

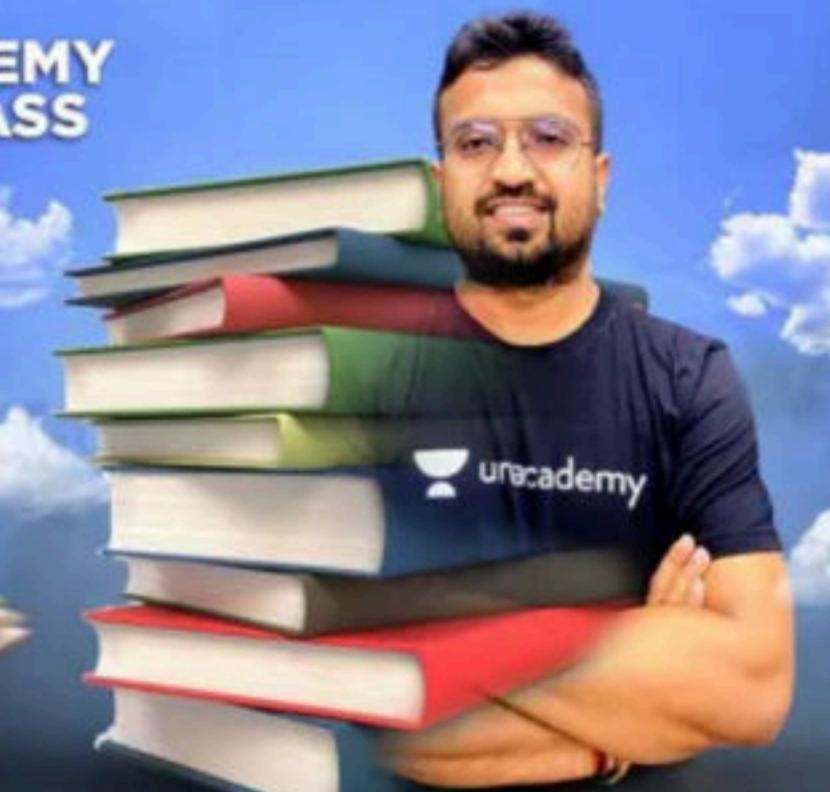




Permutation Combination & Probability - Part II

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

UNACADEMY
PLUS CLASS

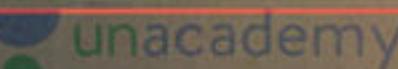


COMPLETE COURSE ON

General Aptitude for
GATE 2024/25

USE CODE ST26

— Saurabh Sir —

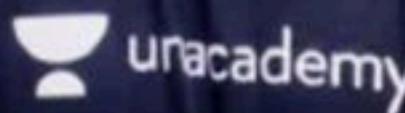


32M+ WATCH MINUTE
12+ YEARS TEACHING EXPERIENCE

SUBSCRIPTION

CODE:ST26

SAURABH THAKUR
IIM ROHTAK



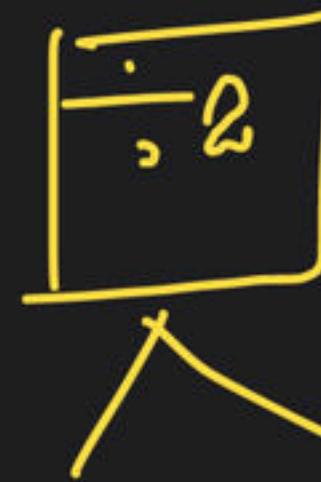
PLC

$+$ \Rightarrow Choice \Rightarrow OR $\rightarrow + \rightarrow \cup$

\times \Rightarrow No choice \rightarrow AND $\rightarrow \times \rightarrow \cap$

TEST

0	2	5	8	9
---	---	---	---	---



R
R



$$U = \frac{EN}{E+N}$$

$\underline{\hspace{1cm} \hspace{1cm} \hspace{1cm}}$

0	2	5	B	9
---	---	---	---	---

R R

$\underline{\hspace{1cm} \hspace{1cm}}$

R ✓

4 \times 5 = 12

$\underline{\hspace{1cm} \hspace{1cm}}$

$\frac{0 \times}{2 \mid 5 \mid 8 \mid 9}$

$\underline{\hspace{1cm} \hspace{1cm}}$

Even.

02 | 8

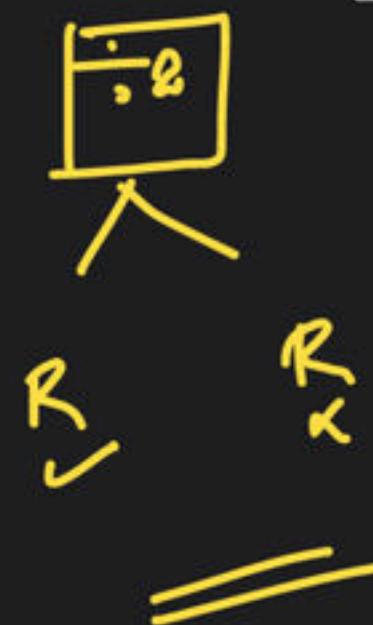
0 | 2 | 5 | 8 | 9



R
R



$$\begin{array}{r} \text{1} \\ \text{2} \\ \text{3} \\ \text{4} \\ \text{5} \\ \text{6} \\ \text{7} \\ \text{8} \\ \text{9} \end{array} \begin{array}{|c|c|c|c|c|} \hline \text{1} & \text{2} & \text{3} & \text{4} & \text{5} \\ \hline \end{array}$$



$$4 \times 25 \overline{) 100}$$

Q R X



$$4 \times 25 \overline{) 100}$$

Q

$\Rightarrow 4$

$$+ 4 \overline{) 100}$$

$$6 \overline{) 100}$$

$$- 2 \overline{) 8}$$



3

\times

X

\times

$\underline{10}$

4

\times

\times

$$+ 4 \overline{) 100}$$

~~1 | 2 | 3~~
~~2 - DIGIT + 10.~~

~~Exactly one~~

~~4 possibilities~~

①

2 ways

~~2x, 1 | 3~~

②

③

2
—
2x
1 | 3

\Rightarrow

1^2
 3^2
 $2 \times 1 = 2$

+ (4)

$1 \times 2 = 2$
04

2 |
2 3

Easathy (mc) 5

T E S T.

$$\begin{array}{r} \\ \text{T} \\ \hline 1 \mid 2 \mid 3 \mid 4 \mid 5 \end{array}$$

①

$$\begin{array}{r} 4 \\ \hline \end{array}$$

5



4

OB

+

$$\begin{array}{r} 1 \mid 2 \mid 3 \mid 4 \end{array} \quad 5 \times \text{T}$$

②

5

$$\begin{array}{r} \\ \hline \text{T} \end{array}$$

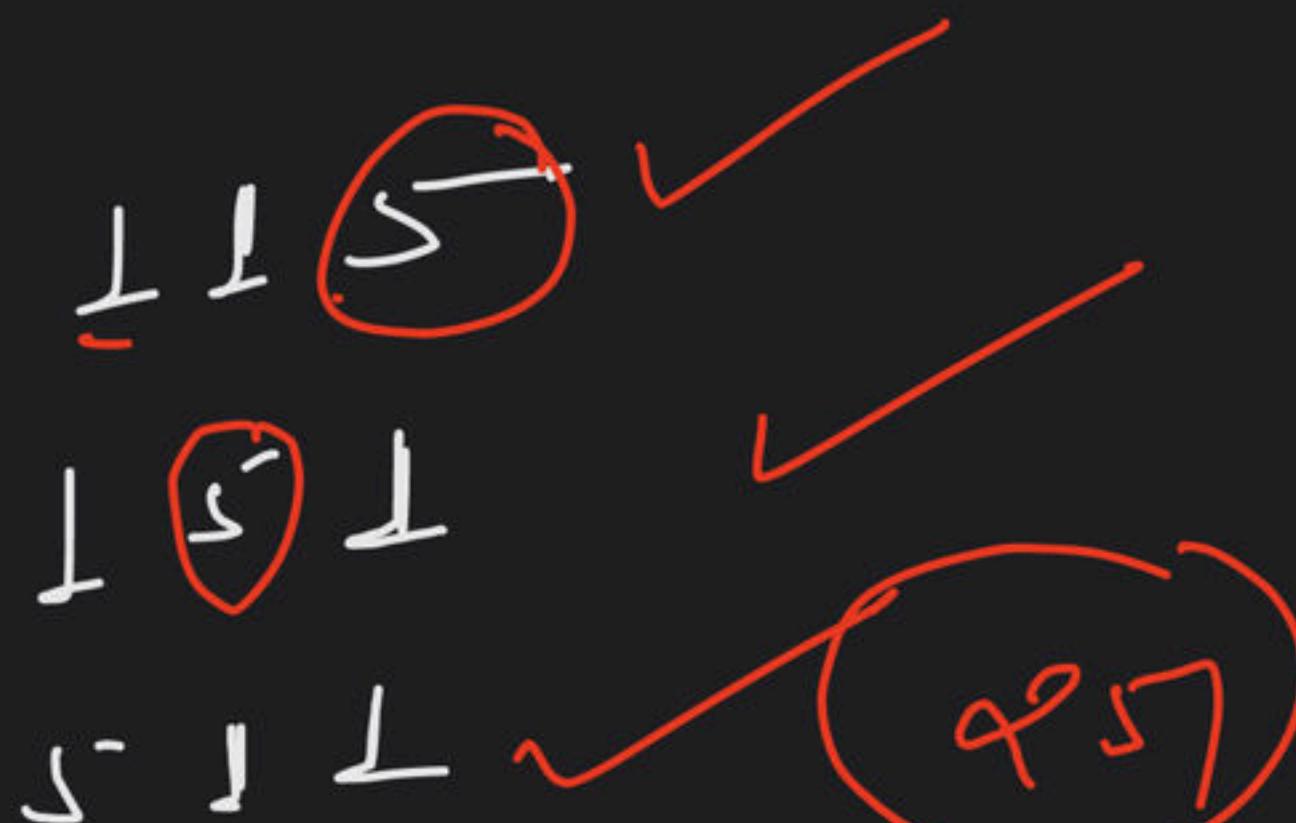
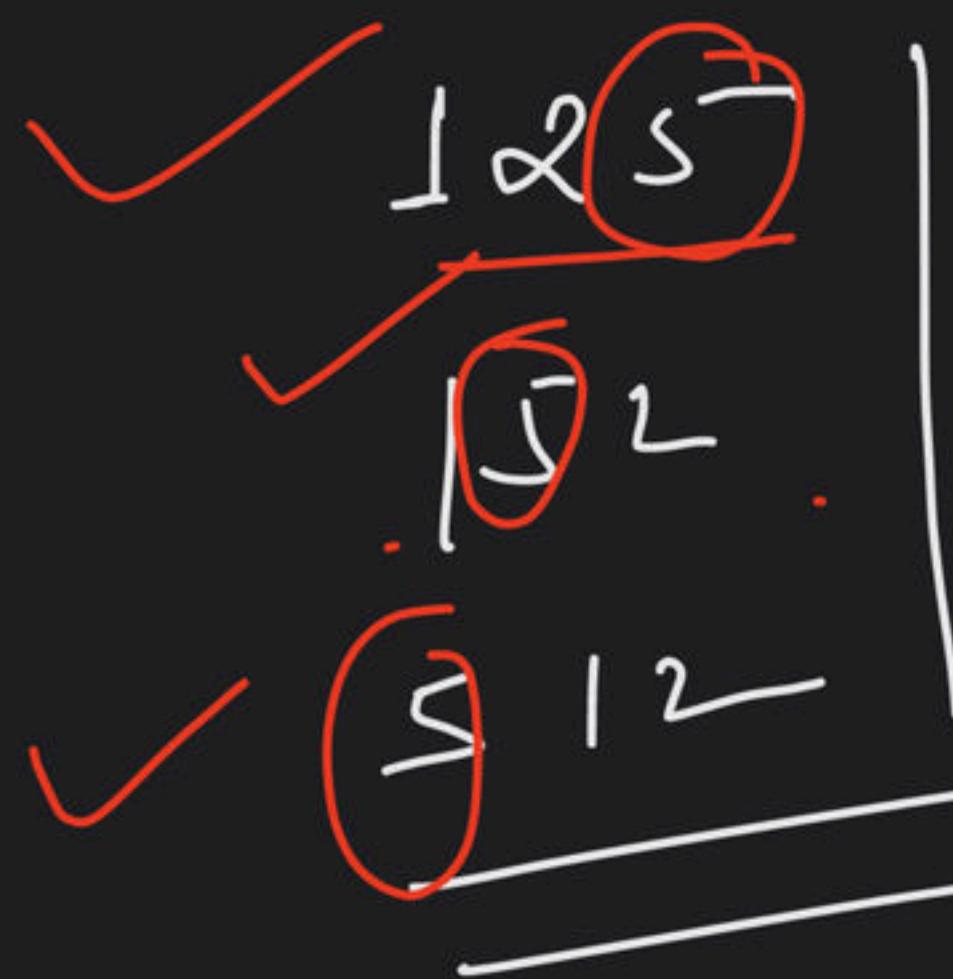
4



5

$$\begin{array}{r} \\ \hline 4 \end{array} \quad 5 \times, \quad 1 \mid 2 \mid 3 \mid 4$$

Exactly one S



Finally me s^7

TEST

1 | 2 | 3 | 4 | s⁻

1 unacademy

1|2|3|4|5
=>



1 - 5
 $\cancel{4} \times \cancel{4}$

$$\frac{\cancel{4}}{5} < 5 <$$

$$\times \frac{5}{4} \Rightarrow 14 \times 3$$

48

1|2|3|4
→

2

$$4 \times \frac{5}{4} \times 4$$
$$\frac{5}{4} < 1 < 5 <$$
$$1 - 4 \longrightarrow 1 - 4$$

$$5 \times 4 \times 4$$
$$\frac{4}{5} < 14 < 52$$
$$\underline{14 - 14}$$
$$16 + 16 + 16 = 48.$$

1 - 9 - — Enantly are 51

$$\begin{array}{r} 8 \\ \hline 5 \times \end{array}$$

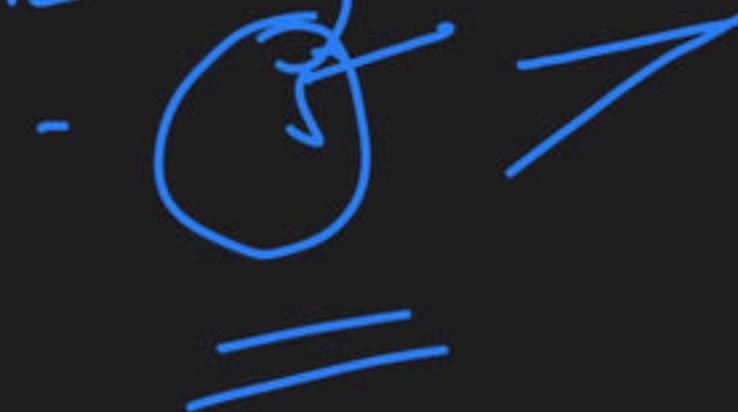
$$\begin{array}{r} 8 \\ \hline 5 \times \end{array}$$

$$\begin{array}{r} 5 \\ \hline \times 3 \\ \hline 192 \end{array}$$

$$1 - 9$$

$$1 - 9$$

Finally One



TG ST

0 | 1 | 2 | 3 | 4 | S -

Equality Only

TG ST

0 1 2 3 4 5 -

fix

$$\begin{array}{r} 4 \times 5x \\ \hline \end{array}$$

5

$$\Rightarrow 4 \times 5x$$

5

5

5

5x

5x

0-4

0-4

$$\begin{array}{r} 25 \\ \hline \end{array}$$

$$\begin{array}{r} 5x \\ 0x \\ \hline k 3 4 \\ 4 \\ \hline \end{array}$$

5x

0-4

5

+

$$\begin{array}{r} 4 \times 1 \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 65 \\ \hline \end{array}$$

$$\begin{array}{r} 5x \\ 0x \\ \hline 14 \\ \hline \end{array}$$

$$\begin{array}{r} 5x \\ 0-4 \\ \hline \end{array}$$

$$\begin{array}{r} 1 - 5 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \hline 5 \times 1 - 4 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \hline \end{array}$$



$$\begin{array}{r} 4 \\ \hline \end{array}$$

+

$$\begin{array}{r} 2 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \hline \end{array}$$

4

$$\begin{array}{r} 5 \\ \hline \end{array}$$



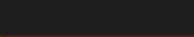
$$\begin{array}{r} 4 \\ \hline \end{array}$$

+

$$\begin{array}{r} 5 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \hline \end{array}$$

4



$$\begin{array}{r} 4 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \hline \end{array}$$

① ~~unacademy~~

1|2|3|4|5 \Rightarrow 0

$$\begin{array}{r} \cancel{4} \times \cancel{4} \times 5 \\ \hline 5 \times \\ 1|2|3|4 \end{array} \Rightarrow 1 \cancel{4} \times 3$$

✓

$$\begin{array}{r} 4 \times 5 \times 4 \\ \hline 5 \times \\ 4 \end{array}$$

$$\begin{array}{r} 5 \times 4 \times 4 \\ \hline 4 \\ 5 \times \\ 1|4 \quad -1 \\ 16+16+16 = 48 \end{array}$$

✓
48
4|2

5
5
5

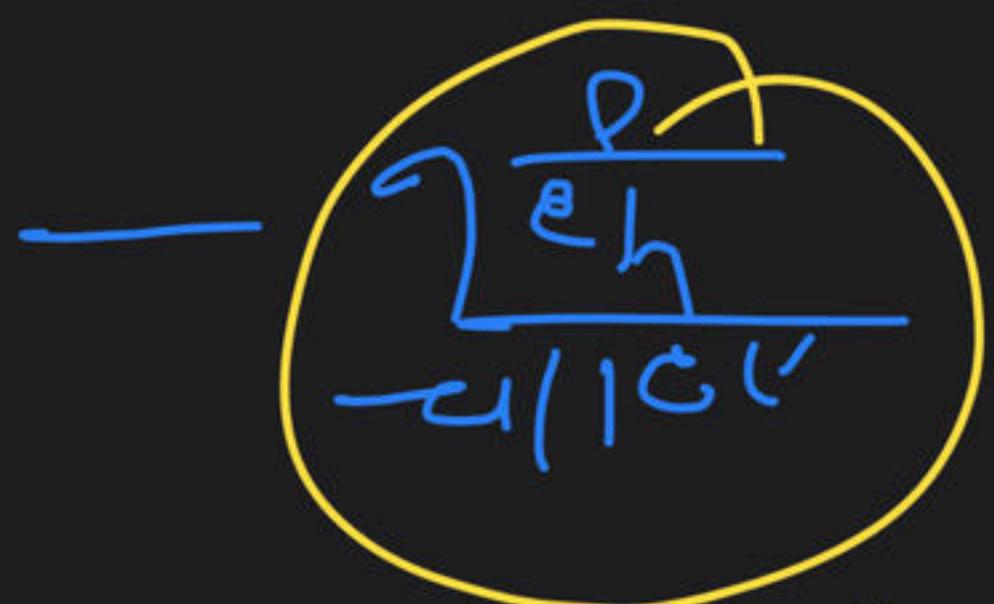
At least
one 5
1

At least one 5

$\begin{array}{r} 1 \\ | 2 | 3 | 4 | 5 \end{array}$

↓ 5's \Rightarrow

$$\begin{array}{r} S \\ \times \quad S \times \quad S \\ \hline 1 - S \quad 1 - S \quad 1 - S \\ = 125 \end{array}$$



+ 1 or - reqd.

$$\begin{array}{r} 4 \\ \times \quad 4 \times 9 \\ \hline = 64 \\ \underline{c1} \end{array}$$

$$\begin{array}{r} 1 - 4 \quad 1 - 4 \quad 1 - 4 \\ S \times \quad S \times \quad S \times \\ = 12 \end{array}$$

1 - 9.
= = =

① Exactly one 



A L least One 

= =

1 - 9

Exactly one

⊕

$$\begin{array}{r}
 8 \\
 - 7 \\
 \hline
 1
 \end{array}$$

$$\begin{array}{r}
 6 \\
 - 7 \\
 \hline
 1
 \end{array}$$

⊕

⊕

⊕

$$\begin{array}{r}
 7 \\
 - 9 \\
 \hline
 1
 \end{array}$$

$$\begin{array}{r}
 64 \times 3 \\
 \hline
 192
 \end{array}$$

At least one 0

لطفاً



$$\frac{9}{1-9} \times \frac{9}{1-1} \times \frac{1}{1-7} = 729$$

$$\frac{6}{1-7} \times \frac{6}{7-7} \times \frac{8}{7-8} = \frac{72}{217}$$

$\frac{8}{1-7} \times 4 \times 1$ \Rightarrow

$+10$ $\boxed{1}$

①

$$\begin{array}{r} 0 \cdot 9 \\ \hline 0 \end{array}$$

Ex. One ①

②

$$\begin{array}{r} 1 \\ \times 1 \\ \hline 1 \end{array}$$

$$0 - 9$$

4

$$\begin{array}{r} 9 \\ - 6 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ + 2 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ + \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ - \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ - \\ \hline \end{array}$$

$$\begin{array}{r} 0 - 9 \\ - 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ - 1 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ + 2 \\ \hline 9 \end{array}$$

25

$$\begin{array}{r} 7 \\ - 9 \\ \hline 0 - 9 \end{array}$$

At least one 7

444

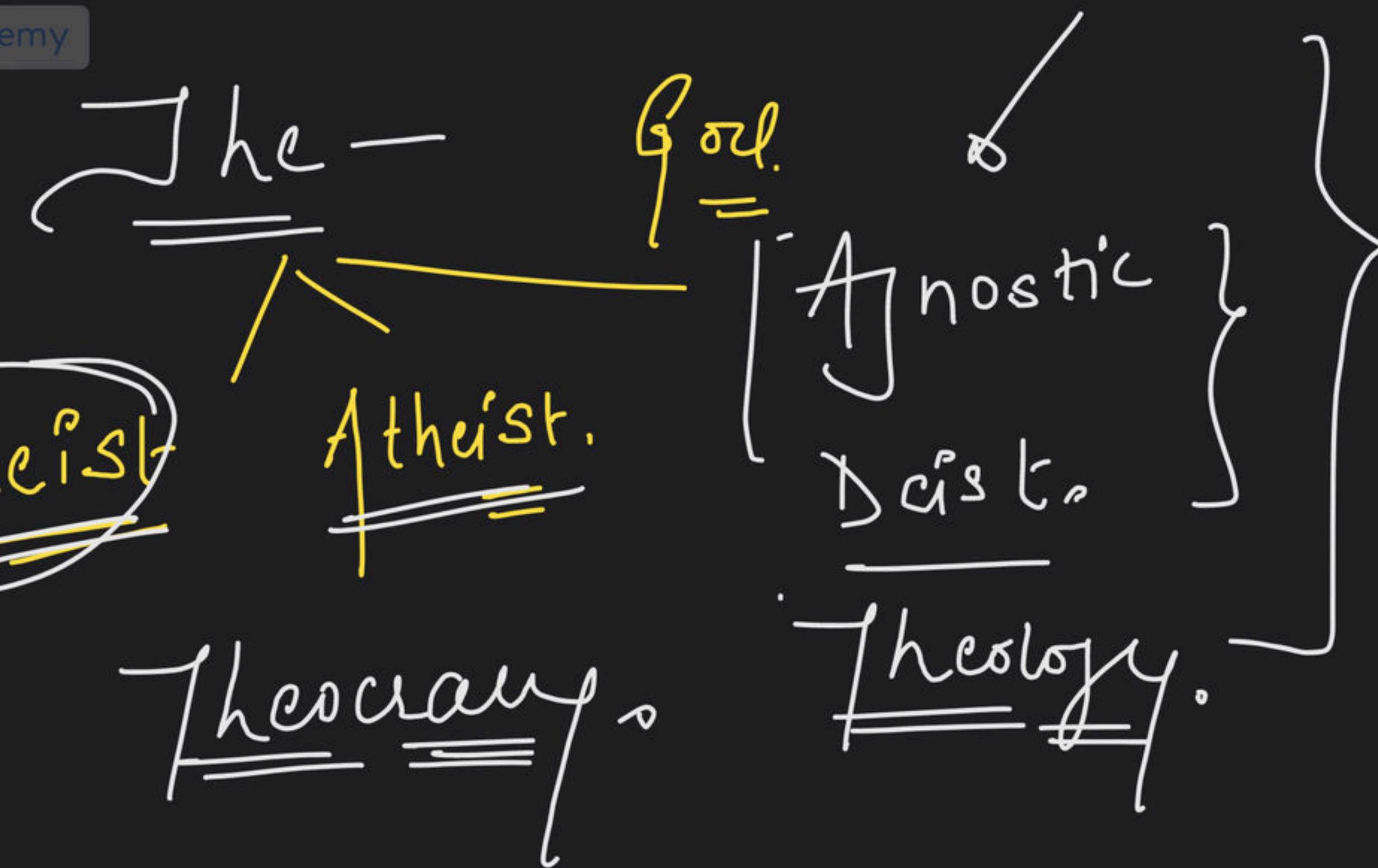
384

$$\frac{9}{0 \times 0-1} \times (0 \times 10) = 90$$

781 ~~781~~ $\sqrt{81}$

$$\frac{8}{0-9} \times \frac{9}{0-9} \times \frac{9}{0-9} = \frac{648}{81-9}$$

Theist



~~0|1|2~~

< -> < -> ~~1|0|0~~

[Smallest ③]

~~0~~

1 0

8 0

0 8

1 9 1 7 + 1 0 .)

1

1 1

8 1

Jotai \Rightarrow

3 \times 3 = 9

2

1 2

8 2

0|1|2

0|1|2

OB cases

0

0 \Rightarrow -1

0 8

0 | 1 | 2

○ < + | <

158

$$\begin{array}{r} 3 \\ \times 3 \times 3 \\ \hline 0112 \end{array}$$

27

~~9112~~

$$\text{LM} = 10^6 \quad \text{LB} = 10^9$$

$$0 < N < 10,000$$

$$\begin{array}{r}
 3 \\
 - \\
 \underline{3} \\
 - \\
 0
 \end{array}
 \quad
 \begin{array}{r}
 3 \\
 - \\
 \underline{3} \\
 - \\
 0
 \end{array}
 \quad
 \begin{array}{r}
 3 \\
 - \\
 \underline{3} \\
 - \\
 0
 \end{array}
 \quad
 \begin{array}{r}
 3 \\
 - \\
 \underline{3} \\
 - \\
 0
 \end{array}
 \quad
 34 - 81 = -47$$

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.

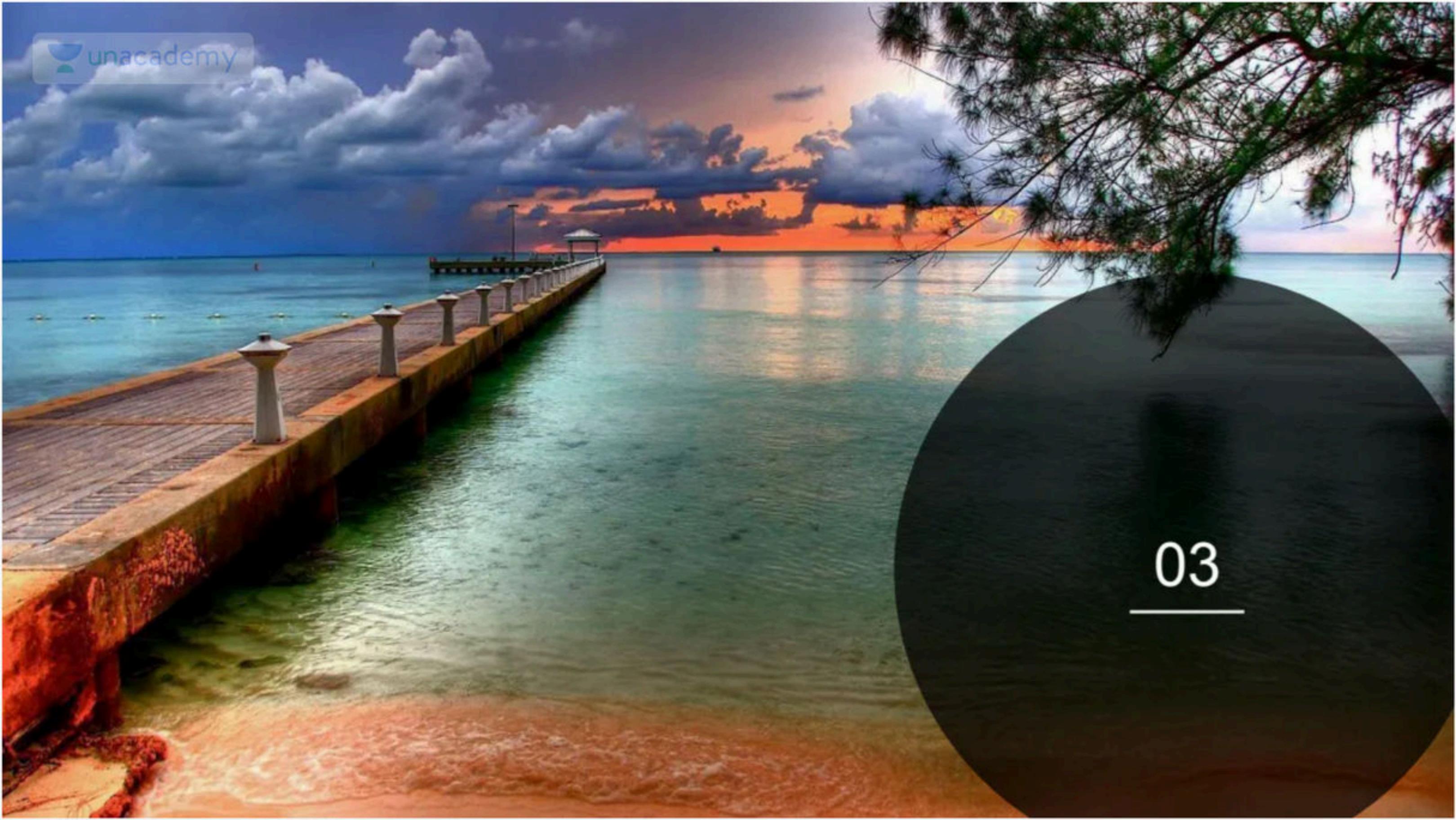


02



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

$$0 < \text{Number} < 1,000,000$$

$$\begin{array}{ccccccccc} 3 & 3 & 3 & 3 & 3 & 3 & \rightarrow & 3 \\ \underline{+} & \underline{+} & \underline{+} & \underline{+} & \underline{+} & \underline{+} & & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 & - & 1 \\ & & & & & & \underline{\underline{\underline{\underline{\underline{+}}}}} & \\ & & & & & & & 7 & 2 & 9 & 1 : 728 \end{array}$$

~~Q - DIGIT X 10.~~

1083.

2

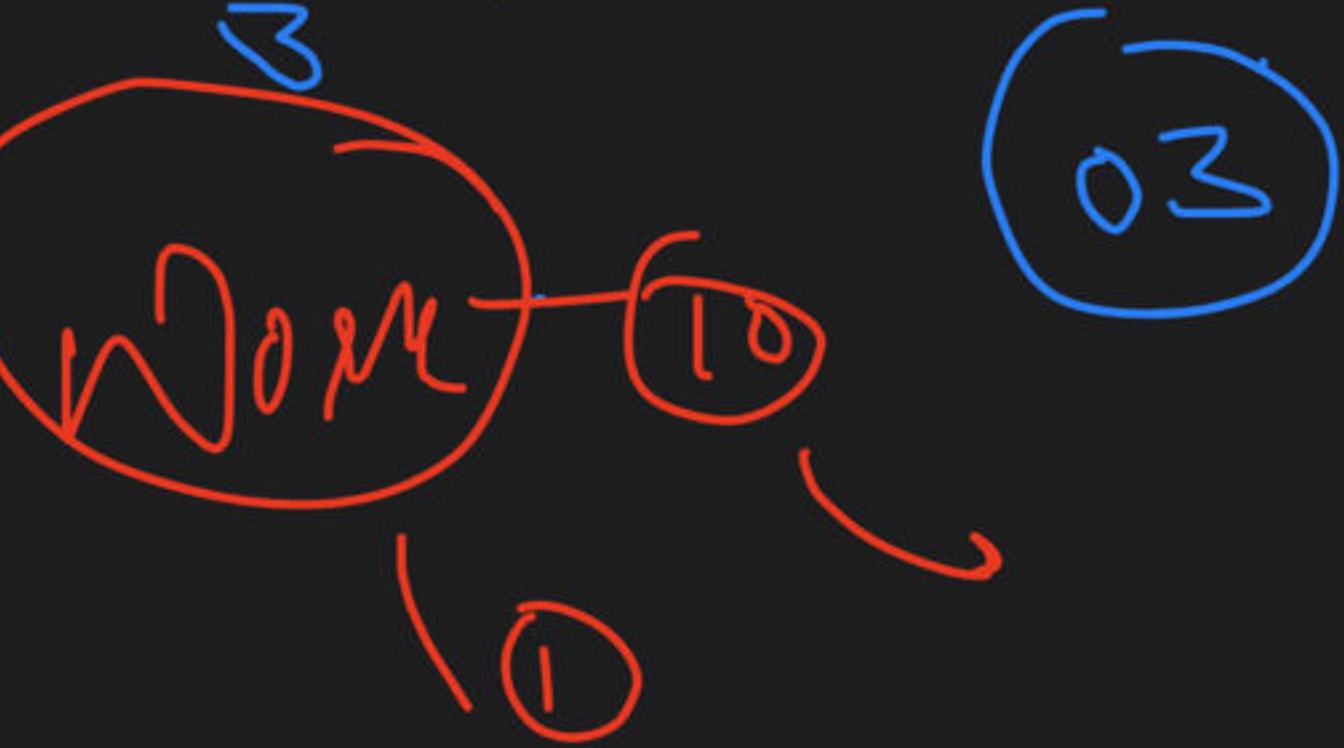
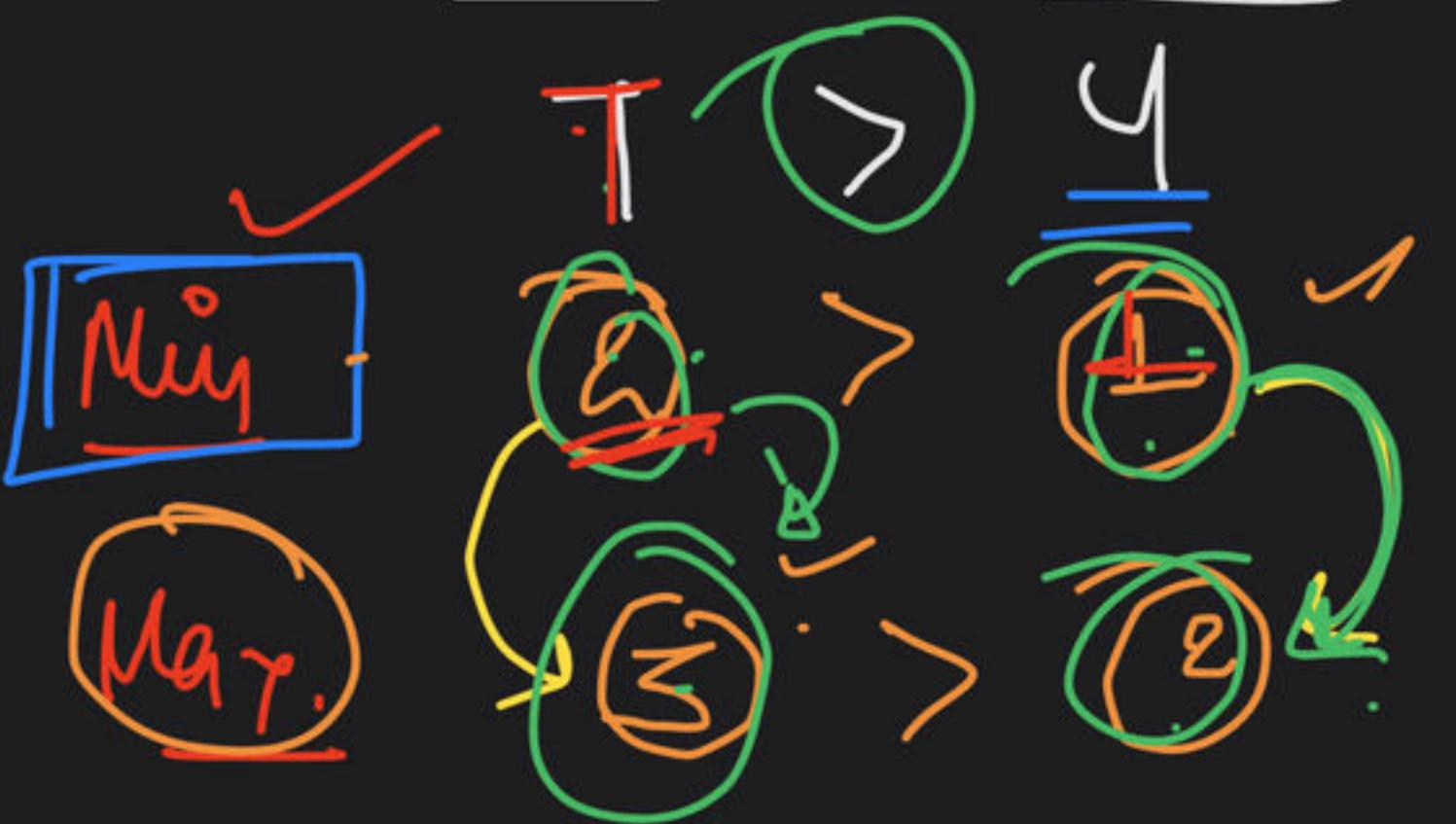
1

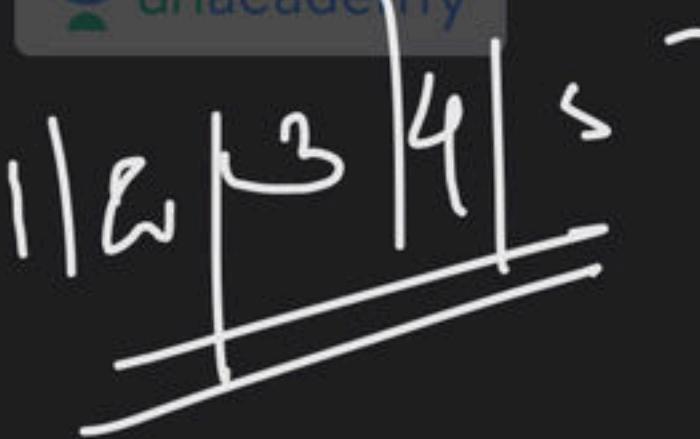
= 02

8 | 3

1
—
3

2
—
9





TEST

$$\frac{2}{4} > \frac{1}{5}$$

$$\frac{3}{4} - \frac{2}{1}$$

$$4 > 4$$

$$4 \times 1 = 4$$

$$(4+3+2+1) = 10$$

$$\frac{4}{2} > \frac{1}{3}$$

$\Rightarrow 4 > 1$

$$\frac{3}{3} > \frac{2}{2}$$

$\Rightarrow 3 = 3$

$$\frac{3}{4} < 1$$

$$\begin{array}{r} 8 \\ \hline 8 - 9 \\ \hline 1 \\ \hline 7 \\ \hline 3 - 9 \\ \hline 6 \\ \hline 1 \\ \hline 9 \end{array}$$

Diagram illustrating the subtraction process:

- Step 1: $8 - 9$ (Result: 1)
- Step 2: $3 - 9$ (Result: 2)
- Step 3: $6 - 9$ (Result: 3)

$$\frac{1}{2} \cdot 8 \cdot 9$$

36

==

1 2 3 | 4

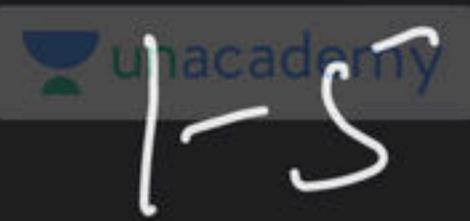
1 7 > 4

$$\begin{array}{r} 4 \\ \hline 1-4 \\ 4 \end{array} \xrightarrow{\text{3}} \frac{3}{3|4} \Rightarrow \boxed{1}$$

$$\begin{array}{r} 4 \\ \hline 1-9 \\ 4 \end{array} \xrightarrow{\text{1}} \frac{1}{\boxed{3}}$$

$$\begin{array}{r} 4 \\ \hline 1-9 \\ 4 \end{array} \xrightarrow{\text{2}} \frac{2}{3|4} \Rightarrow \boxed{2}$$

$$4(3+2+1) = 24$$



$$5 \times (4+3+2+1)$$

$$\begin{array}{r} 1 \\ - 5 \\ \hline \end{array}$$

$$= \boxed{25}$$

$$\begin{array}{r} 5 \\ 4 \\ \hline 1 \\ & 4 \\ & > \textcircled{1} \\ \hline 1 - 5 \\ \& 5 \\ \hline 1 - 5 \\ & 3 \\ & > \textcircled{2} \\ \hline 3 - 5 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ 4 \\ \hline 1 \\ & 4 \\ & > \textcircled{3} \\ \hline 4 - 5 \\ \hline 5 \\ & 1 \\ & > \textcircled{4} \\ \hline 5 \\ \hline \end{array}$$

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

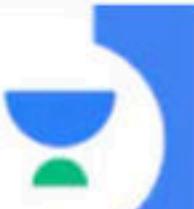




Using the digits : (1) 1,2,3,4,5,6,7,8 and 9 (2) 0, 1,2,3,4,5,6,7,8 and 9
how many three digit numbers can be formed , such that it must have
:

- (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:

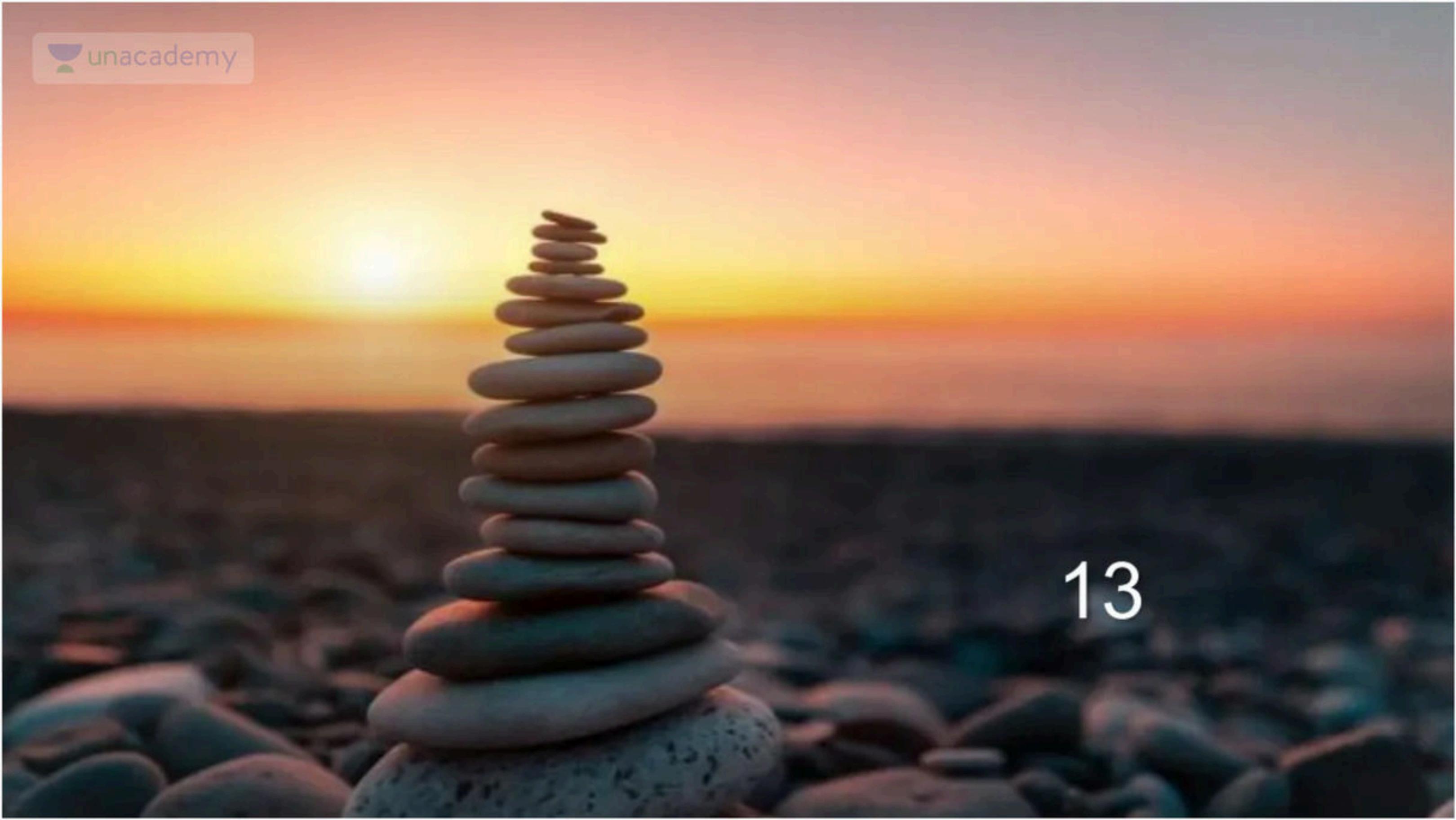
- (A) All the letters are taken.
- (B) The letter G always occupies the first place.
- (C) The letters P and E respectively occupy the first and last places.
- (D) All the vowels are always together.
- (E) How many words of 5 letters each can be formed each containing 3 consonants and 2 vowels?
- (F)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





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.

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

[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 small blue and white triangular road sign. The foreground is dark, while the sky above is filled with numerous stars and some faint clouds.

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



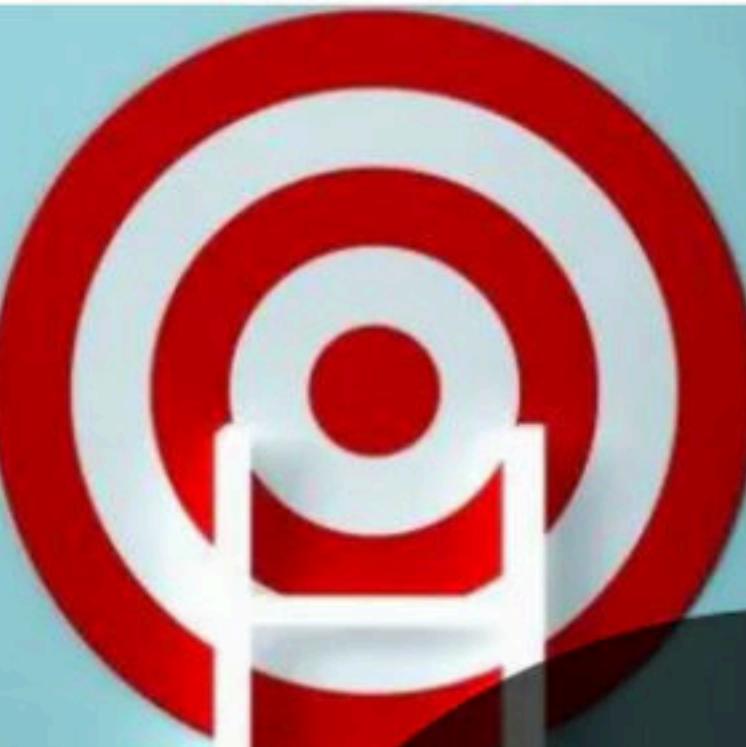
Find the number of :

- (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?

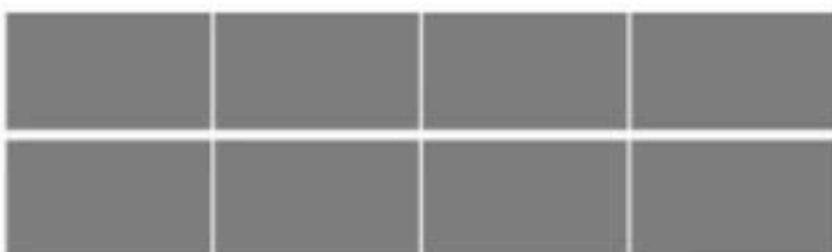


28



A 2×4 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)]