearing on them are different, find the probability that the sum of the numbers is 6 .

(A) $\frac{2}{9}$ (B) $\frac{2}{15}$

(C) $\frac{1}{5}$ (D) $\frac{1}{9}$

Q3 A bag contains $2n+1$ coins. It is known that n of these coins have head on both sides whereas the other $n+1$ coins are fair. One coin is selected at random and tossed. If the probability that toss results in heads is 31/42, then the value of n is

(A) 8 (B) 5

(C) 10 (D) 6

Q4 A die is thrown. Let A be the event that the number obtained is greater than 3. Let B be the event that the number obtained is less than 5. Then $P(A \cup B)$ is

(A) $\frac{2}{5}$ (B) $\frac{3}{5}$

(C) 0 (D) 1

Q5 Let A and B be two events and P(A B) = $\frac{5}{6}$, P(A B) = $\frac{1}{3}$,$P(\overline{A})$ = $\frac{1}{2}$ then

(A) P(B) ≤ P(A)

(B) P(A) = P(B)

(C) A,B are independent

(D) A and B are mutually exclusive

Q6 A bag contains 3 white and 6 black balls while another bag contains 6 white and 3 black balls. A bag is selected at random and a ball is drawn find the probability that the ball drawn is of black colour

(A) $\frac{1}{5}$ (B) $\frac{1}{4}$

(C) $\frac{1}{3}$ (D) $\frac{1}{2}$

Q7 A die is thrown. Let A be the event that the number obtained is greater than 3. Let B be the event that the number obtained is less than 5. Then $P(A \cup B)$ is

(A) $\frac{2}{5}$ (B) $\frac{3}{5}$

(C) 0 (D) 1

Q8 If A and B are two events such that $P(A) \neq 0$ and $P(B) \neq 1$ then $P\left(\frac{\overline{A}}{\overline{B}}\right)=$

(A) $1-P\left(\frac{A}{B}\right)$

(B) $1-P\left(\frac{\overline{A}}{B}\right)$

(C) $\frac{1-P(A \cup B)}{P(\overline{B})}$

(D) $\frac{P(\overline{A})}{P(\overline{B})}$

Q9 If A and B are two events such that $P(A \cup B)=\frac{3}{4}, P(A \cap B)=\frac{1}{4} \& P(\overline{A})=\frac{2}{3}$, then $P(\overline{A} \cap B)=$

(A) 1/12 (B) 2/12

(C) 7/12 (D) 5/12

Q10 Three persons A, B and C, fire at a target in turn, starting with A. Their probability of hitting the target are 0.4, 0.3 and 0.2, respectively. The probability that exactly two of them hits target is

(A) 0.024 (B) 0.188

(C) 0.336 (D) 0.452

Q11 A salesman has a 60% chance to sell a product to any customer. The behavior of two different customer is independent. If two customer A and B came into the shop, then what is the probability that salesman will sell the product to customer A or B?

(A) 0.84 (B) 0.91
(C) 0.72 (D) 0.60

Q12 A machine operates if all of its three components function. The probability that the first component fails during the year is 0.14, the second component fails is 0.10 and the third component fails is 0.05 What is the probability that the machine will fail during the year?

(A) 0.1542 (B) 0.2647
(C) 0.3642 (D) 0.4231

Q13 If A and B are two independent events with P(A) = 3/5 and P(B) = 4/9 then $P\left(A' \cap B'\right)$ equals to

(A) 4/15 (B) 8/45
(C) 1/3 (D) 2/9

Q14 **If A and B are two independent events with P (A) = $\frac{1}{3}$ and P(B) = $\frac{1}{4}$, then P(B' | A) is equal to**

(A) 1/4 (B) 1/8
(C) 3/4 (D) 1

Q15 An urn contains 10 black and 5 white balls. Two balls are drawn from the urn one after the other without replacement, then the probability that both drawn balls are black, is

(A) 2/7 (B) 1/7
(C) 5/7 (D) 3/7

Q16 A bag contains 10 white and 15 black balls. If two balls are drawn in succession without replacement, then the probability that first is white and second is black, is

(A) 2/5 (B) 5/8
(C) 1/4 (D) 1/5

Q17 A box contains 3 orange balls, 3 green balls and 2 blue balls. Three balls are drawn at random from the box without replacement. The probability of drawing 2 green balls and one blue ball is

(A) 3/28 (B) 2/21
(C) 8/28 (D) 167/168

Q18 12 cards numbered 1 to 12 (one number on one card), are placed in a box and mixed up thoroughly. Then a card is drawn at random from the box. If it is known that the number on the drawn card is greater than 5, find the probability that the card bears an odd number.

(A) 1/7 (B) 2/7
(C) 3/7 (D) 4/7

Q19 A card is picked at random from a pack of 52 playing cards. Given that the picked card is a queen, the probability of this card to be a card of spade is

(A) 1/3 (B) 4/13
(C) 1/4 (D) 1/2

Q20 Let *A* and *B* be two events. If *P*(*A*) = 0.2, *P*(*B*) = 0.4, *P*(*A* È *B*) = 0.6, then *P*(*A*|*B*) is equal to

(A) 0.8 (B) 0.5
(C) 0.3 (D) 0

Q21 A man speaks truth 2 out of 3 times. He picks one of the natural numbers in the set *S* = {1, 2, ,3 4, 5, 6, 7} and reports that it is even. The probability that it is actually even is

(A) 2/5 (B) 1/10
(C) 1/5 (D) 3/5

Q22 A company has two plants to manufacture scooters. Plant-1 manufactures 70% of the scooters and plant-2 manufactures 30%. At plant-1, 80% of the scooters are rated of standard quality and at plant-2, 90% of the scooters are rated of standard quality. A scooter is chosen at random and is found to be of standard quality. Find the probability that it has come from plant-2.

(A) 27/83 (B) 40/83
(C) 56/83 (D) 47/83

Q23 In a certain college, 4% of the men and 1% of the women are taller than 1.8 meters. Also 60% of the students are women. If a student selected at random is found to be taller than 1.8 Meters, then the probability that the student being a woman is

(A) 3/11 (B) 5/11
(C) 6/11 (D) 8/11

Q24 The number of ways of arranging letters of the word HAVANA so that V and N do not appear together is

(A) 40 (B) 60
(C) 80 (D) 100

Q25 The number of ways in which 5 boys and 5 girls can sit in a row so that all the girls sit together is

(A) 86400 (B) 14400
(C) 7200 (D) 12600

Q26 Five digit number divisible by 3 is formed using 0, 1, 3, 4, 6, 7 without repetition. Total number of such numbers are

(A) 312 (B) 3125
(C) 120 (D) 7216

Q27 If ${}^{n}C_{r-1} : {}^{n}C_{r} : {}^{n}C_{r+1} = 2:3:4$, then (n, r) =

(A) (34, 14) (B) (15, 10)
(C) (24, 16) (D) (11, 7)

Q28 In an election there are 8 candidates, out of which 5 are to be choosen. If a voter may vote for any number of candidates but not greater than the number to be choosen, then in how many ways can a voter vote?

(A) 216 (B) 114
(C) 218 (D) None of these

Q29 The value of ${}^{47}C_4 + \sum_{r=1}^{5} {}^{52-r}C_3$ is equal to

(A) ${}^{47}C_6$ (B) ${}^{52}C_5$
(C) ${}^{52}C_4$ (D) ${}^{48}C_4$

Q30 How many words can be formed by taking 3 consonants and 2 vowels out of 5 consonants and 4 vowels?

(A) ${}^{5}C_3 \times {}^{4}C_2$
(B) $\frac{{}^{5}C_3 \times {}^{4}C_2}{5}$
(C) ${}^{5}C_3 \times {}^{4}C_3$
(D) $\left({}^{5}C_3 \times {}^{4}C_2\right)5!$

Answer Key

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

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Total numbers according to given condition = 9

\ Required probability= $\frac{9}{100}$

Video Solution:

Q2 Text Solution:

Consider the following events :

A = numbers appearing on two dice are different

B = The sum of the numbers on two dice is 6

Clearly, A={(1,2),(1,3),(1,4),(1,5),(1,6),(2,1),(2,3),
(2,4),(2,5),(2,6),(3,1),(3,2),(3,4),(3,5),(3,6),(4,1),
(4,2)
(4,3),(4,5),(4,6),(5,1),(5,2)(5,3),(5,4),(5,6),(6,1),
(6,2),(6,3),(6,4),(6,5),(3,3)}

B={(1,5),(5,1),(2,4)(4,2)}

Clearly, A B={(1,5),(5,1),(2,4),(4,2)},

n(A B)=4,n(A C)=4 and n(A)=30

Required probability =P(B A)=(n(A B))/(n(A))

= $\frac{4}{30}$ = $\frac{2}{15}$

Video Solution:

Q3 Text Solution:

Given : Total number of coins : $n(S) = 2n + 1$

Let E : be the number of coins that have hand on both sides $n(E) = n$

F : be the number of coins that are four $n(F) = n + 1$

$\therefore P(E)= \frac{n}{2n+1} \quad P(F)= \frac{n+1}{2n+1}$

$\therefore \text{Required probability} = \frac{n}{2n+1} + \frac{1}{2} \times \frac{n+1}{2n+1}$

$\frac{31}{42} = \frac{n}{2n+1} + \frac{n+1}{2(2n+1)}$

$\Rightarrow \ n = 10$

Video Solution:

Q4 Text Solution:

Since, $A = \{4, 5, 6\}$ and $B = \{1, 2, 3, 4\}$

$A \cap B = \{4\}$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow P(A \cup B) = 1$

Video Solution:

Q5 Text Solution:

P(A B) = P(A) + P(B) - P(A B)

$\frac{5}{6} = (1-\frac{1}{2}) + P(B) - \frac{1}{3}$ [$P(\overline{A}) = \frac{1}{2}$ $P(A) = 1 - P(\overline{A})$]

$P(B) = \frac{2}{3}$ $P(A) \times P(B) = \frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3} =$ P(A B)

Hence, A and B are independent but not mutually exclusive

Video Solution:

Q6 Text Solution:

Let $E_1 =$ Bag I is selected

$E_2 =$ Bag II is Selected

A = Black Ball it drawn.

Now $P(E_1) = \frac{1}{2} = P(E_2)$

$P(A \mid E_1) = \frac{6}{9} = \frac{2}{3}$ $P(A \mid E_2) = \frac{3}{9} = \frac{1}{3}$

$P(A)n = P(E_1)P(A \mid E_1) + P(E_2)P(A \mid E_2)$

$= \frac{1}{2} \times \frac{2}{3} + \frac{1}{2} \times \frac{1}{3} = \frac{1}{3} + \frac{1}{6} = \frac{1}{2}$

Video Solution:

Q7 Text Solution:

Since, $A = \{4, 5, 6\}$ and $B = \{1, 2, 3, 4\}$

$A \cap B = \{4\}$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow P(A \cup B) = 1$

Video Solution:

Q8 Text Solution:

$P\left(\frac{\overline{A}}{\overline{B}}\right) = \frac{P(\overline{A} \cap \overline{B})}{P(\overline{B})} = \frac{P(\overline{A \cup B})}{P(\overline{B})} = \frac{1 - P(A \cup B)}{P(\overline{B})}$

Video Solution:

Q9 Text Solution:

Given : $P(A \cup B) = \frac{3}{4}, P(A \cap B) = \frac{1}{4}$

$P(\overline{A}) = \frac{2}{3}$

$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\therefore P(A \cup B) = \left(1 - P(\overline{A})\right) + P(B)$
$- P(A \cap B)$

$\therefore P(B) = \frac{2}{3}$

$\therefore P(\overline{A} \cap B) = \frac{2}{3} - \frac{1}{4} = \frac{5}{12}$

Video Solution:

Q10 Text Solution:

Here, $P(A) = 0.4,\ P(\bar{A}) = 0.6,\ P(B) = 0.3,\ P(\bar{B}) = 0.7$

$P(C) = 0.2$ and $P(\bar{C}) = 0.8$

$\therefore$ Probability of two hits $= P_A \cdot P_B \cdot P_{\bar{C}} + P_A \cdot P_{\bar{B}} \cdot P_C + P_{\bar{A}} \cdot P_B \cdot P_C$

$= 0.4 \times 0.3 \times 0.8 + 0.4 \times 0.7 \times 0.2 + 0.6 \times 0.3 \times 0.2$

$= 0.096 + 0.056 + 0.036 = 0.188$

Video Solution:

Q11 Text Solution:

$P(A \cup B) = 1 - P(A')P(B') = 1 - (0.4)(0.4)$

$= 1 - 0.16 = 0.84$

Video Solution:

Q12 Text Solution:

$P(A \cup B \cup C) = 1 - P(A')P(B')P(C')$

$= 1 - (0.84)(0.90)(0.95)$

$= 0.2647$

Video Solution:

Q13 Text Solution:

$P(A' \cap B') = P(A \cup B)'$

$= 1 - P(A \cup B)$

$= 1 - [P(A) + P(B) - P(A \cap B)]$

$= 1 - [\frac{3}{5} + \frac{4}{9} - (\frac{3}{5} \times \frac{4}{9})]$

$= \frac{2}{9}$

Video Solution:

Q14 Text Solution:

Given, A and B are independent events.

Also, P(A) = $\frac{1}{3}$ and P(B) = $\frac{1}{4}$

Now, $P(B' \mid A) = \frac{P(B' \cap A)}{P(A)}$

$= \frac{P(B')P(A)}{P(A)}$ [A, B are independent events]

$= P(B') = 1 - P(B) = 1 - \frac{1}{4} = \frac{3}{4}$

Video Solution:

Q15 Text Solution:

Let E and F denote respectively the events that first and second ball drawn is black. We have to find $P(E \cap F)$ or $P(EF)$

Now, P(E) = P(Black ball in first draw) = 10/15

and P(F|E) = 9/14

By multiplication rule of probability, we have

$P(E \cap F) = P(E) \cdot P(F|E) = \frac{10}{15} \times \frac{9}{14} = \frac{3}{7}$

Video Solution:

Q16 Text Solution:

Let A be the event that first ball is white and B be the event that second ball is black, given that first drawn ball is white and not replaced.

$\therefore P(A) = \frac{10}{25}$ and $P(B) = \frac{15}{24} = \frac{5}{8}$

($\because$ 1 ball was taken out and not replaced)

$\therefore$ Required probability $= P(A) \cdot P(B) = \frac{10}{25} \times \frac{5}{8} = \frac{1}{4}$

Video Solution:

Q17 Text Solution:

Let G and B represent green and blue balls respectively and let E be the event of drawing 2 green and one blue ball then

$$P(E) = P_G \cdot P_G \cdot P_B + P_B \cdot P_G \cdot P_G + P_G \cdot P_B \cdot P_G$$

$$= \frac{3}{8} \cdot \frac{2}{7} \cdot \frac{2}{6} + \frac{2}{8} \cdot \frac{3}{7} \cdot \frac{2}{6} + \frac{3}{8} \cdot \frac{2}{7} \cdot \frac{2}{6} = \frac{1}{28} + \frac{1}{28} + \frac{1}{28} = \frac{3}{28}$$

Video Solution:

Q18 Text Solution:

The sample space, S is given by S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\} Let A be the event that number on the drawn card is odd, and B be the event that number on the drawn card is greater than 5.

$\therefore A = \{1, 3, 5, 7, 9, 11\}$

$B = \{6, 7, 8, 9, 10, 11, 12\}$

and $A \cap B = \{7, 9, 11\}$

Now, $P(B) = \frac{n(B)}{n(S)} = \frac{7}{12}$

$P(A \cap B) = \frac{n(A \cap B)}{n(S)} = \frac{3}{12}$

$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{3/12}{7/12} = \frac{3}{7}$

Video Solution:

Q19 Text Solution:

Let A be the event that the card is a spade and B be the event that the picked card is a queen. We have a total of 13 spades and 4 queen cards. Also only one queen is from spade

$\therefore P(A)=\frac{13}{52},\ P(B)=\frac{4}{52},\ P(A\cap B)=\frac{1}{52}$

$\therefore P(A|B)=\frac{P(A\cap B)}{P(B)}=\frac{\frac{1}{52}}{\frac{4}{52}}=\frac{1}{4}$

Video Solution:

Q20 Text Solution:

$P(A\cap B)=P(A)+P(B)-P(A\cup B)$

$=0.2+0.4-0.6$

$=0$

$\therefore P\left(\frac{A}{B}\right)=\frac{P(A\cap B)}{P(B)}=0$

Video Solution:

Q21 Text Solution:

Given : $S=\{1, 2, 3, 4, 5, 6, 7\}$

E_1 = An even number is picked $P(E_1)=\frac{3}{7}$

E_2 = An odd number is picked $P(E_2)=\frac{4}{7}$

Let A be the event that the picked number is even.

$P\left(\frac{A}{E_1}\right)=\frac{2}{3}$ and $P\left(\frac{A}{E_2}\right)=\frac{1}{3}$

Then the probability that the picked number is actually even is given by Baye;'s Theorem.

$$P\left(\frac{E_1}{A}\right)=\frac{P\left(\frac{A}{E_1}\right)\cdot P(E_1)}{P\left(\frac{A}{E_1}\right)\cdot P(E_1)+P\left(\frac{A}{E_2}\right)\cdot P(E_2)}$$

$$=\frac{\left(\frac{2}{3}\right)\cdot\left(\frac{3}{7}\right)}{\left(\frac{2}{3}\right)\cdot\left(\frac{3}{7}\right)+\left(\frac{1}{3}\right)\cdot\left(\frac{4}{7}\right)}=\frac{3}{5}$$

Video Solution:

Q22 Text Solution:

Let E_1 = choosing scooter of plant-1 E_2 = choosing scooter of plant-2 A = choosing a scooter of standard quality

It is given that $P(E_1)=70\%=\frac{70}{100}=\frac{7}{10}$

$P(E_2)=30\%=\frac{30}{100}=\frac{3}{10}$

$P\left(\frac{A}{E_1}\right)=80\%=\frac{8}{10}$ and $P\left(\frac{A}{E_2}\right)=90\%=\frac{9}{10}$

Required probability $=P(E_2|A)$

$$=\frac{P(E_2)\times P(A|E_2)}{P(E_1)P(A|E_1)+P(E_2)P(A|E_2)}$$

$$=\frac{\frac{3}{10}\times\frac{9}{10}}{\frac{7}{10}\times\frac{8}{10}+\frac{3}{10}\times\frac{9}{10}}=\frac{27}{56+27}=\frac{27}{83}$$

Video Solution:

Q23 Text Solution:

Let E_1, E_2, A be the events such that

E_1 = Selected student is woman

E_2 = Selected student in man

A = selected student is taller than 1.8 meters.

$\therefore P(E_1)=\frac{60}{100}=\frac{3}{5},\ P(E_2)=\frac{40}{100}=\frac{2}{5}$

$\therefore P(A/E_1)=\frac{1}{100},\ P(A/E_2)=\frac{4}{100}$

$\therefore$ Required probability $=P(E_1/A)$

$$=\frac{P(E_1)\cdot P(A/E_1)}{P(E_1)\cdot P(A/E_1)+P(E_2)\cdot P(A/E_2)}$$

$$=\frac{\frac{3}{5}\times\frac{1}{100}}{\frac{3}{5}\times\frac{1}{100}+\frac{2}{5}\times\frac{4}{100}}=\frac{3}{11}$$

Video Solution:

Q24 Text Solution:

We can arrange the letters H, A, A, A in 4!/3! = 4 ways.

We can arrange V, N at any of the two places marked O in the following arrangement OX OXOXOXO.

5 2 Thus, we can arrange V and N in $^5P_2$ = 20 ways.

Thus, the number of ways in which letters can be arranged is 4 x 20 = 80.

Video Solution:

Q25 Text Solution:

Required number of ways = 5! 6! = 120 × 720 = 86400

Video Solution:

Q26 Text Solution:

A number is divisible by 3 if sum of its digits be divisible by 3.

Hence, the selection of 5 digits for forming five digit numbers divisible by 3 are either 1, 3, 4, 6, 7 or 0, 1, 4, 6, 7 or 0, 1, 3, 4, 7. In first case i.e., when 1, 3, 4, 6, 7 are taken as digits, the number of five digit numbers will be 5! = 120.

In rest of the two cases, we have 4 × 4! = 96 in each case.

Total number of required numbers

= 120 + (2 × 96) = 312.

Video Solution:

Q27 Text Solution:

(A)

We have, $\frac{^nC_{r-1}}{^nC_r} = \frac{2}{3}$

$\Rightarrow \frac{r}{n-r+1} = \frac{2}{3}$

$\Rightarrow 3r = 2n - 2r + 2$

$\Rightarrow 2n - 5r + 2 = 0$ ....(i)

Also, $\frac{^nC_r}{^nC_{r+1}} = \frac{3}{4}$

$\Rightarrow \frac{r+1}{n-r} = \frac{3}{4}$

$\Rightarrow 4r + 4 = 3n - 3r$

$\Rightarrow 3n - 7r - 4 = 0 \quad \ldots(ii)$

Solving (i) and (ii), we get r = 14, n = 34

$\Rightarrow$(n, r) = (34, 14).

Video Solution:

Q28 **Text Solution:**

Required number of ways

$$= {}^8C_1 + {}^8C_2 + {}^8C_3 + {}^8C_4 + {}^8C_5$$

$$= 8 + 28 + 56 + 70 + 56 = 218$$

Video Solution:

Q29 **Text Solution:**

$$ {}^{47}C_4 + \sum_{r=1}^{5} {}^{52-r}C_3 = {}^{47}C_4 + {}^{51}C_3 + {}^{50}C_3 + {}^{49}C_3 + {}^{48}C_3 + {}^{47}C_3 $$

$$ = {}^{51}C_3 + {}^{50}C_3 + {}^{49}C_3 + {}^{48}C_3 + \left({}^{47}C_3 + {}^{47}C_4\right) = {}^{52}C_4 $$

Video Solution:

Q30 **Text Solution:**

The letters can be select in ${}^5C_3 \times {}^4C_2$ ways.

(9) Therefore the number of arrangements are $({}^5C_3 \times {}^4C_2)5!$

Video Solution: