

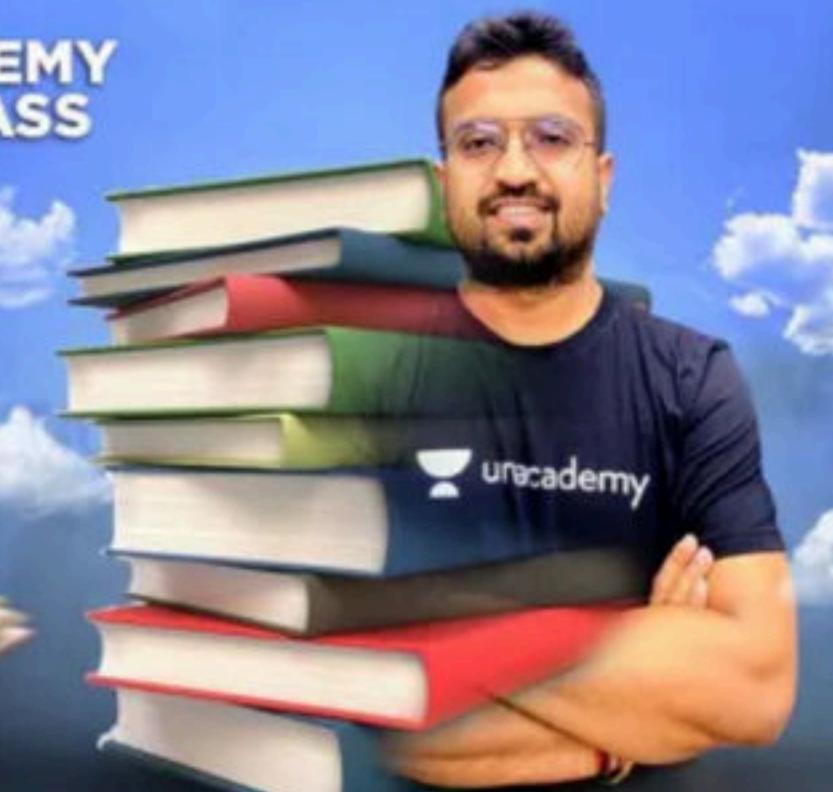




# Permutation Combination & Probability - Part V

Complete Course on General Aptitude - GATE & ESE, 2024 & 2025

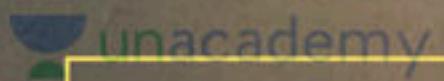
UNACADEMY  
PLUS CLASS



# COMPLETE COURSE ON General Aptitude for GATE 2024/25

**USE CODE ST26**

**— Saurabh Sir —**

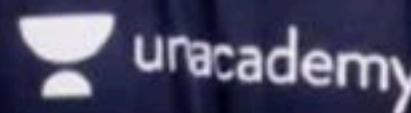


**32M+** WATCH MINUTE  
**12+** YEARS TEACHING EXPERIENCE

SUBSCRIPTION

**CODE:ST26**

**SAURABH THAKUR**  
**IIM ROHTAK**



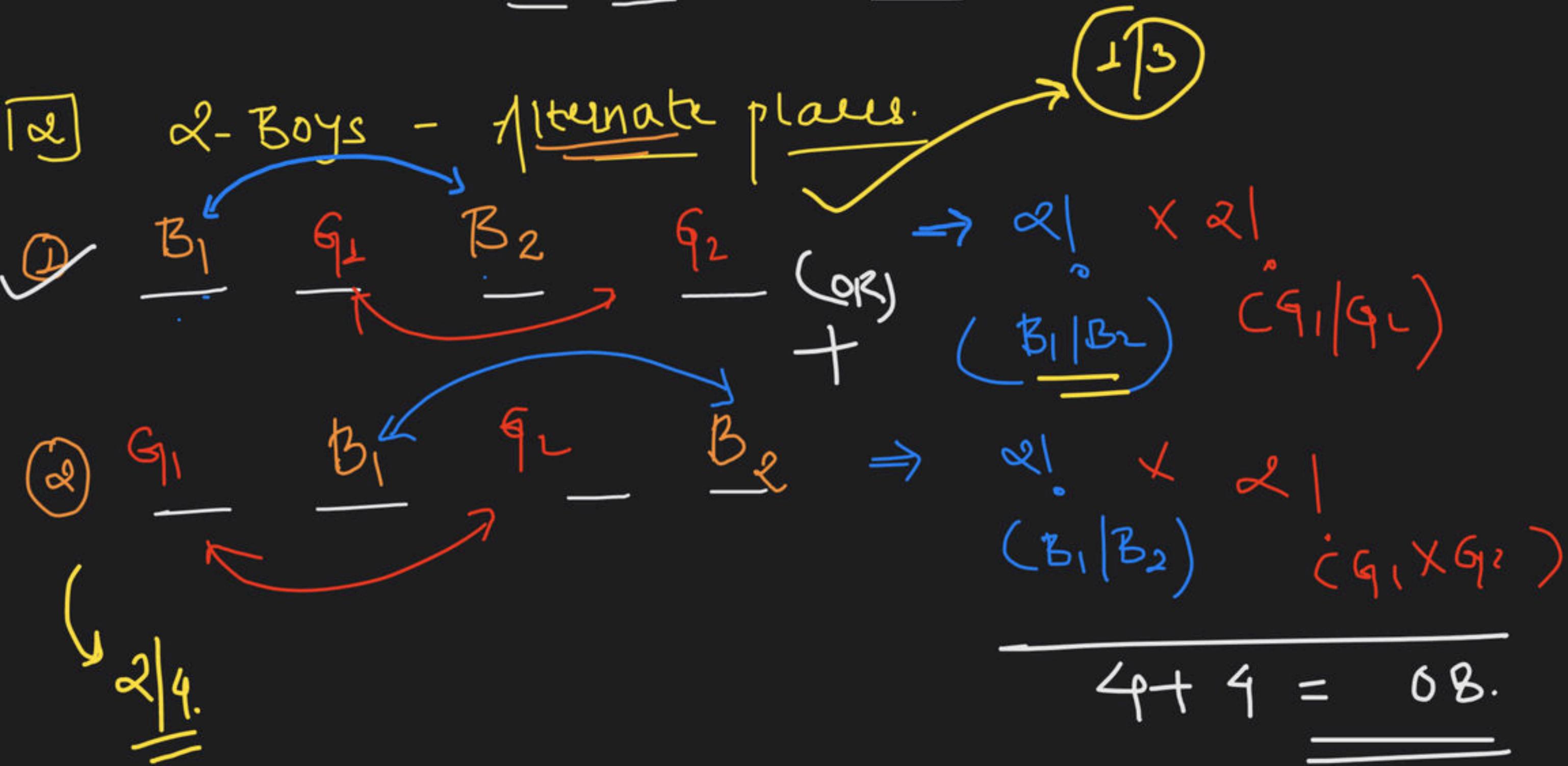
$$\left| \underline{B_1}, \underline{B_2}, \underline{E_1}, \underline{E_2} \right| \Rightarrow$$

□  $\left| n \Rightarrow \eta \right|$

P  
C

$$4! = \boxed{24}$$

$B_1 | B_2 | E_1 | E_2$

$B_1, B_2, G_1, G_2$ 


$B_1$   $B_2$ ,  $q_1$ ,  $q_2$

Q2  $\alpha$ -Boys - Alternate phase.

$$\textcircled{1} \quad \begin{array}{c} B_1 \\ \downarrow \\ q_1 \\ \uparrow \\ B_2 \end{array} \quad \begin{array}{c} q_2 \\ \uparrow \\ B_1 \\ \downarrow \\ B_2 \end{array} \rightarrow \alpha_1 \times \alpha_1 \\ \left( \frac{B_1}{B_2} \right) + \left( \frac{B_2}{B_1} \right) \left( \frac{q_1}{q_2} \right) \left( \frac{q_2}{q_1} \right)$$

$$\textcircled{2} \quad \begin{array}{c} q_1 \\ \uparrow \\ B_1 \\ \downarrow \\ q_2 \\ \uparrow \\ B_2 \end{array} \rightarrow \alpha_1 \times \alpha_1 \\ \left( \frac{q_1}{B_2} \right) + \left( \frac{q_2}{B_1} \right) \left( \frac{q_1 \times q_2}{q_1 \times q_2} \right)$$

$$\overline{4 + 4 = 0B.}$$

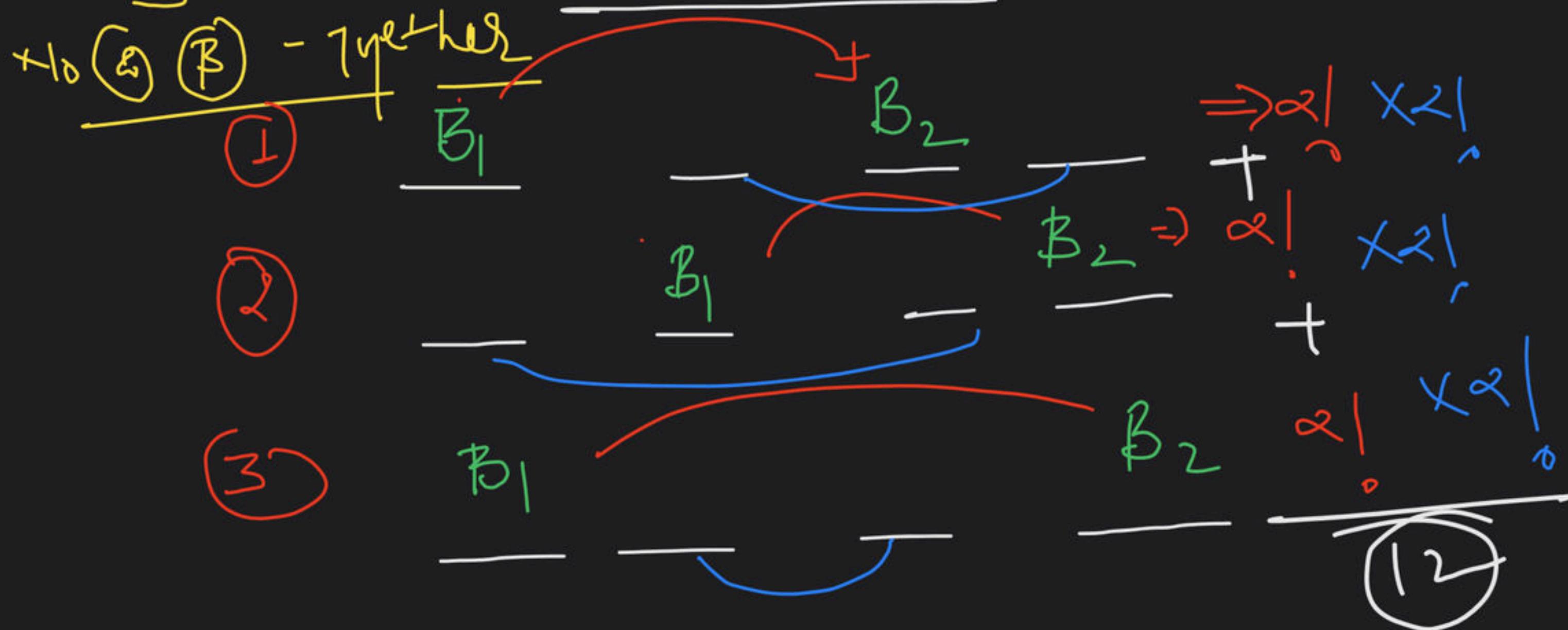


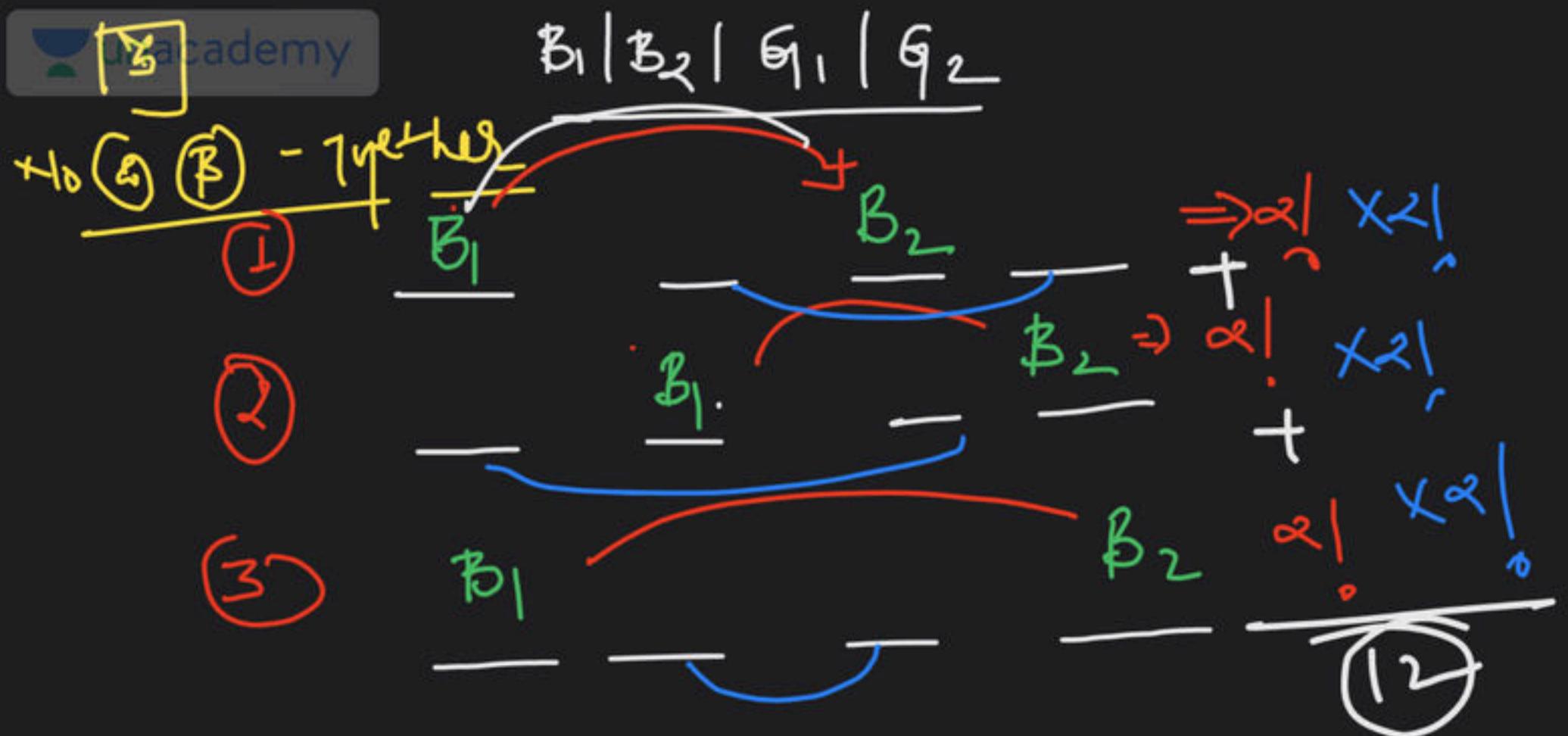
Q4

$$\left( \alpha_{\perp} \times \alpha_1 \right) \times \alpha_1 = \alpha_{\perp}$$

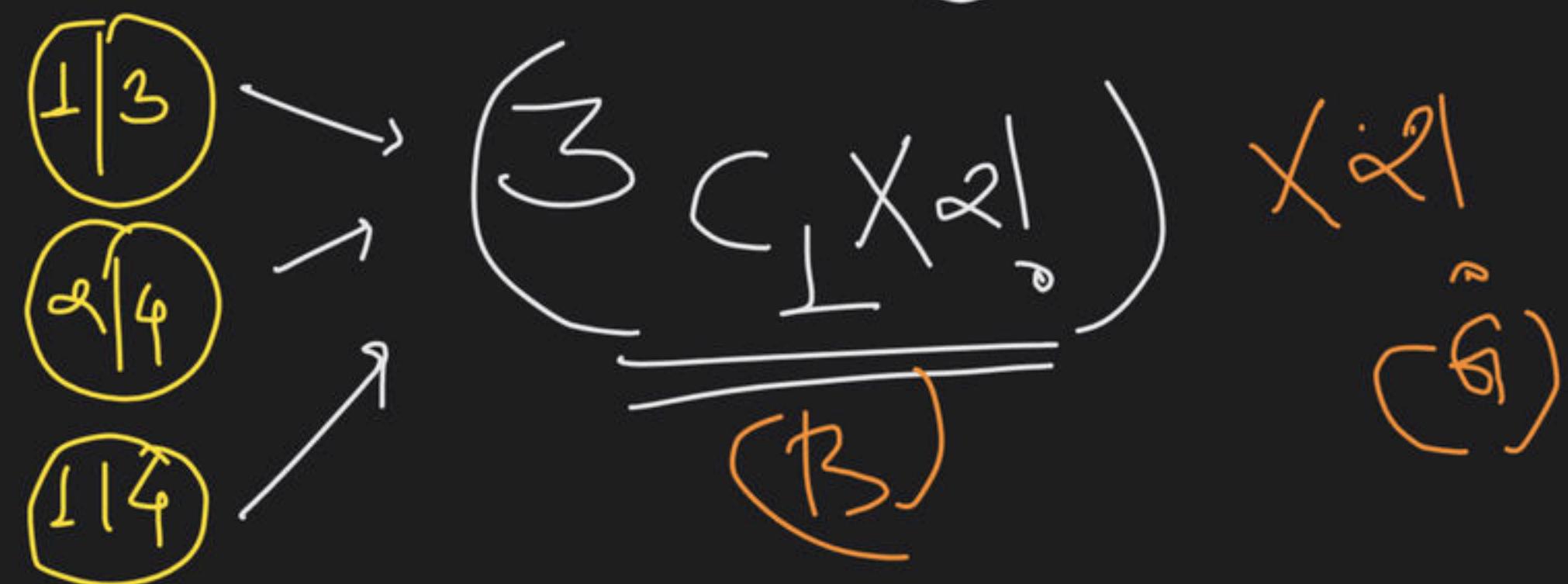


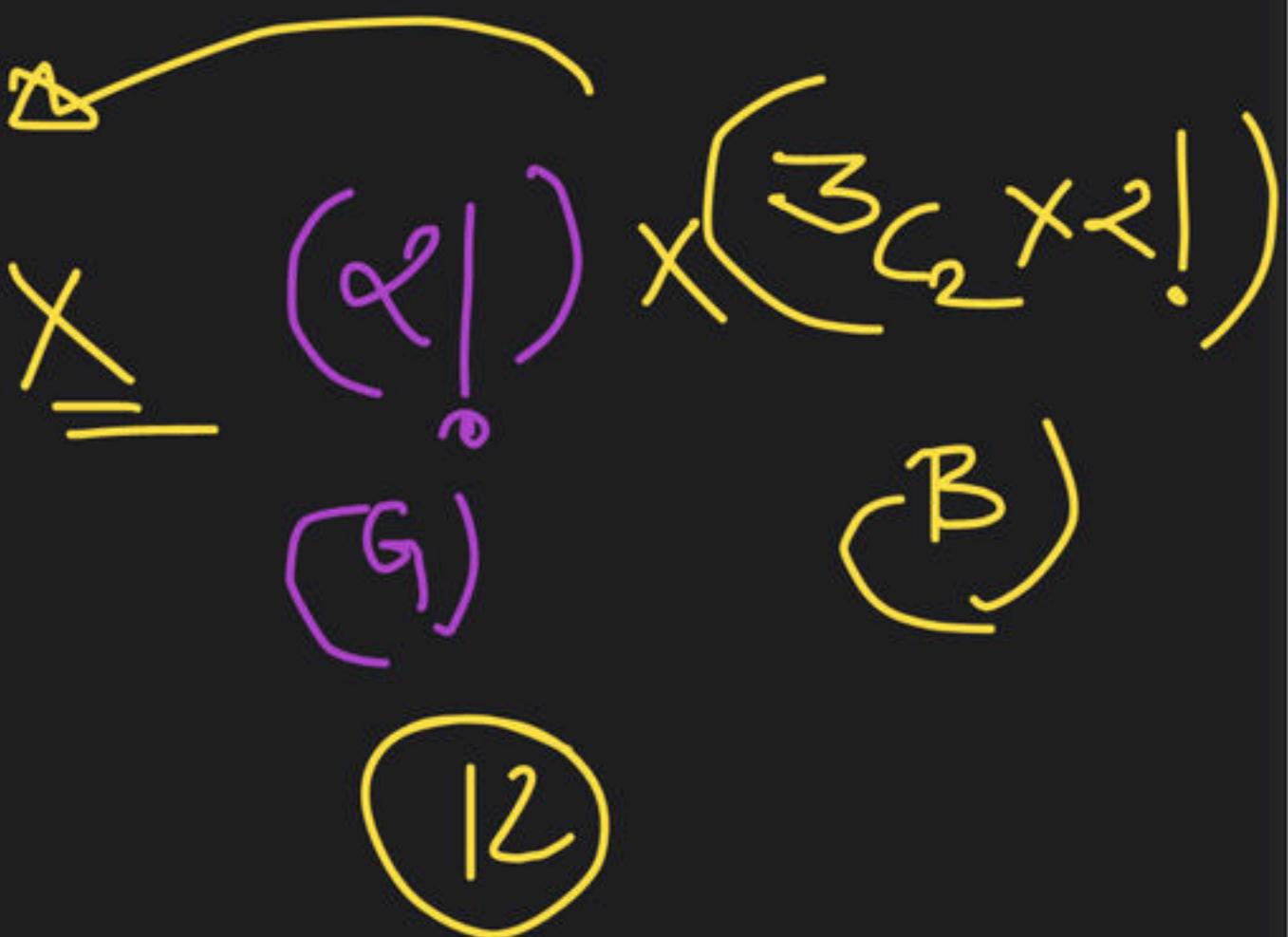
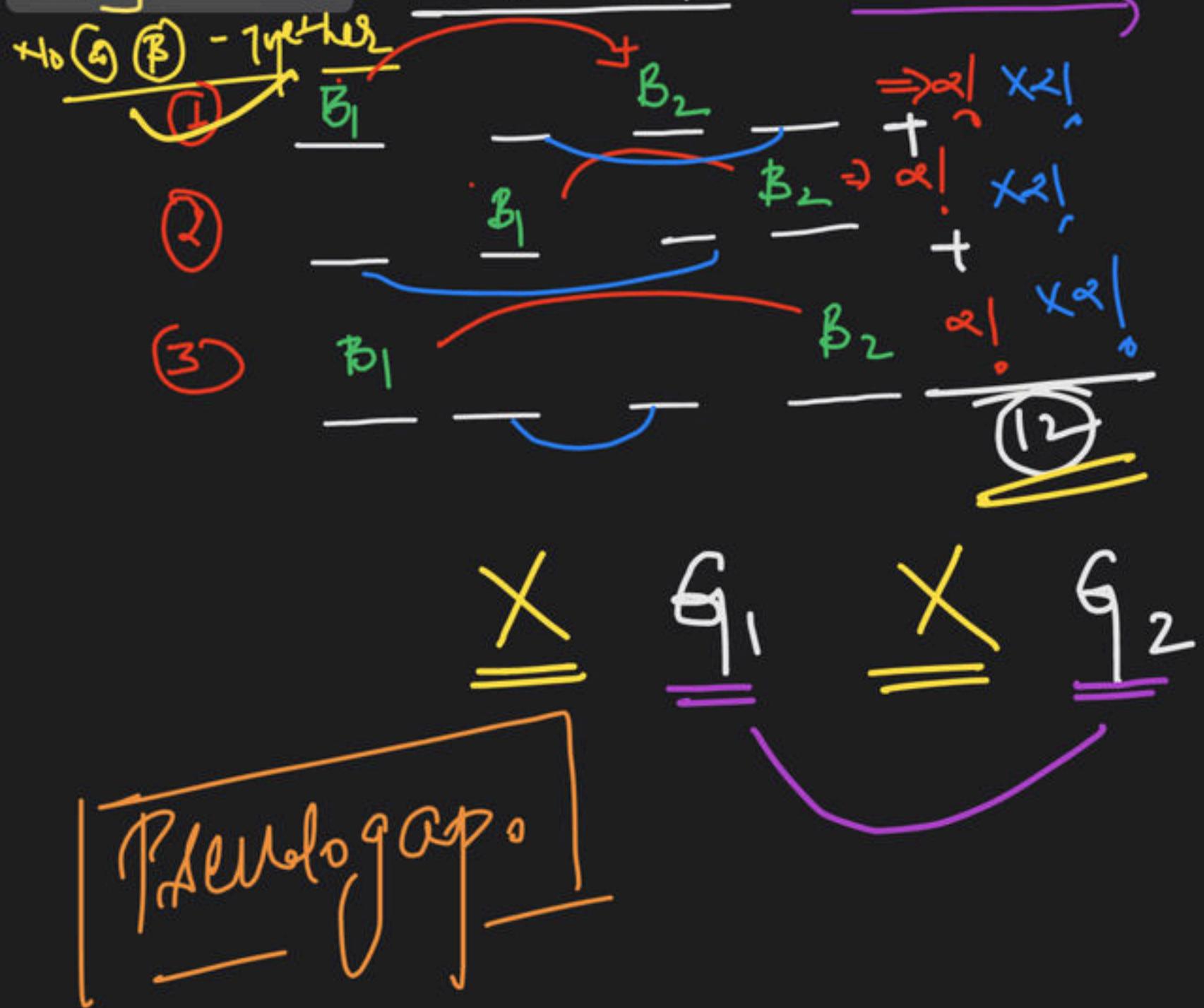
$B_1 | B_2 | G_1 | G_2$





[OR]



$B_1 | B_2 | G_1 | G_2$ 


$$\begin{array}{r} \text{BB} \\ \times 56 \\ \hline \end{array}$$



$$\begin{array}{r} \cancel{\times} \underline{g_1} \times \cancel{\underline{g_2}} \times \underline{g_3} \quad \cancel{\times} \underline{g_4} \times \cancel{\underline{g_5}} \times \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times (6) \\ \hline \end{array} + \begin{array}{r} (6 \times 3) \\ \times (6) \\ \hline \end{array}$$

m - Boys

n - Q

+ 10 Q boys.

$$\frac{n!}{m!} \times \binom{n+1}{m+1}$$

Q)

B)

5B | 106

To ② Boys -  $\alpha$

~~—~~  $\frac{10 \times (10 \times 5)}{(\text{Boys})}$

GAHESH PURI

① No condition  $\Rightarrow \frac{7!}{0!}$

② All vowels together  $\Rightarrow \text{ACEH} \quad G \text{ HSH PR}$

③ All the vowels are never together  $\Rightarrow \frac{7! - 6! \times (4!)^2}{0!}$

Nikhilacademy G A N E S H P U R I

① No condition  $\rightarrow \underline{\underline{10!}}$

② All vowels together (A E U) G N S H P R

③ All the vowels  
are never together  $\Rightarrow \underline{\underline{10! - 3! \times (4!)}}$

① G N S H P R A E U

② G N S H P A E U R I

③ G + I A S H P E R U I

④ G A + I E S U H I P R

Nikhilacademy G A N E S H P U R I

① No condition  $\rightarrow \underline{\underline{10!}}$

② All vowels together  $(A E U)$  G N S H P R

③ All the vowels  
are never together  $\Rightarrow \underline{\underline{10! - 3! \times (4!)}}$

① G N S H P R A E U

② G N S H P A E U R

③ G + I A S H P E R

④ G A + I E S U H

Nikhilacademy G A N E S H P U R I

① No condition  $\rightarrow \underline{\underline{10!}}$

② All vowels together  $(A E U)$  G N S H P R

③ All the vowels  
are never together  $\Rightarrow \underline{\underline{10! - 3! \times (4!)}}$

① G N S H P R A E U

② G N S H P A E U R

③ G + I A S H P E R

④ G A + I E S U H

Nikhilacademy G A N E S H P U R I

① No condition  $\rightarrow \underline{\underline{10!}}$

② All vowels together  $(AEUI) \underline{\underline{G N S H P R}}$

③ All the vowels  
are never together  $\Rightarrow \underline{\underline{10! - 5! \times (4!)}}$

① G N S H P R A E U I

② G N S H P A E U R

③ G + I A S H P E R

④ G A + I E S U H

① No condition  $\rightarrow \underline{\underline{1}}$

② All vowels together  $\rightarrow \underline{\underline{2}}$

③ All the vowels are now together  $\rightarrow \underline{\underline{3}}$

(ACB)  $\rightarrow$  ABC

$5! \times (4!)$

$10! - 5! \times 4!$

ENGLISH PRIMER

ENGLISH PRIMER

ENGLISH PRIMER

ENGLISH PRIMER

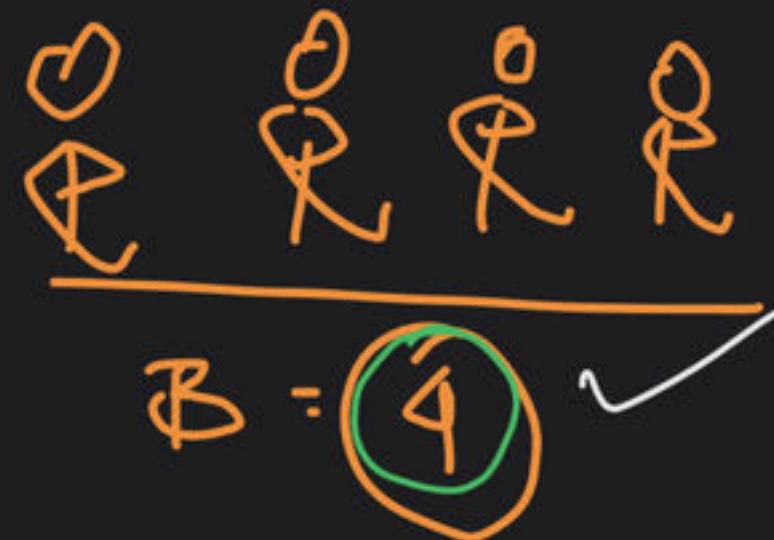
~~GANSHIPRADEEP~~① No condition  $\rightarrow 10!$ ② All vowels together ~~(AEI)~~  $\rightarrow 5 \times 9!$ ③ All the vowels are now together  $\Rightarrow 10! - 5 \times 9!$ ~~GANSHIPRADEEP~~~~GANASH PAKER~~~~GANASHIPAKER~~Pseudogap~~(GANSHIPAKER)~~

No. ②

~~(AEGIJ)~~vowels together $(6!) \times (4 \times 4!)$



Exactly | At least | At most - Team.



---

①  $\Rightarrow 7C_4$

②  $= 3C_2 \times 4C_2$

Exactly At least at most = Team.

$$\boxed{6-3}$$

$$\boxed{3-4}$$

①  $\boxed{4} \Rightarrow 7C_4$

②  $\boxed{29+13} = 3C_2 \times 4C_2$   
 $(6) \quad (3)$

$$4-1 \text{ Team}$$

(OR)

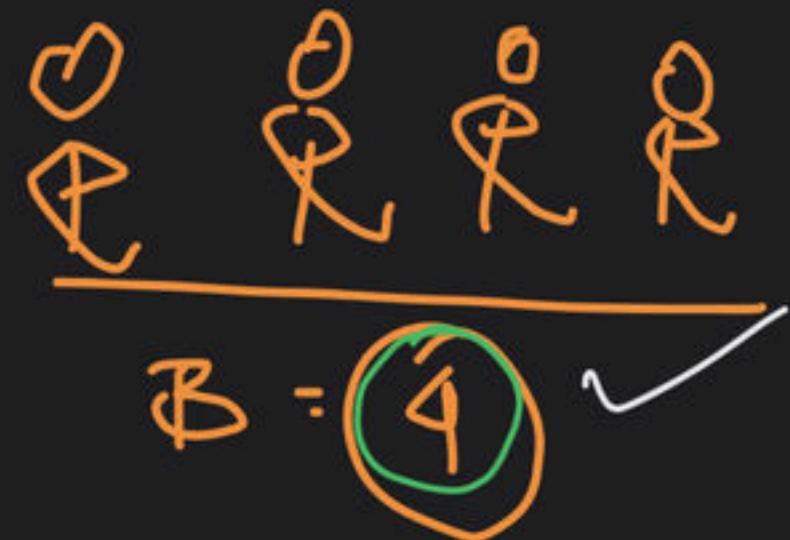
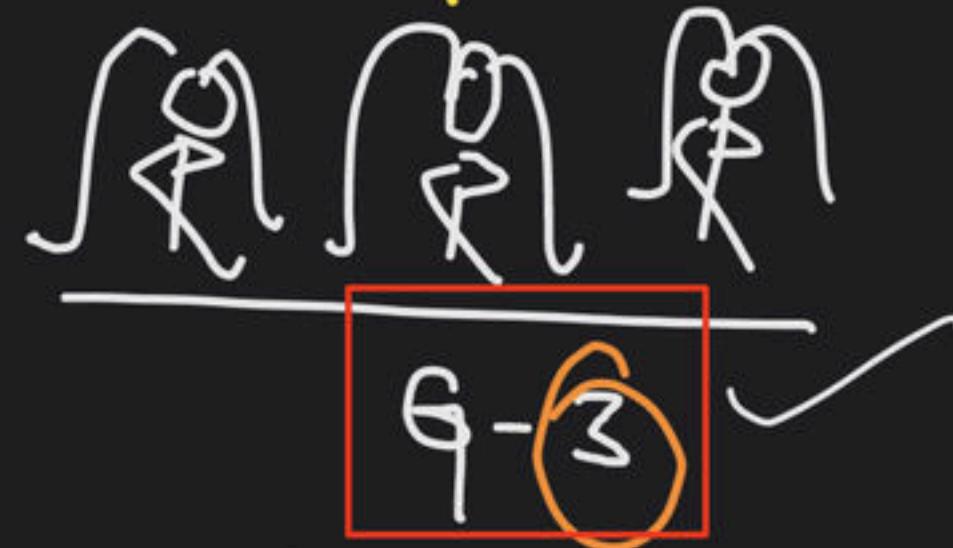
③ At least 2 Boys

or  
 $7C_4 - [4C_1 \times 3C_3]$

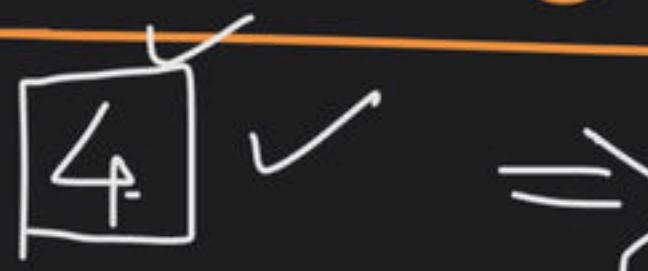
$$4C_2 \times 3C_2 + 4C_3 \times 3C_1$$

$$+ 4C_4 \times 3C_0$$

 Exactly | At least | At most - Team.



---

①   $\Rightarrow 7C_4$

② 

$$= 3C_2 \times 4C_2$$
$$(G) \quad (B)$$

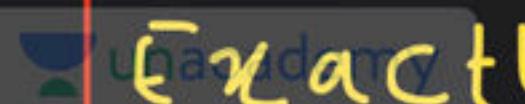
Exactly   At least   At most - Team.

$$\begin{array}{c} \text{संकेत} \\ \hline \boxed{6-3} \end{array}$$

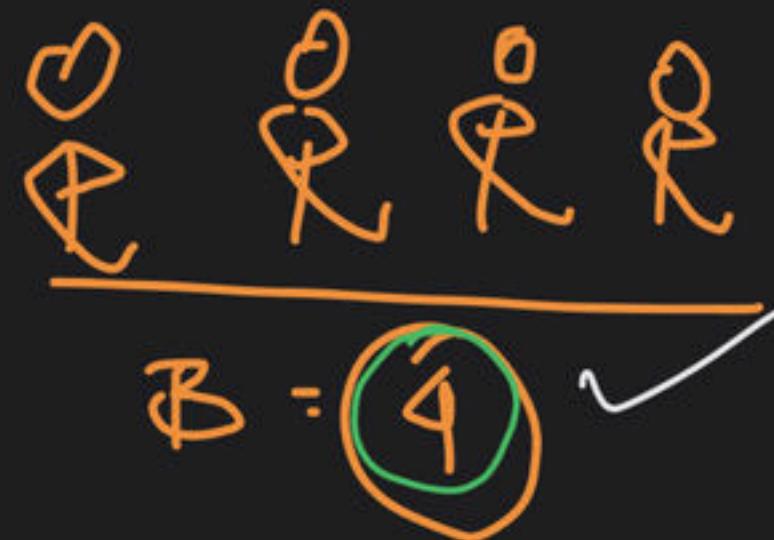
$$\begin{array}{c} \text{संकेत} \\ \hline B = \boxed{4} \end{array}$$

$$\begin{aligned} \textcircled{1} & \quad \boxed{4} \checkmark \Rightarrow \underline{7c_4} \checkmark \\ \textcircled{2} & \quad \boxed{\cancel{29} + \cancel{23}} \quad 3c_2 \times 4c_2 \\ & \qquad \qquad \qquad (\textcircled{4}) \quad (\textcircled{3}) \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad \boxed{\text{At most}} - \boxed{\text{सभी}} \\ 3c_2 \times 4c_2 + 34 \times 4c_3 + 36 \times 4c_4 \end{aligned}$$



Exactly | At least | At most - Team.

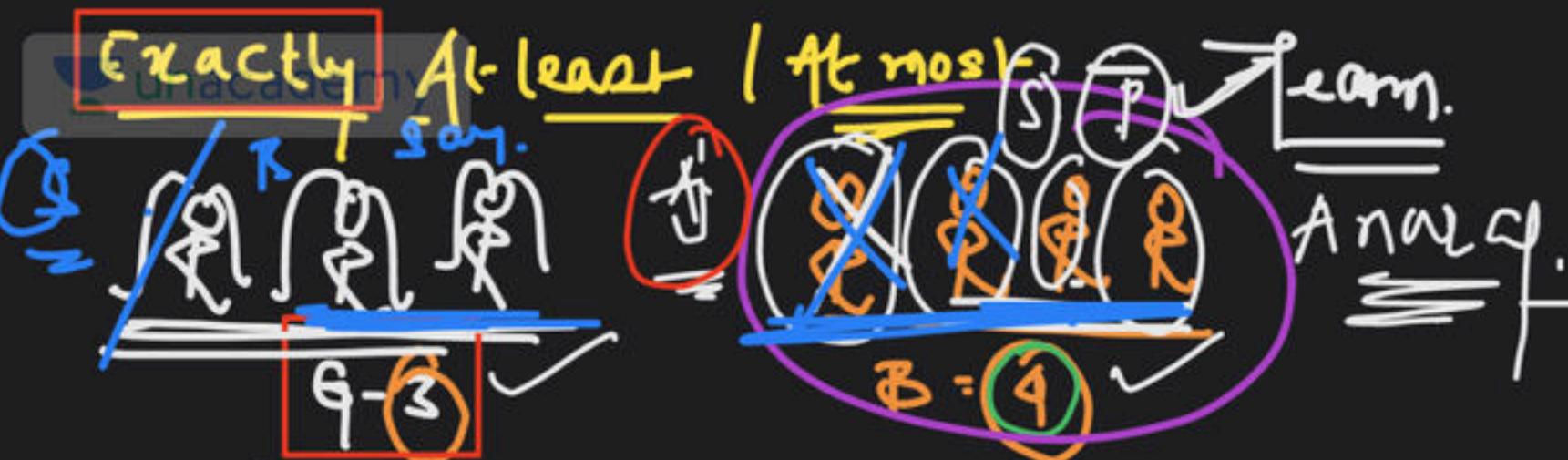


---

①  $\Rightarrow 7C_4$

②  $= 3C_2 \times 4C_2$

$(G)$   $(B)$



$$\textcircled{1} \quad 4 \checkmark \Rightarrow 7C4 \checkmark$$

$$\textcircled{2} \quad \boxed{29 + 43}$$

$$3C_2 \times 4C_2$$

(6) (3)

Particular

$$(1C_1) \times (6C_3)$$

~~4C1~~





# PERMUTATION COMBINATION

A photograph of an open book lying flat. The left page is dark and textured, while the right page features a vibrant, detailed illustration of a lush green landscape with rolling hills and a small white bird flying in the sky. The book is resting on a light-colored wooden surface.

01



Using the digits : 1,2,3,4 and 5 how many three digit numbers can be formed :

- (A) Repetition allowed.
- (B) Repetition not allowed.

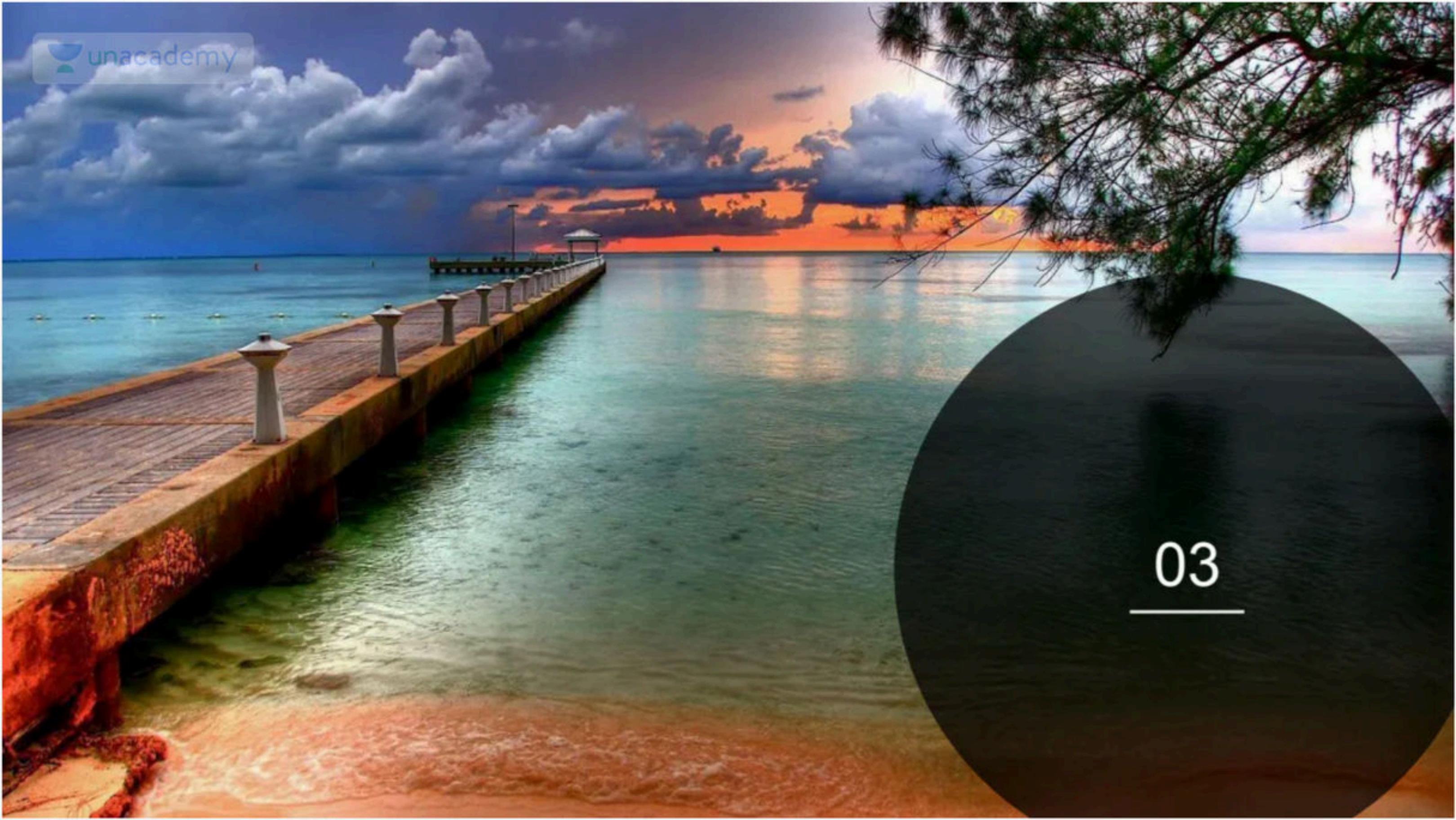


02



Using the digits : 0,1,2,3,4 and 5 how many three digit numbers can be formed :

- (A) Repetition allowed.
- (B) Repetition not allowed.



03



How many four digit numbers can be formed with the 10 digits 0, 1, 2, .... 9 if no number can start with 0 and if repetitions are not allowed?

[GATE 2015 : IIT Kanpur (CE Set - 2)]

04





How many numbers between 0 and 1 million can be formed using 0, 7 and 8?

- (A) 486
- (B) 1086
- (C) 728
- (D) 900

[GATE 2014 : IIT Kharagpur]

05



How many 3 digit no. are there from 100 – 1000

- (A) All three digits prime and distinct.
- (B) All 3 digits odd.

06





Using the digits : 1,2,3,4 and 5 how many three digit numbers can be formed , such that it must have :

- (A) Exactly one 5
- (B) Eaxactly two 5
- (C) At least one 5



07



Using the digits : 0,1,2,3,4 and 5 how many three digit numbers can be formed , such that it must have :

- (A) Exactly one 5
- (B) Exactly two 5
- (C) At least one 5

08

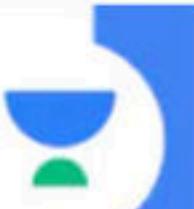




Using the digits : (1) 1,2,3,4,5,6,7,8 and 9 (2) 0, 1,2,3,4,5,6,7,8 and 9  
how many three digit numbers can be formed , such that it must have  
:

- (A) Exactly one 7
  - (B) Exactly two 7
  - (C) At least one 7

09



Using the digits : (1) 1,2,3,4 and 5 (2) 0, 1,2,3,4 and 5 how many three digit numbers can be formed , such that :

- (A) The ten's place is greater than the unit's place digit .
- (B) The ten's place is greater than the unit's place digit and less the hundred's place digit.



10



Using the digits : (1) 1,2,3,4,5,6,7,8 and 9 (2) 0,1,2,3,4,5,6,7,8 and 9 how many three digit numbers can be formed , such that :

- (A) The ten's place is greater than the unit's place digit.
- (B) The ten's place is greater than the unit's place digit and less the hundred's place digit.

11



How many different words can be formed from the letters of the word GANESHPURI when:

- (A) All the letters are taken.
- (B) The letter G always occupies the first place.
- (C) The letters P and E respectively occupy the first and last places.
- (D) All the vowels are always together.
- (E) How many words of 5 letters each can be formed each containing 3 consonants and 2 vowels?
- (F) All the vowels are never together.
- (G) No 2 vowels are together.



$$3 \text{ of } 8 + 4 \text{ of } 4 \Rightarrow 5 \Rightarrow \textcircled{1} \text{ No condition. } \boxed{12C5}$$

How many committees of 5 members each can be formed from 8 official and 4 non-official members in the following cases :

- (A) Each consisting of 3 official and 2 nonofficial members.
- (B) Each contains at least two non-official members.
- (C) Each consisting of at most two official members.
- (D) A particular official member is always included.
- (E) A particular non-official member is never included.

$$\begin{aligned} \textcircled{3} \quad & 4C_2 \times 8C_3 \\ & + 4C_3 \times 8C_2 \\ & + 4C_4 \times 8C_1 \end{aligned}$$

$$\begin{aligned} \textcircled{C} \quad & 8C_1 \times 4C_3 \\ & + 8C_2 \times 4C_4 \\ & + \cancel{8C_0 \times 4C_5} \end{aligned}$$

$$\boxed{8C_3 \times 4C_2}$$

$$\textcircled{D} \quad \boxed{(1C_1) \times 11C_4}$$

$$\textcircled{E} \quad \boxed{11C_5}$$

$$\underline{\underline{8M \text{ AND } 10W}} \Rightarrow 8 + 10 = 18$$

1   $\Rightarrow$  

2   $\underline{\underline{6M \text{ AND } 5W}} \Rightarrow \underline{\underline{6C_6 \times 10C_5}}$

BM MH TQW

$$B + T = 18$$

$$\text{① } 10 - 2 \Rightarrow 18 C_1$$

$$\text{② } GM \text{ & SW} \Rightarrow \frac{BC_6 \times LO_{C_5}}{GM \cdot SW}$$

$$\text{MRS. B} \Rightarrow \text{MRS. A}$$

$$\frac{BM}{GM \cdot SW}$$

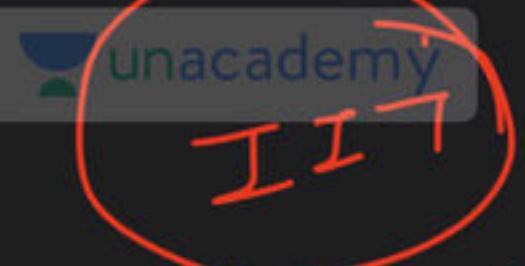
$$\cdot \frac{LO_{C_5} \times BC_6}{GM \cdot SW}$$

$$(W=5)$$

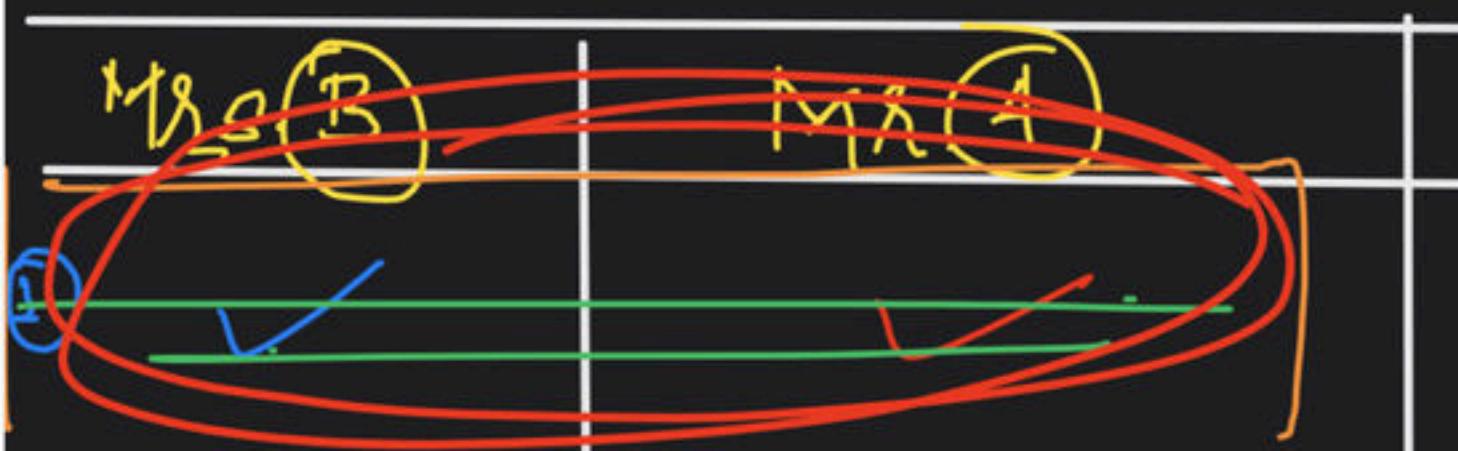
$$(M=6)$$

M&U

$$= \left[ \frac{(L_{C_1} \times q_{C_4})}{W=5} \times \frac{(L_q \times T_{C_5})}{(M=6)} \right]$$



$M_e \cdot A_e$



$M_{eB}$

$M_e \cdot A_e$

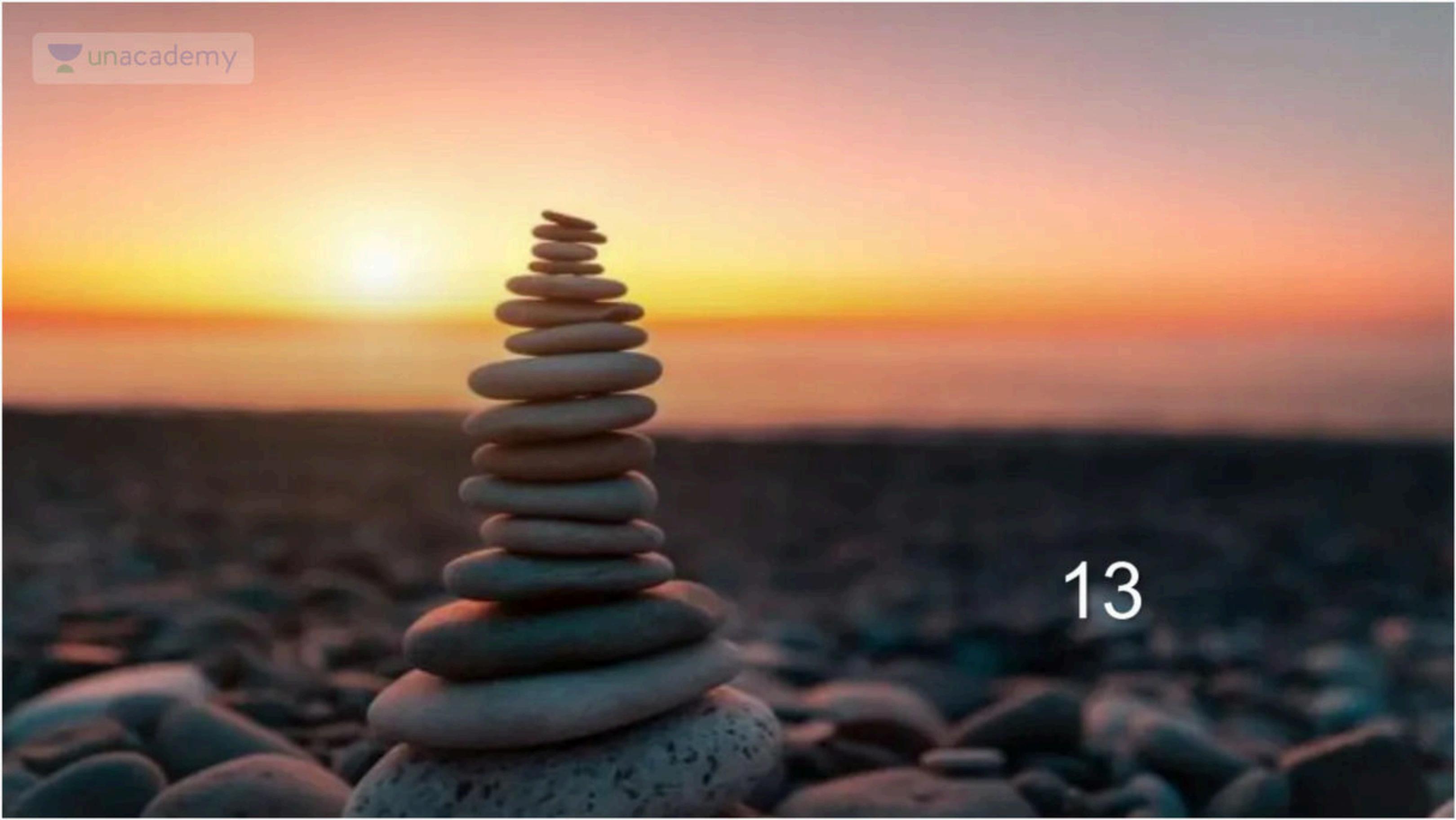


$$[(1c_1) \times q_{c4}] \times [Fc_6] \\ \boxed{\omega = s^-} \\ M_e \approx L$$



$$M_{eB} \times [(1c_1) J \times [(1c_0 - s^-)]$$

$$[q_{c5} M_{eB} \times] \times [Fc_6] M_e$$

A photograph of a tall, spiraling stack of smooth, grey stones, likely zen stones, balanced perfectly against a vibrant sunset or sunrise backdrop. The sky is a gradient of warm colors from orange to yellow and then to a darker blue at the horizon. In the foreground, there are more stones scattered across the ground.

13



Out of 8 men and 10 women a committee consisting of 6 men and 5 women is to be formed. How many such committees can be formed when one particular man A refuses to be a member of the committee in which his boss B's wife is there?



14



There are 4 women  $P, Q, R, S$  and 5 men  $V, W, X, Y, Z$  in a group. We are required to form pairs each consisting of one woman and one man.  $P$  is not to be paired with  $Z$ , and  $Y$  must necessarily be paired with someone. In how many ways can 4 such pairs be formed?

- (A) 74
- (B) 76
- (C) 78
- (D) 80

**[GATE 2017 : IIT Roorkee (ME Set – 2)]**





A three-member committee has to be formed a group of 9 people.  
How many such distinct committees can be formed?

- (A) 27
- (B) 72
- (C) 81
- (D) 84

→ **84**

$$9C_3 = \frac{9 \cdot 8 \cdot 7}{1 \cdot 2 \cdot 3}$$

[GATE 2018 : IIT Guwahati (CE Set – 2)]

16





An e-mail password must contain three characters. The password has to contain one numeral from 0 to 9, one upper and one lower case character from the English alphabet. How many distinct passwords are possible?

- (A) 6,760
- (B) 13,520
- (C) 40,560
- (D) 1,05,456

**[GATE 2018 : IIT Guwahati (EE Set – 1)]**





Arun, Gulab, Neel and Sweta must choose one shirt each from a pile of four shirts coloured red, pink, blue and white respectively. Arun dislikes the colour red and Sweta dislikes the colour white. Gulab and Neel like all the colours. In how many different ways can they choose the shirts so that no one has a shirt with a colour he or she dislikes?

- (A) 21
- (B) 18
- (C) 16
- (D) 14

[GATE 2017 : IIT Roorkee (EE, CS, Set – 1)]



18



A candidate is required to answer 7 out of 15 questions which are divided into three groups A,B,C each containing 4, 5 , 6 questions respectively. He is required to select at least 2 questions from each group. In how many ways can he make up his choice?





There are 3 Indians and 3 Chinese in a group of 6 people. How many subgroups of this group can we choose so that every subgroup has at least one Indian?

- (A) 56
- (B) 52
- (C) 48
- (D) 44

**[GATE 2017 : IIT Roorkee (EC, BT, PI Set – 1)]**





What is the sum of all 4 digit numbers which can be formed using the digits 1,2,3 and 4 without repetition?

A photograph of a two-lane road stretching into the distance under a dark, star-filled sky. The road is marked with white dashed lines. In the background, there's a low horizon with some distant lights and trees. The foreground is mostly dark asphalt.

21



What is the sum of all 5 digit numbers which can be formed using the digits (exactly once):

- (A) 1,2,3,4 and 5.
- (B) 1,1,2,3 and 4.
- (C) 1,1,2,2 and 2
- (D) 0,1,2,3 and 4.
- (E) 0,1,1, 2 and 3.





A five digit number is formed using the digits 1,3,5,7 and 9 without repeating any of them. What is the sum of all such possible five digit numbers?

- (A) 6666660
- (B) 6666600
- (C) 6666666
- (D) 6666606

**[GATE 2014 : IIT Kharagpur (EC Set – 4, ME Set - 4)]**





In how many ways may 6 Hindi medium students and 6 English medium students sit :

- (A) In a line
- (B) Around a round table such that two Hindi medium students may never sit together?



24



Four cards lie on a table. Each card has a number printed on one side and a colour on the other. The faces visible on the cards are 2, 3, red and blue.

Proposition : If a card has an even value one side, then its opposite face is red.

The cards which MUST be turned over to verify the above proposition are

- (A) 2, red
- (B) 2, 3, red
- (C) 2, blue
- (D) 2, red, blue

**[GATE 2017 : IIT Roorkee (IN, CE, Set – 2)]**





How many diagonals are there in an  $n$  side polygon.



26



Find the number of :

- (A) Straight Lines
- (B) Diagonals
- (C) Triangles formed in a decagon.





Out of 18 points in a plane, no three are in the same straight line except five points which are collinear. How many

- (A) Straight lines
- (B) Triangles can be formed by joining them?

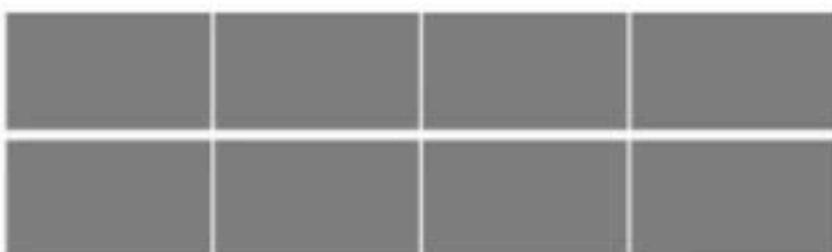


28



A  $2 \times 4$  rectangle grid shown below, each cell is a rectangle. How many rectangles can be observed in the grid?

- (A) 21
- (B) 27
- (C) 30
- (D) 36



[GATE 2016 : IISc Bangalore (EE Set - 1, CSE Set - 1)]





A set of 4 parallel lines intersect with another set of 5 parallel lines.  
How many parallelograms are formed?

- (A) 20
- (B) 48
- (C) 60
- (D) 72

[GATE 2018 : IIT Guwahati (IN Set – 1)]



30



Everybody in a room shakes hands with everybody else. The total number of hand shakes is 66. The total number of persons in the room is 12. True or False ?

31

In a football championship, there were played 153 matches. Every two teams played one match with each other. The number of teams participating in the championship is .....

32





930 Deepawali greeting cards are exchanged amongst the students of a class. If every student sends a card to every other student then what is the number of students in the class?

33



Five teams have to compete in a league, with every team playing every other team exactly once, before going to the next round. How many matches will have to be held complete the league round of matches?

- (A) 20
- (B) 10
- (C) 8
- (D) 5

[GATE 2015 : IIT Kanpur (ME Set - 3, IN)]

34





If all the letters of the word ‘AGAIN’ be arranged as per English dictionary , what is the 50th word.

# SUCCESS

35

How many word can be formed by taking 4 letters at a time out of the letters of the word MATHEMATICS ?



36



A five digit number is formed using the digits 1,3,5,7 and 9 without repeating any of them. What is the sum of all such possible five digit numbers?

- (A) 6666660
- (B) 6666600
- (C) 6666666
- (D) 6666606

**[GATE 2014 : IIT Kharagpur (EC Set – 4, ME Set - 4)]**



# PROBABILITY





An unbiased die is thrown. What is the probability of getting –

- (A) An even number
- (B) A multiple of 3.
- (C) An even number or a multiple of 3
- (D) An even number and a multiple of 3.





2 Dice are thrown simultaneously. Find the probability of getting:

- (A) An even no. as the sum.
- (B) The sum as a prime no.
- (C) A total of at least 10.
- (D) A multiple of 2 on 1 dice and multiple of 3 on the other.

39



3 dice are thrown together. Find the probability of getting sum of :

- (A) At least 6
- (B) At most 6
- (C) Exactly 6

40



Find the probability that a leap year selected at random , will have:

- (A) 53 Sun
- (B) 53 Sun & 53 Mon
- (C) 52 Sun
- (D) 52 Sun & 53 Mon
- (E) 52 Sun & 52 Mon
- (F) 52 Sun& 53 Tue
- (G) 52 Sun& 52 Tue.



41



What is the probability that a no. selected from the nos. 1-100 (both inclusive) is :

- (A) A Prime no.
- (B) Is a composite no.
- (C) A perfect square
- (D) A perfect Integer
- (E) Multiple of 2
- (F) Multiple of 4
- (G) Multiple of 3

42



Out of all the 2-digit integers between 1 and 100, a 2-digit number has to be selected at random. What is the probability that the selected number is not divisible by 7?

- (A)  $13/90$
- (B)  $12/90$
- (C)  $78/90$
- (D)  $77/90$

[GATE 2013 : IIT Bombay (CSE, ME)]



43



Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

(A)  $\frac{1}{9}$

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

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

(D)  $\frac{4}{9}$

[GATE 2017 : IIT Roorkee (IN, CE Set – 2)]

44





Given set A = {2, 3, 4, 5} and Set B = {11, 12, 13, 14, 15}, two numbers are randomly selected, one from each set. What is probability that the sum of the two numbers equals 16?

- (A) 0.20
- (B) 0.25
- (C) 0.30
- (D) 0.33



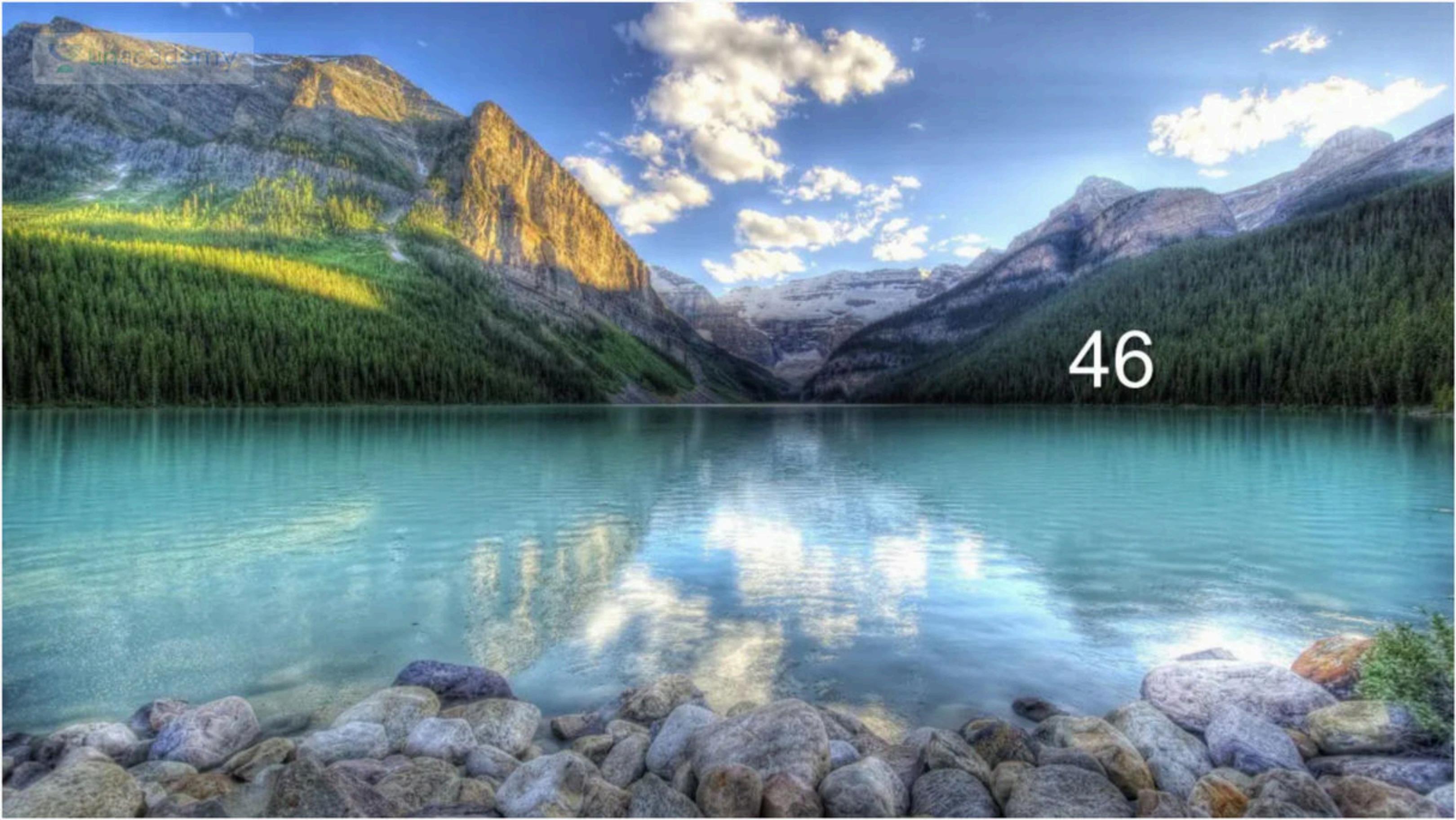
45



The probability that a k-digit number does NOT contain the digits 0, 5 or 9 is

- (A)  $0.3^k$
- (B)  $0.6^k$
- (C)  $0.7^k$
- (D)  $0.9^k$

[GATE 2017 : IIT Roorkee (EE, CS Set – 1)]

A wide-angle photograph of a mountainous landscape. In the foreground, a rocky shoreline is visible along the edge of a lake. The lake's water is a vibrant turquoise color. Behind the lake, several majestic mountains rise, their slopes covered in dense green forests. The lighting suggests either sunrise or sunset, with the sun's rays illuminating the peaks and casting long shadows. The sky above is a clear blue, dotted with wispy white clouds.

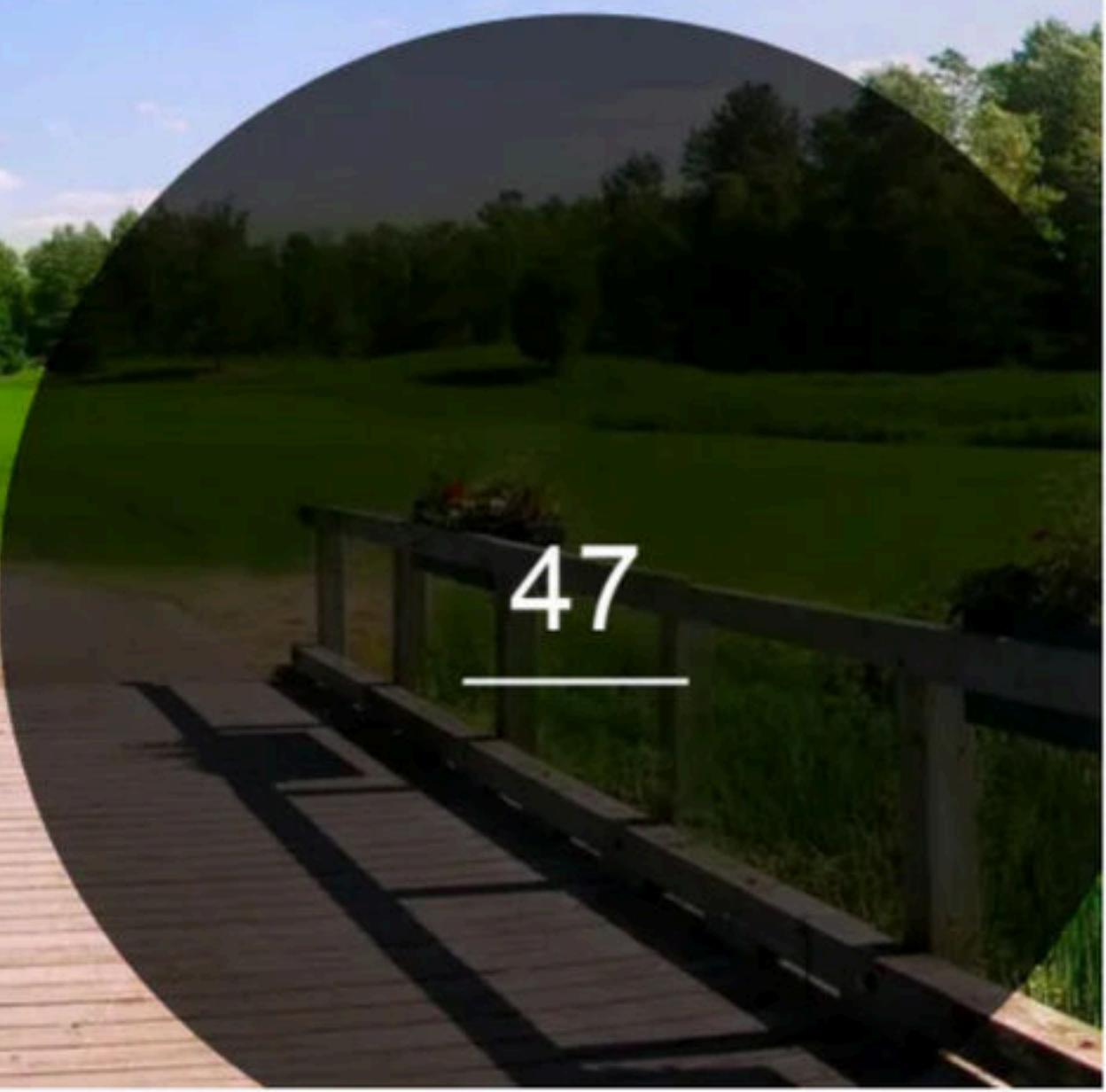
46



A couple has 2 children. The probability that both children are boys if the older one is a boy is

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

[GATE 2017 : IIT Roorkee (ME Set – 2)]





What is the chance that a leap year, selected at random, will contain 53 Saturdays?

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

**[GATE 2013 : IIT Bombay (EC, EE, IN)]**



48



One card is drawn from a pack of 52 cards , each of the 52 cards are equally likely to be drawn. Fin the probability that the card drawn is :

- (A) An Ace
- (B) Red
- (C) Either Ace or Red
- (D) Ace & Red



49



4 persons are to be chosen at random from a group of 3 men , 4 women and 4 children. Find the probability of selecting:

- (A) 1 man , 1 woman and 2 children.
- (B) 2 Women.
- (C) At least 2 women.
- (D) At most 2 women .





The letters of the word ‘SOCIETY’ are placed at random in a row.  
What is the probability that:

- (A) All the vowels are together.
- (B) All the vowels are never together.
- (C) No 2 vowels are together.
- (D) “SOIT” are always together.





2 integers are selected at random from integers 1-11. If the sum is even , find the probability that :

- (A) Both the integers are odd.
- (B) Both the integers are even.



52



A bag contains 6 white, 5 red and 4 black balls. If two balls are drawn at random, what is the probability that none is white?

(A)  $\frac{1}{3}$

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

(C)  $\frac{12}{35}$

(D)  $\frac{13}{16}$





There are 3 red socks, 4 green socks and 3 blue socks. You choose 2 socks.  
The probability that they are of the same colour is

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

(B)  $\frac{7}{30}$

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

(D)  $\frac{4}{15}$

[GATE 2017 : IIT Roorkee (EE, CS Set – 2)]



54



Two dice are rolled one after the other. The probability that the number on the first is smaller than the number on second

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

(B)  $\frac{7}{8}$

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

(D)  $\frac{2}{12}$





A regular die has six sides with numbers 1 to 6 marked on its sides. If a very large number of throws show the following frequencies of occurrence:  
 $1 \rightarrow 0.167$ ;  $2 \rightarrow 0.167$ ;  $3 \rightarrow 0.152$ ;  $4 \rightarrow 0.166$ ;  $5 \rightarrow 0.168$ ;  $6 \rightarrow 0.180$ . We call this die

- (A) Irregular
- (B) Biased
- (C) Gaussian
- (D) Insufficient

[GATE 2014 : IIT Kharagpur (EC Set - 2, ME Set - 2)]



56



A coin tossed thrice. Let X be the event that head occurs in each of the first two tosses. Let Y be the event that a tail occurs on the third toss. Let Z be the event that two tails occurs in three tosses. Based on the above information, which one of the following statements is TRUE?

- (A) X and Y are not independent
- (B) Y and Z are dependent
- (C) Y and Z are independent
- (D) X and Z are independent

[GATE 2015 : IIT Kanpur (ME Set - 3, IN)]

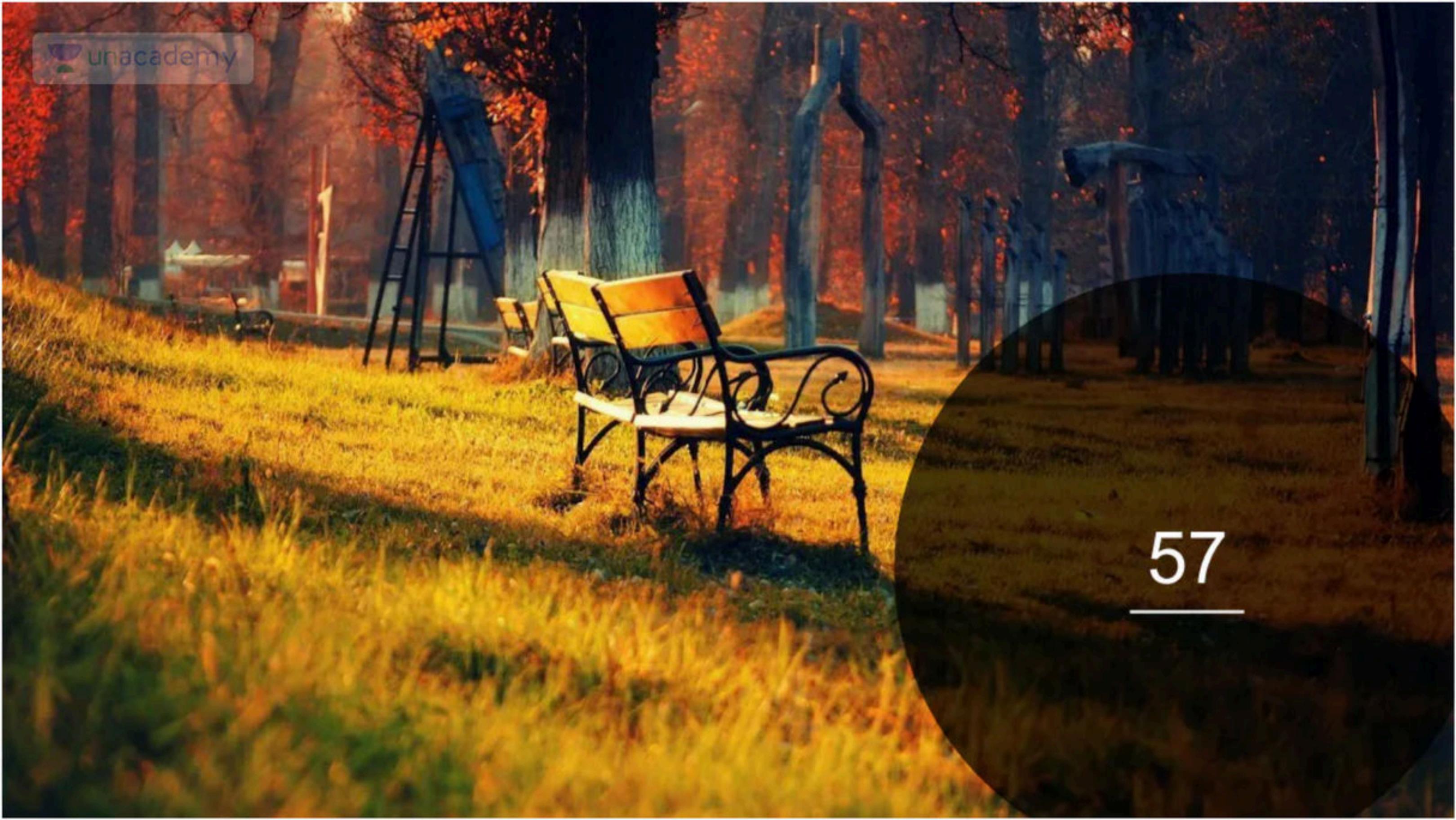


# **Agenda : Probability**

# **Agenda : Concept**

# **Builder - II**







A problem in statistics is given to three students A, B and C whose chances of solving it are  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  respectively. The probability that the problem will be solved is

- (A)  $\frac{3}{4}$
- (B)  $\frac{1}{24}$
- (C)  $\frac{1}{4}$
- (D)  $\frac{1}{2}$



58



An unbiased coin is tossed six times in a row and four different such trials are conducted. One trial implies six tosses of the coin. If H stands for head and T stands for tail, the following are the observations from the four trials :

- (1) HTHTHT
- (2) TTTHHHT
- (3) HTTHHT
- (4) HHHT\_\_

Which statement describing the last two coin tosses of the fourth trial has the higher probability of being correct?

- (A) Two T will occur
- (B) One H and one T will occur
- (C) Two H will occur
- (D) One H will be followed by one T.

[GATE 2018 : IIT Guwahati (ME Set – 2)]





Ram and Ramesh appeared in an interview for two vacancies in the same department. The probability of Ram's selection is  $\frac{1}{6}$  and that of Ramesh is  $\frac{1}{8}$ . What is the probability that only one of them will be selected?

(A)  $\frac{47}{48}$

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

(C)  $\frac{13}{48}$

(D)  $\frac{35}{48}$

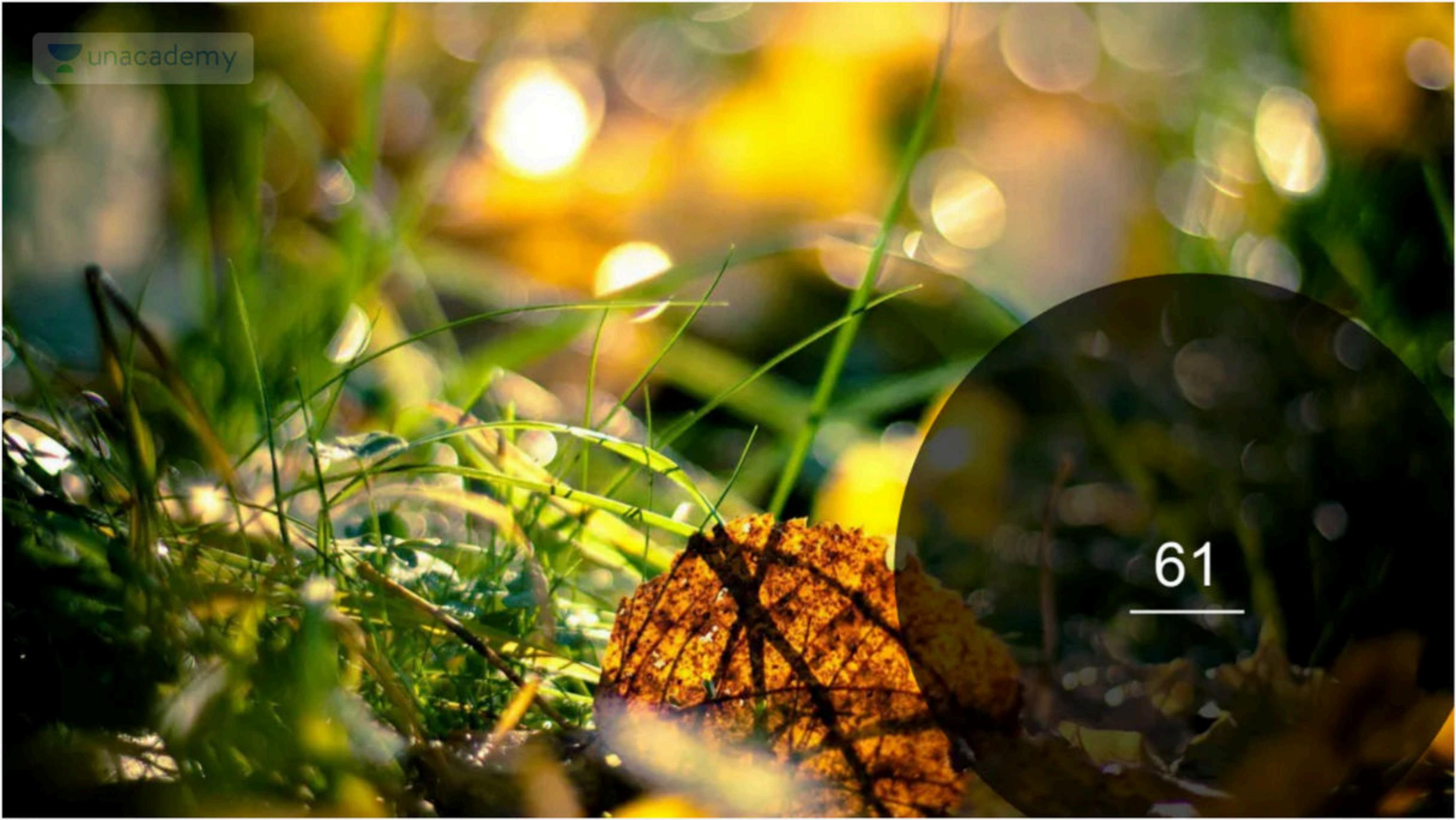
[GATE 2015 : IIT Kanpur (EC Set - 2, ME Set - 1)]





You are given three coins: one has heads on both faces, the second has tails on both faces, and the third has a head on one face and a tail on the other. You choose a coin at random and toss it, and it comes up heads. The probability that the other face is tails is

- (A)  $1/4$
- (B)  $1/3$
- (C)  $1/2$
- (D)  $2/3$



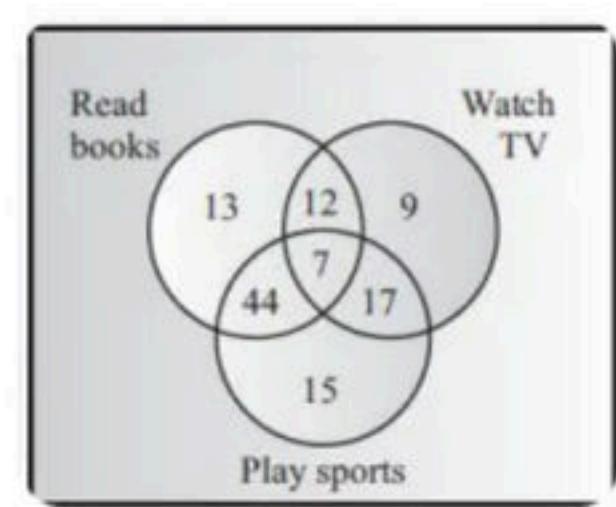
61



The Venn diagram shows the preference of the student population for leisure activities.

From the data given, the number of students who like to read books or play sports is \_\_\_\_.

- (A) 44
- (B) 51
- (C) 79
- (D) 108



[GATE 2016 : IISc Bangalore (EC Set - 2, ME Set- 3)]





The probabilities of the three doctors A, B and C getting success in an operation are 0.5, 0.2 and 0.3 respectively. Find the probability that the operation is not successful.

- (A) 0.78
- (B) 0.64
- (C) 0.56
- (D) 0.28



63



If 5 unbiased coins are tossed, what is the probability of getting even number of heads?

- (A)  $1/2$
- (B)  $1/5$
- (C)  $5/32$
- (D)  $15/32$



A photograph of a beach at sunset. The sky is filled with warm orange and yellow hues, transitioning into darker blues and purples. In the foreground, dark, wet rocks are silhouetted against the bright, foaming white waves of the ocean. The water reflects the warm colors of the sky. In the background, more rocks and the shoreline are visible under the setting sun.

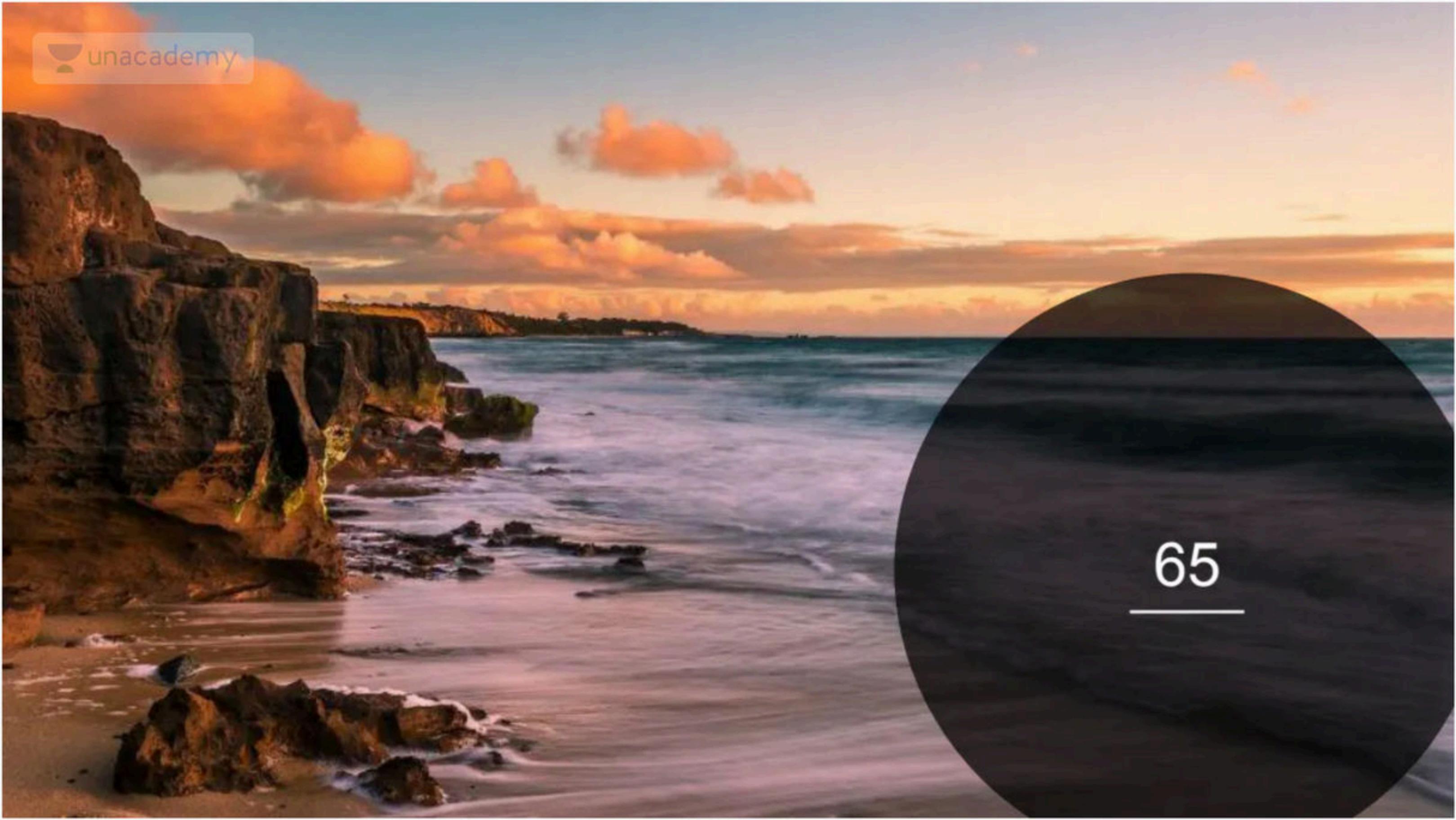
64



A class of twelve children has two more boys than girls. A group of three children are randomly picked from this class to accompany the teacher on a field trip. What is the probability that the group accompanying the teacher contains more girls than boys?

- (A) 0
- (B)  $\frac{325}{864}$
- (C)  $\frac{525}{864}$
- (D)  $\frac{5}{12}$

[GATE 2018 : IIT Guwahati (EE Set – 1)]



65



An automobile plant contracted to buy shock absorbers from two suppliers X and Y. X supplies 60% and Y supplies 40% of the shock absorbers. All shock absorbers are subjected to a quality test.

The ones that pass the quality test are considered reliable. Of X's shock absorbers, 96% are reliable. Of Y's shock absorbers, 72% are reliable. The probability that a randomly chosen shock absorber, which is found to be reliable, is made by Y is

- (A) 0.288
- (B) 0.334
- (C) 0.667
- (D) 0.720

**[GATE 2012 : IIT Delhi (ME, CE, CSE)]**



66



Shaquille O' Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average.

What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

- (A) 0.2508
- (B) 0.2816
- (C) 0.2934
- (D) 0.6000

**[GATE 2016 : IISc Bangalore (EE Set - 2)]**

67



A batch of one hundred bulbs is inspected by testing four randomly chosen bulbs. The batch is rejected if even one of the bulbs is defective. A batch typically has five defective bulbs. The probability that the current batch is accepted is \_\_\_\_\_.

[GATE 2014 : IIT Kharagpur (EC Set - 3, ME Set - 3)]





In any given year, the probability of an earthquake greater than Magnitude 6 occurring in the Garhwal Himalayas is 0.04. The average time between successive occurrences of such earth quakes is \_\_\_\_\_ years.

[GATE 2014 : IIT Kharagpur (CE Set - 2, IN)]



69



10% of the population in a town is HIV+. A new diagnostic kit for HIV detection is available; this kit correctly identifies HIV+ individuals 95% of the time, and HIV- individuals 89% of the time. A particular patient is tested using this kit and is found to be positive. The probability that the individual is actually positive is \_\_\_\_\_.

**[GATE 2014 : IIT Kharagpur (CE Set - 2, IN)]**

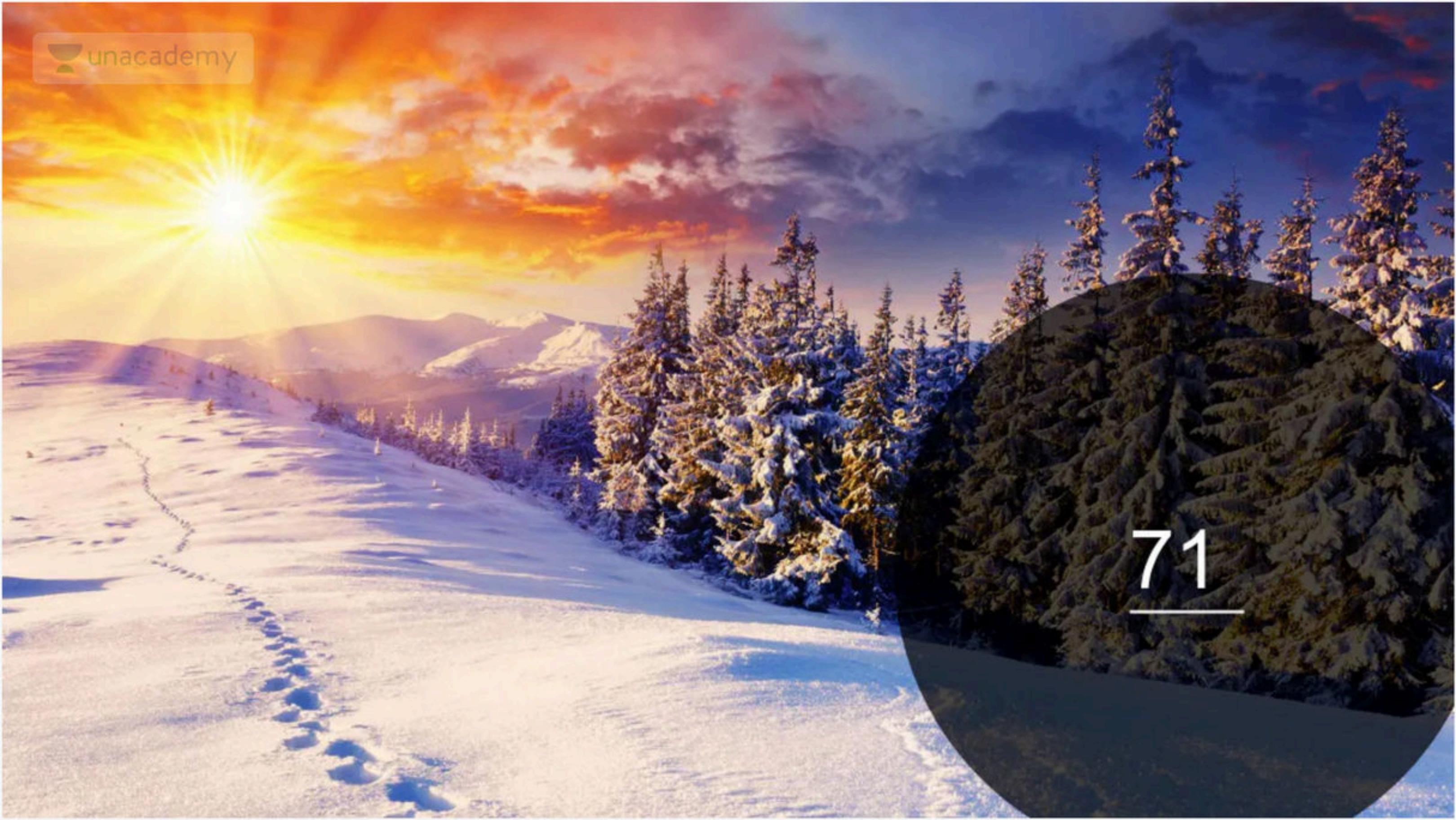


70



A die is rolled three times. The probability of getting a larger number than the previous number each time is

- (A)  $7/54$
- (B)  $5/54$
- (C)  $11/54$
- (D)  $6/54$





There are 30 coins out of which 20 are biased. Of these 20 biased coins, 15 always show head while the rest always show tail. The probability of getting at least 14 tails in a single throw of 30 coins is

- (A)  $10 \times 2^{-10}$
- (B)  $11 \times 2^{-10}$
- (C)  $10 \times 2^{-30}$
- (D)  $11 \times 2^{-30}$





A and B are friends. They decide to meet between 1 PM and 2 PM on a given day. There is a condition that whoever arrives first will not wait for the other for more than 15 minutes. The probability that they will meet on that day is

- (A)  $1/4$
- (B)  $1/16$
- (C)  $7/16$
- (D)  $9/16$

[GATE 2012 : IIT Delhi (EC, EE)]



73

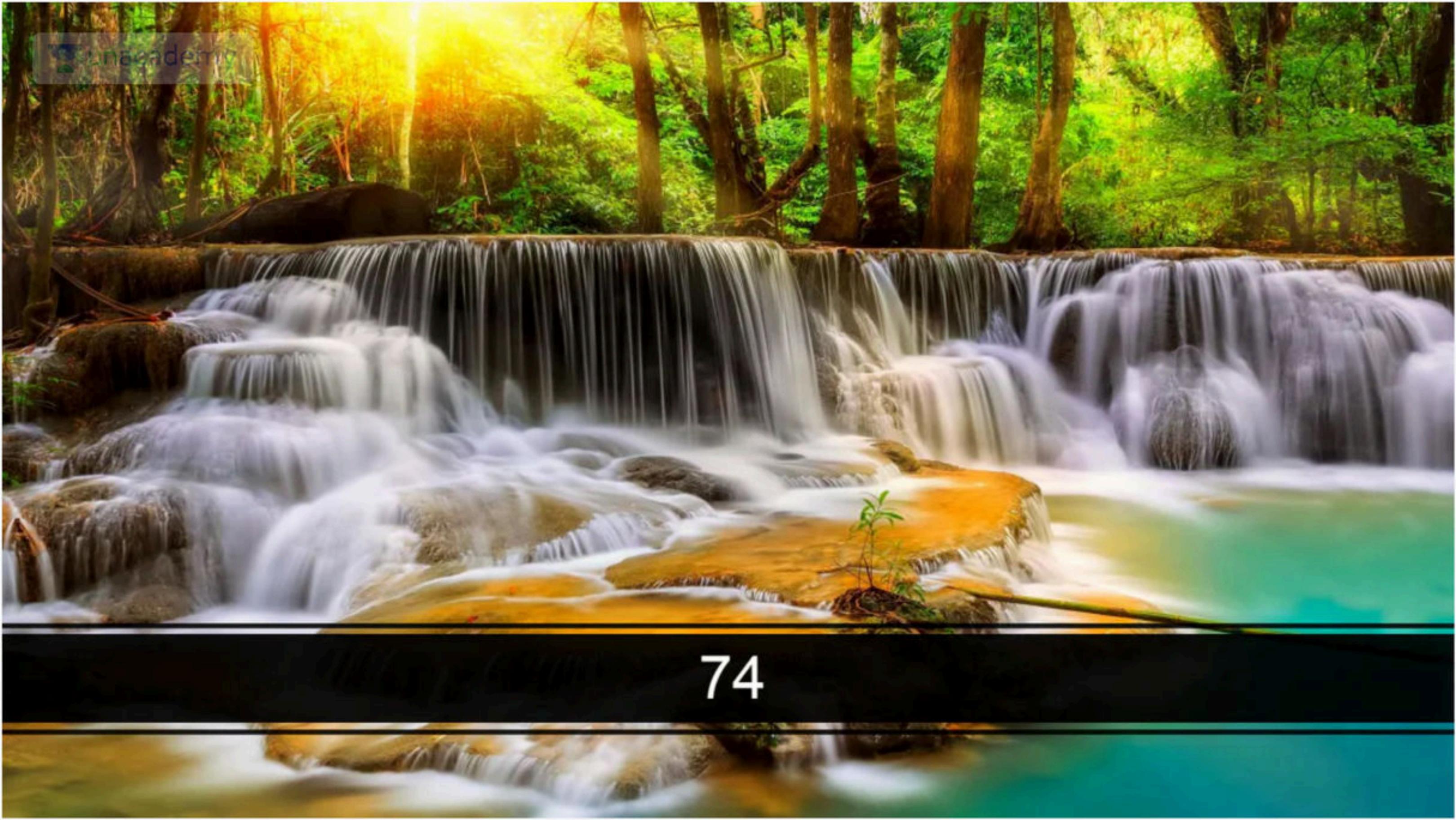


In a Las Vegas Casino, 3 games were played.

- (A) A bet on tossing of 2 unbiased coins.
- (B) A bet on drawing a card from a pack of 52 cards.
- (C) A bet on the sum of the scores of the top face of 2 die.

Each of the above events occur at random. A 'Mechanical ark' was programmed to conduct the 3 events simultaneously. What is the probability of getting atleast 1 head, a picture card and a sum below 9 (in the game of dice) ?

- (A)  $5/52$
- (B)  $1/4$
- (C)  $1/36$
- (D)  $1/8$





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

- (A)  $1/5$
- (B)  $2/4$
- (C)  $2/3$
- (D)  $4/5$



75



In a plane, 5 lines of lengths 2, 3, 4, 5, and 6 cm are lying. What is the probability that by joining then three randomly chosen lines end to end a triangle cannot be formed?

- (A)  $3/10$
- (B)  $7/10$
- (C)  $1/2$
- (D) 1

76



In a class exam, possible grades A, B, C and D are equally probable for any student. If A, B, C are passing grades and D is a fail grade then in a class of 100, what is the probability that at least 2% of the class will get grade D?

(A)  $\frac{100C_2 \left(\frac{1}{4}\right)^2}{400}$

(B)  $1 - \left(\frac{3}{4}\right)^{100}$

(C)  $1 - \left(\frac{3}{4}\right)^{100} - 25 \left(\frac{3}{4}\right)^{99}$

(D) None of these





In a card game six cards (2 Aces, 2 Kings and 2 Queens of different suits) are distributed among three people such that the first card of every person is kept face down while the other card is kept open. The person whose closed card is the highest wins the game. The probability that there is no winner in the game is

- (A)  $1/10$
- (B)  $3/20$
- (C)  $3/10$
- (D)  $1/5$