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Volume - 3

Reasoning & Computer Aptitude

SIERRA INNOVATIONS

INDEX

1 CHAPTER

Arrangement and Pattern (Alphabet & Number Series)

Introduction of Alphabet

- This chapter includes questions based on the English alphabet (A – Z). Candidates should know the positions of all 26 letters and basic related concepts clearly.
- **Letters are of two types:**
  - ✓ **Vowels –** A, E, I, O, U (There are 5 vowels in the English alphabet.)
  - ✓ **Consonants –** B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z (There are 21 consonants in the English alphabet.)
- **The alphabet is divided into two halves:**
  - ✓ **First Half –** A to M (The first half contains 13 letters, i.e., positions 1 to 13.)
  - ✓ **Second Half –** N to Z (The second half contains 13 letters, i.e., positions 14 to 26.)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Short trick:

- **EJOTY (इजोटी)**

5	10	15	20	25
E	J	O	T	Y

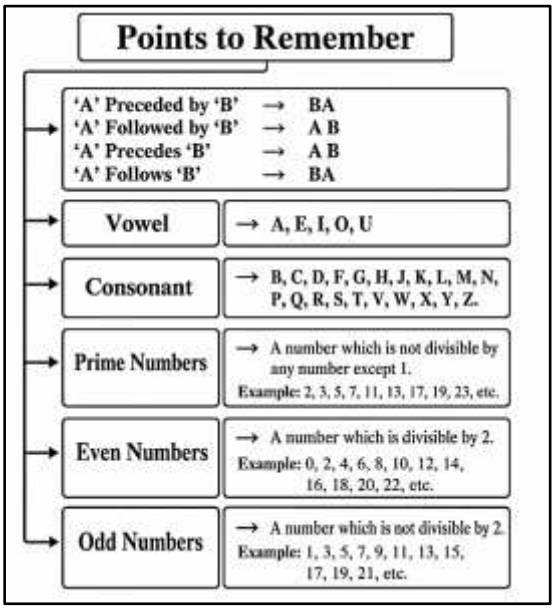
- **CFILORUX (सिफिलोरक्स)**

3	6	9	12	15	18	21	24
C	F	I	L	O	R	U	X

- **Finding letters from the right side can be simplified using the formula:**
  - ✓ Position from left = 27 − Position from right
- **Trick to Remember Opposite Letters**

Pair	**AZ**	**BY**	**CX**	**DW**	**EV**	**FU**	**GT**
Trick	**AZ**	**BY**e	Cracks	**D**e**W**	**EV**ening	Few / Uff	**G.T**. Road

Pair	**HS**	**IR**	**JQ**	**KP**	**LO**	**MN**
Trick	**H**igh **S**chool	**I**ndian **R**ailway	**J**aipur **Q**ueen	**K**an**P**ur	**L**ife **O**K	**M**a**N**



Type 1: Dictionary or Alphabet Based

Ex: In the given word "AUTHORISE" replace the consonants with the succeeding letter as per the English alphabet series and vowel with their preceding letter as per the English alphabet series. Then arrange the letters in reverse alphabetical order from right to left. Which of the following letter is third from the left end after arrangement?

Sol:

- ✓ **According to Questions:**
  - Vowel → Previous letter
  - Consonant → Next letter
  - "Reverse alphabetical from right to left" Same as A → Z from left

✓ **Apply this Rule:**

AUTHORISE

A U T H O R I S E

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

Z T U I N S H T D

✓ **New word**: Z T U I N S H T D

✓ **Arrange (A → Z from left)**

D H I N S T T U Z

✓ **Answer** → 3rd from left = I

Exam Tip

For phrase **"reverse alphabetical order from right to left"**, arrange **Z to A starting from the right side**. So, from the **left side**, it appears as **A to Z**.

Ex: **Read the following information carefully and answer the given questions: If it is possible to make a meaningful four-letter English word from the third, fifth, sixth, and eighth from the left end of the word "DIABETES", then which of the following will be the second letter of that word from the right end? If more than one such word can be made then give 'Z' as the answer and if no such word can be formed then give 'X' as the answer.**

Sol:

✓ **Trick:** Find positions → Pick letters → Make words

✓ **Rule**:

- **Only 1 word** → answer the asked letter
- **More than 1 word** → answer **Z**
- **No word** → answer **X**

✓ **Word:** DIABETES

D	I	A	B	E	T	E	S
1	2	3	4	5	6	7	8
		↑		↑	↑		↑
		A		E	T		S

✓ **Possible meaningful words**: EATS, SEAT, EAST, TEAS, SATE

✓ More than one word can be formed.

Exam Tips

Do not stop after finding one word. Check whether **more than one meaningful word** can be made.

Ex: In the following question, five different words are given in the options. Along with each word, positions of four letters in that word are given and the positions of the letters are counted from the left end of the word. Four lettered meaningful word can be formed from the letters corresponding to the positions given in each option without jumbling the letters. Which of the following options will give a meaningful English word?

(A) Claustrophobia - 2, 7, 12, 14

(B) Photosynthesis - 2, 7, 8, 12

(C) Incomprehensive - 3, 4, 10, 12

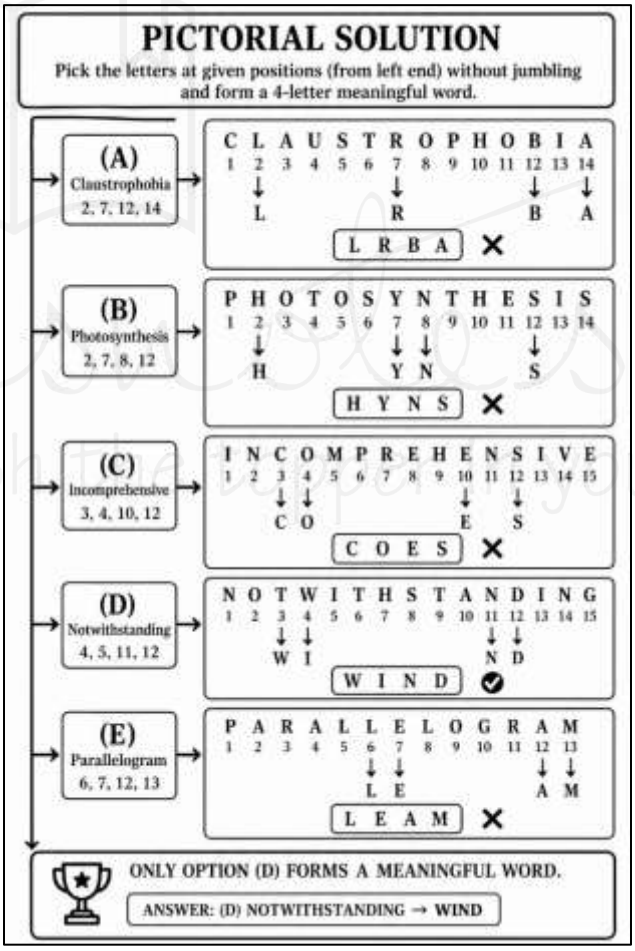
(D) Notwithstanding - 4, 5, 11, 12

(E) Parallelogram - 6, 7, 12, 13

Sol:

✓ **Trick**: Count positions → Pick letters → Do not jumble → Check word

✓ Meaningful word must be formed **in the same order**.



Ex: There are four words given in each option that follows a certain logic, if the second letter from the left of each word is taken then a meaningful word can be formed, find the odd one which does not follow the same pattern.

Sol:

- ✓ **Trick:** Take the **2nd letter from the left** of each word.
- ✓ If those 4 letters form a meaningful word → it follows the pattern.
- ✓ The option that does **not** form a meaningful word is the **odd one**.
- ✓ **Second letter from left from each word is**
  - **In option-1-** P, I, A, R → Meaningful word is PAIR.
  - **In option-2-** T, P, E, S → Meaningful word is PEST.
  - **In option-3-** B, D, I, R → Meaningful word is BIRD.
  - **In option-4-** R, T, U, H → Meaningful word is HURT.
  - **In option-5-** X, B, H, Y → No meaningful word.

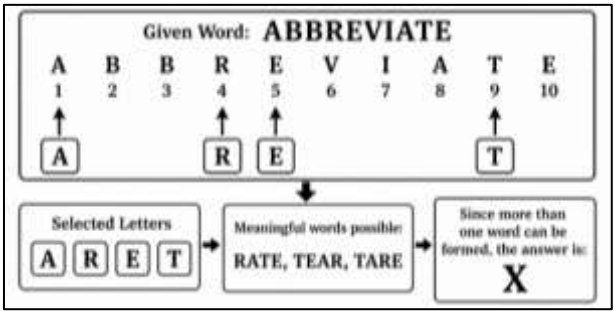
Hence, option-5 is odd.

Exam Tips
Second letters only → Make 4 - letter word → Odd option = no meaningful word

Ex: If it is possible to make only one 4 letters meaningful word without repetition from the first, fourth, fifth, and the ninth letters of the word 'ABBREVIATE', which would be the second letter of the word? If more than one such word can be formed, give X as the answer. If no such word can be formed, give K as your answer.

Sol:

- ✓ **Trick:** Pick letters → Make 4-letter word → Check count



Exam Tips
Only 1 word → 2nd letter More than 1 → X No word → K

Type 2: Random Sequence of Alphabets

Ex:

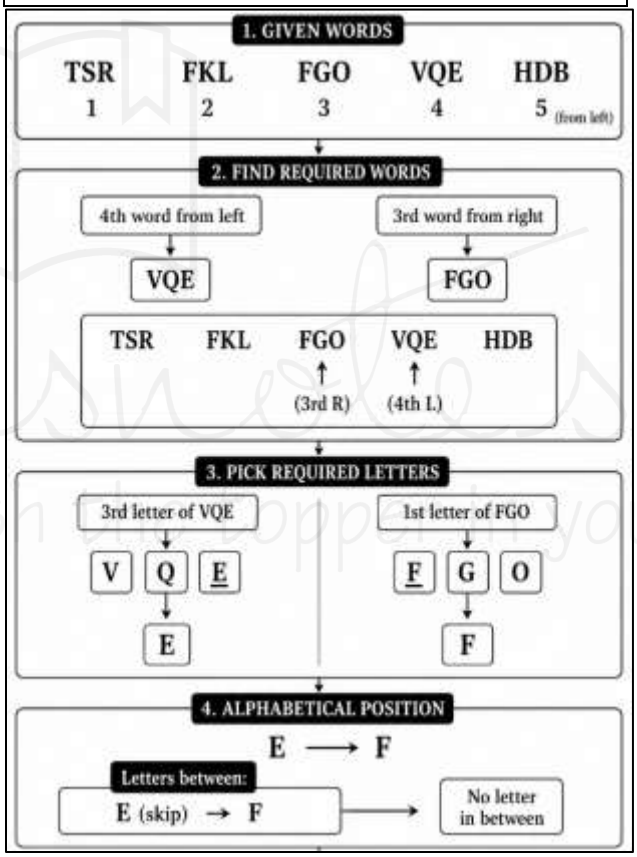
Direction: Following questions are based on five words given below: TSR FKL FGO VQE HDB

(The new words formed after performing the mentioned operations may or may not necessarily be meaningful English words)

How many letters are there in between the third letter of the fourth word from the left end and first letter of the third word from the right end as per the alphabetical series?

Sol:

Trick: Always break the question into 3 parts 1. Identify word position 2. Pick required letters 3. Count letters between them (A–Z series)



Ex: If all the letters of the word "FRONTIER" are arranged in alphabetical order starting from the left end, then how many letters are there in English alphabets between the letters which are fifth from the right end and fourth to the left of the seventh letter from the left end?

Sol:

Trick:
1. Arrange letters in A → Z
2. Identify positions carefully
3. Convert both letters to alphabetical positions
4. Count letters BETWEEN (not including ends)

Given Word - FRONTIER

If all the letters of the word "FRONTIER" are arranged in alphabetical order starting from the left end, then we get → EFINORRT

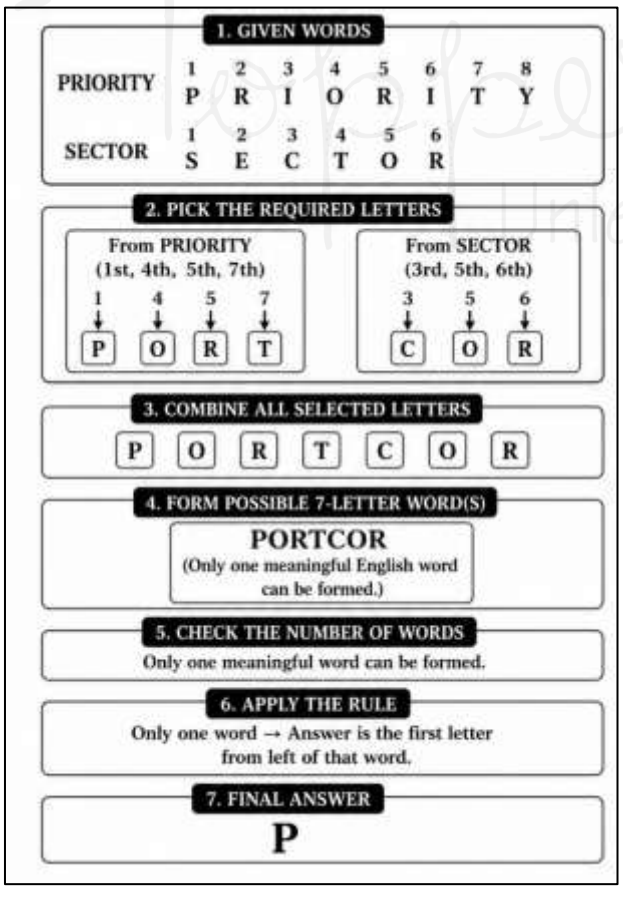
N is **fifth from the right** end and **I** is **fourth to the left of the seventh letter** from the **left end that is R.**

There are **four letters between I and N** in alphabetical order. (J, K, L and M)

Hence, the correct answer is Four.

Ex: If it is possible to make only one seven letter meaningful English word with the 1st, 4th, 5th, and 7th letter of the word PRIORITY and 3rd, 5th, and 6th letter of the word SECTOR, which of the following will be the first letter from left of that word? If no such word can be made give 'X' as the answer and if more than one such word can be made give 'Y' as the answer.

Sol:



Type 3: General Series of Alphabets

Ex:

Direction: Study the following series carefully and answer the question given below.

M F J O L Q W E R T Y U P A H D G I N X Z C V B S K

How many vowels are there in the given series which is immediately followed by a letter which comes after 'M' in alphabetical series?

Sol:

Given series: M F J O L Q W E R T Y U P A H D G I N X Z C V B S K

Vowels which is immediately followed by a letter which comes after 'M' in alphabetical series

M F J O L Q W E R T Y U P A H D G I N X Z C V B S K

Hence there are 'three' vowels which are immediately followed by a letter which comes after 'M' in alphabetical series.

Ex:

Direction: Read the following information carefully and answer the given questions below;

G M Z P Q R S U T A B I J K O N S P C E D F A H L G I M S V P O

How many elements are there between the 15th element from the left end and 23rd element from the right end?

Sol:

Series: G M Z P Q R S U T A B I J K O N S P C E D F A H L G I M S V P O

15th element from the left end is O and **23rd element from the right end is A.**

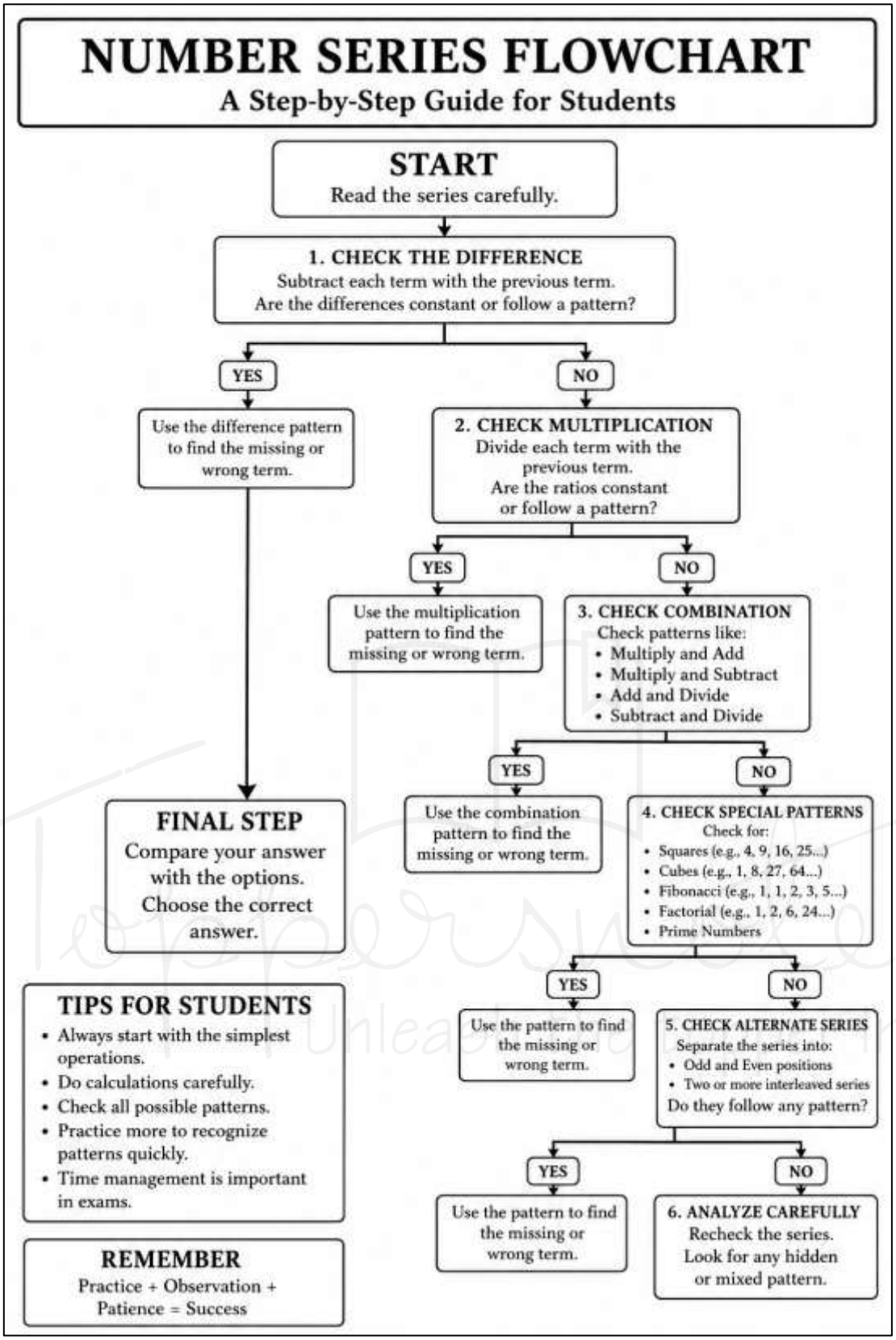
G M Z P Q R S U T **A** B I J K **O** N S P C E D F A H L G I M S V P O

There are only 4 elements between the 15th element from the left end and 23rd element from the right end.

Hence, the answer is Four.

Introduction of Number Series

A series is a systematic arrangement of numbers or letters within a defined group. In competitive exams, sequences of numbers, letters, or a mix of both are presented. One position in the sequence is either left blank or contains an incorrect number or letter. Candidates are tasked with completing the series by selecting the correct option to fill the blank or identify the incorrect element.



Here's a clearer and concise way to solve number series problems:

- **Look for Patterns**: Check if the numbers are increasing or decreasing by a constant (addition/subtraction) or multiplied/divided by a constant (multiplication/division).
- **Find Differences**:
  - ✓ If the difference between consecutive numbers is the same, it's an arithmetic series (e.g., 2, 5, 8, 11).
  - ✓ If the second difference (difference of differences) is constant, it's a quadratic series.

- **Check for Multiplication/Division**: Look if each number is multiplied or divided by a constant to get the next number (e.g., 3, 6, 12, 24 where each number is doubled).
- **Recognize Special Sequences**:
  - ✓ **Squares**: 1, 4, 9, 16, ...
  - ✓ **Cubes**: 1, 8, 27, ...
  - ✓ **Fibonacci**: Each number is the sum of the two preceding ones (e.g., 0, 1, 1, 2, 3, 5).
- **Check for Ratios**: If the numbers increase by a constant ratio, it's a geometric progression (e.g., 2, 4, 8, 16).
- **Test the Options**: If options are provided, check which one follows the identified pattern.

Type 1: Number Arrangement

Ex:

Direction: The following questions are based on the five three-digit numbers given below.

483 396 625 834 967

If 2 is added to the last digit of each number and then the positions of the first and the second digits are interchanged, which of the following will be the highest number?

Sol:

Given series: 483 396 625 834 967

Adding 2 to the last digit: 485 398 627 836 969

Interchanging first and the second digit: 845 938 267 386 699

So, 938 is the highest number which came from 396.

Ex:

Direction: The following questions are based on the five three-digit numbers given below;

824 625 769 983 726

How many numbers are greater than that the average of all the five numbers?

Sol:

Trick: Find Average → Compare each number → Count greater numbers

(824 + 625 + 769 + 983 + 726) ÷ 5 → 785.4

824 > 785.4 → **Smaller Than**

625 < 785.4 → Greater Than

769 < 785.4 → Greater Than

983 > 785.4 → **Smaller Than**

726 < 785.4 → Greater Than

Greater numbers: 824, 983

Answer: (C) 2

Ex:

Directions: Read the given information carefully and answer the following questions.

If 2 is added to each of the odd digits,3 is subtracted from each of the even digits and we eliminate the second and third terms from the right side in the number '7516438', then the sum of prime numbers is.

Sol:

Given number: 7516438

According to the question,

Number given	7	5	1	6	4	8
Odd digit → (+2) Even digit → (−3)	(+2	(+2)	(+2)	(−3)	(−3)	(−3)
Resultant number	9	7	3	3	1	5

So, the difference between the greatest and smallest digits in the new number thus formed → $9 - 1 = 8$

Hence, "Option 1" is the correct answer.

Type-2: Series in Increasing Order

Ex: In the following question, select the missing number from the given series.

169, 196, 225, 256,_?

1. 289 2. 324

3. 441 4. 361

Ans:

169 196 225 256 **289**

+27 +29 +31 +33

Ex: Which of the following numbers will replace the question mark (?) in the given series?

235, 271, ?, 349, 391, 435

1. 311 2. 307

3. 313 4. 309

Ans:

235 271 **309** 349 391 435

+36 +38 +40 +42 +44

+2 +2 +2 +2

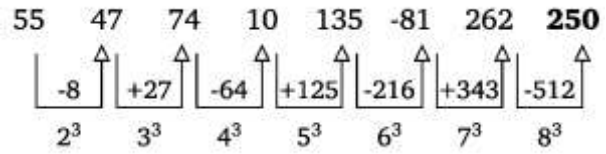
Ex: What number should replace question Mark (?) in the series given below.

55, 47, 74, 10, 135, -81, 262, ?

1. 774 2. -250

3. 343 4. -343

Ans:



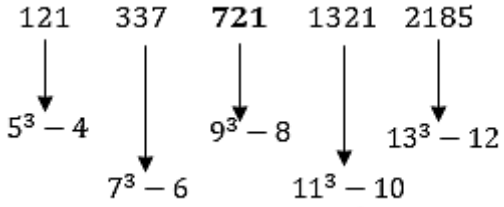
Ex: Find the missing number in the following series:

121, 337,?, 1321, 2185

1. 713 2. 720

3. 721 4. 737

Ans:



Type-3: Multiplication Based Increasing Series

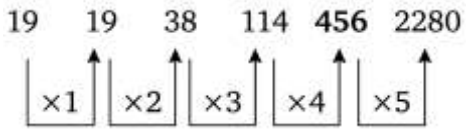
Ex: Select the number from among the given options that can replace the question mark (?) in the following series.

19, 19, 38, 114, ?, 2280

1. 344 2. 1140

3. 456 4. 224

Ans:



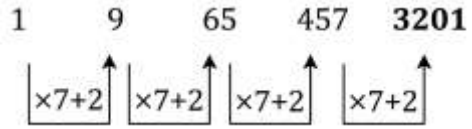
Ex: Which of the following numbers will replace the question mark (?) in the given series?

1, 9, 65, 457, ?

1. 4258 2. 3125

3. 3201 4. 5289

Ans:



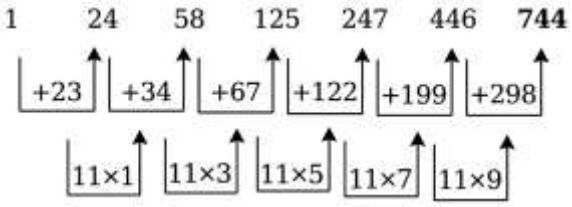
Ex: Which of the following numbers will replace the question mark (?) in the given series?

1, 24, 58, 125, 247, 446, ?

1. 774 2. 747

3. 744 4. 777

Ans:



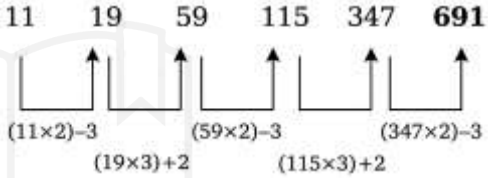
Ex: Select the number from among the given options that can replace the question mark (?) in the following series.

11, 19, 59, 115, 347, ?

1. 697 2. 619

3. 679 4. 691

Ans:



Type- 4: Addition and Subtraction Series

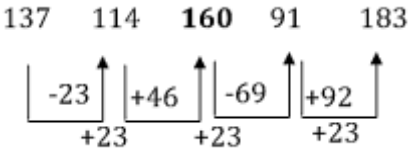
Ex: Which of the following number will replace the question mark (?) in the given series?

137, 114, ?, 91, 183

1. 145 2. 160

3. 125 4. 112

Ans:

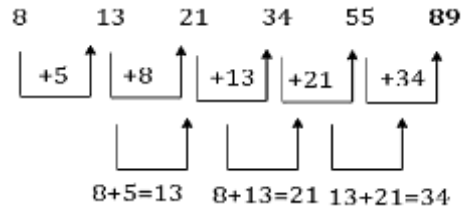


Ex: Which of the following numbers will replace the question mark (?) in the given series?

8, 13, 21, 34, 55, ?

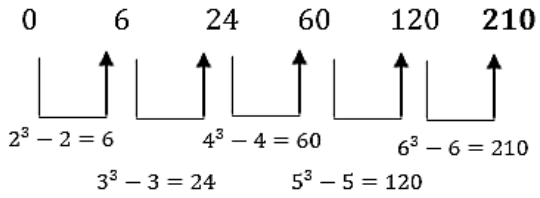
1. 74 2. 68 3. 72 4. 89

Ans:

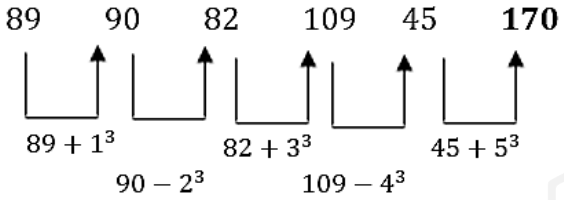


Type- 5: Square and Cube Based Series

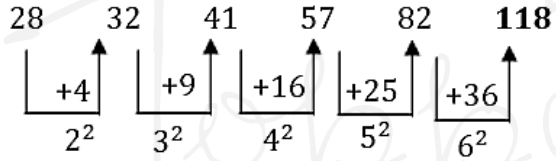
Ex: Find the next term of the series:
0, 6, 24, 60, 120, ?
1. 180 2. 210
3. 216 4. 240
Ans:



Ex: Which number will replace the question mark (?) in the following series?
89, 90, 82, 109, 45, ?
Ans:

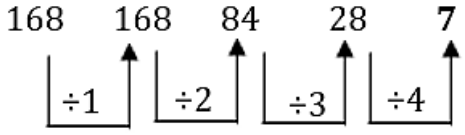


Ex: Which number will replace the question mark (?) in the following series?
28, 32, 41, 57, 82, ?
Ans:

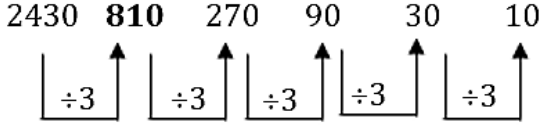


Type- 6: Division Based Decreasing Series

Ex: Which number will replace the question mark (?) in the following number series?
168, 168, 84, 28, ?
Ans:



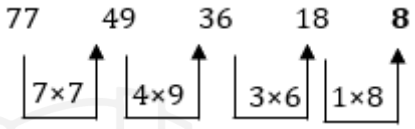
Ex: Which number will replace the question mark (?) in the following series?
2430, ?, 270, 90, 30, 10
Ans:



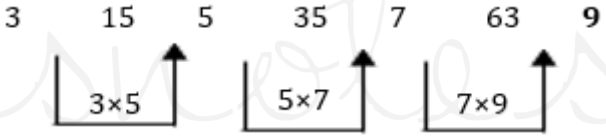
Type- 7: Mixed Number Series

Ex: Find the next terms 11,13,17,19, 23,_?
1. 27 2. 29
3. 31 4. 33
Ans:
11 → Prime number
13 → Prime number
17 → Prime number
19 → Prime number
23 → Prime number
Next prime number = 29

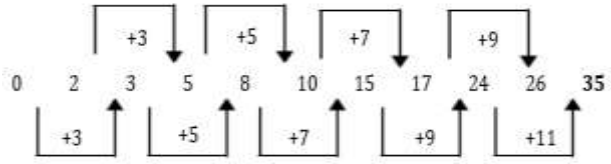
Ex: What will come in place of the question mark (?) in the following series?
77, 49, 36, 18, ?
1. 10 2. 12
3. 8 4. 16
Ans:



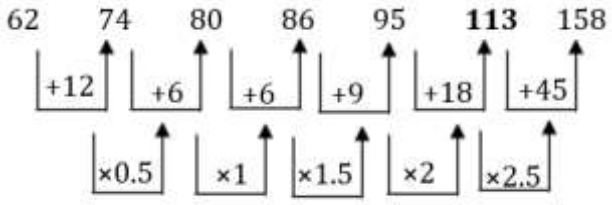
Ex: What will come in place of the question mark (?) in the following series?
3, 15, 5, 35, 7, 63, ?
1. 10 2. 126
3. 9 4. 84
Ans:



Ex: In the following series, what comes in place of the question mark (?)?
0, 2, 3, 5, 8, 10, 15, 17, 24, 26, ?
1. 28 2. 30
3. 32 4. 35
Ans:



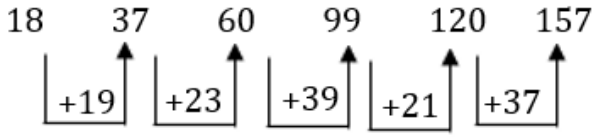
Ex: Select the number from among the given options that can replace the question mark (?) in the following series.
62, 74, 80, 86, 95, ?, 158
1. 113 2. 100
3. 108 4. 122
Ans: The correct answer is 113



Ex: Find the wrong number in the FIRST series and then find the value of the following question.
(i) 455, 212, 131, 104, 94
(ii) Analyze the series and find the missing number (The exact place of the missing number is not known it can be on 1st, 2nd... 6th position) 57, 82, 167, 231, 312
1. Wrong term's position from left.
2. Find the position of the missing term from the right side.
Ans:
First Series:
455-212=243 = 3^5
212-131=81 = 3^4
131-104=27 = 3^3
104-95 = 3^2
95-92 = 3^1 (Wrong term 5^{th} from left)
Second Series:
57 + 5^2 = 82
82 + 6^2 = 118 (Missing term 4^{th} from right)
118 + 7^2 = 167
167 + 8^2 = 231
231 + 9^2 = 312

Type- 8: Finding the Wrong Term in a Series

Ex: Find the wrong number in the following series
18, 37, 60, 99, 120, 157
1. 18 2. 37
3. 60 4. 99
Ans:



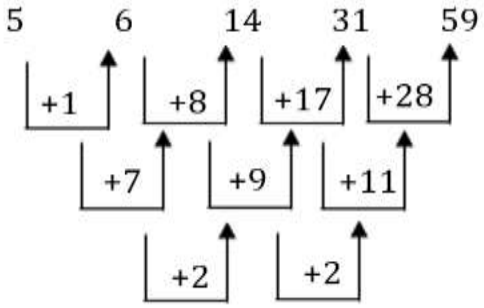
Logic used: (+) Increasing prime
18+19=37 37 +23=60
60+29=89 89+31=120
120+37=157
But given number is 99 instead of 89.
So, wrong number is 99.

Ex: Find the wrong number in the following series
2, 5, 14, 41, 124, 371
1. 14 2. 41
3. 371 4. 2
5. 124
Ans:
2 × 3 -1 = 5 5 ×3 - 1 = 14
14 × 3 - 1 = 4141 × 3 - 1 = 122 (Not 124)
122 × 3 - 1 = 365
Wrong number = 124

Ex: In the following number series, a wrong number is given. Find out the wrong number.
781, 783, 793, 791, 805, 800
1. 783 2. 793
3. 791 4. 805
5. 800
Ans:
156 × 5 + 1 = 781 157 × 5 - 2 = 783
158 ×5 + 3 = 793 159 × 5 - 4 = 791
160 × 5 + 5 = 805 161× 5 - 6 = 799
Wrong number in the given series is 800

Ex: Find the wrong number in the following series
2, 12, 66, 404, 2828, 22716
1. 2 2. 404
3. 2828 4. 22716
5. 12
Ans:
Each term is obtained by multiplying the previous term with successive numbers (4, 5, 6, 7, 8) and then adding successive even numbers (4, 6, 8, 10, 12).
2 × 4 + 4 = 8 + 4 = 12
12 × 5 + 6 = 60 + 6 = 66
66 × 6 + 8 = 396 + 8 = 404
404 × 7 + 10 = 2828 + 10 = 2838
2838 × 8 + 12 = 22704 + 12 = 22716
The wrong number is 2828.

Ex: Find the wrong term from the given number series.
5, 7, 14, 31, 59
1. 31 2.5
3. 59 4.7
Ans: Correct answer in 7



In the place of 6, it is written 7, so the answer is 7.

Ex: Find the Wrong number in the given number series:

6, 7, 10, 13, 21, 37

1. 10 2. 37
3. 6 4. 13
5. 21

Ans:

The given number series follows the pattern:

$6 + 2^0 = 7$ $7 + 2^1 = 9$

$9 + 2^2 = 13$ $13 + 2^3 = 21$

$21 + 2^4 = 37$

Wrong Number in the given number series is 10.

Mixed Series

Ex: A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

FK27, LQ64, RW125, ?

1. CX216 2. XB216
3. XC216 4. YB343

Ans:

Letters follow +6 steps in the alphabet

F → L → R → X and K → Q → W → C (after Z it starts from A)

Numbers are cubes of consecutive numbers

$27 = 3^3$, $64 = 4^3$, $125 = 5^3$, $216 = 6^3$

Final answer XC216

Ex: Find the missing term. C4X, F9U, 116R,

1. L25P 2. L250
3. L270 4. L27P

Ans:

First part (letters):

C → F → I → L (each +3)

Second part (numbers):

4 → 9 → 16 → 25 (perfect squares 2^2, 3^2, 4^2, 5^2)

Third part (letters):

X → U → R → O (each −3)

So, the missing term is L25O

Ex: What will be the next term in the following category?

G7Z26, H8X24, I9V22, _____?

1. J10T20 2. W23J10
3. J10W23 4. W23T20

Ans:

First letter: G → H → I → J (+1 each step)

Number: 7 → 8 → 9 → 10 (+1 each step)

Second letter: Z → X → V → T (−2 each step)

Last number: 26 → 24 → 22 → 20 (−2 each step)

Final answer: J10T20

2 CHAPTER

Coding – Decoding

General Introduction

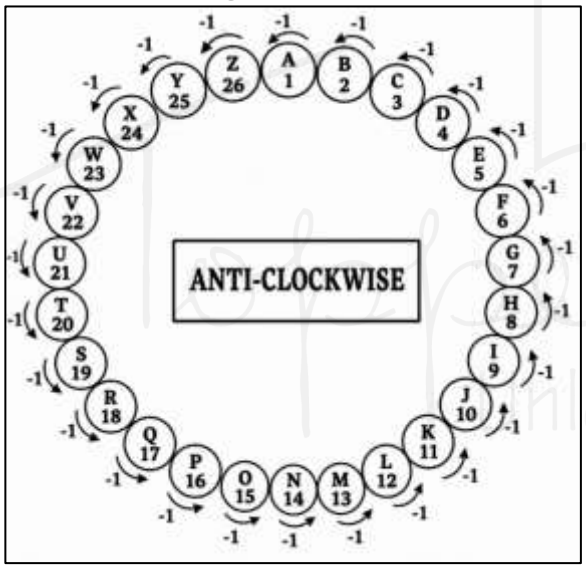
- Coding-decoding is a way of changing a message into a secret form before sending it, so that anyone who doesn't know the key can't understand it.
- **Positional Value of Alphabets in forward direction:**

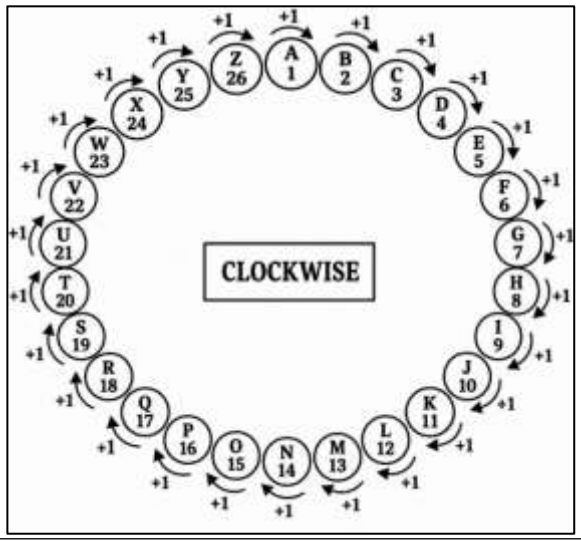
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

- **Positional Value of Alphabets in Forward Direction:**

ALPHABET	Z	Y	X	W	V	U	T	S	R	Q	P	O	N	M	L	K	J	H	G	F	E	D	C	A
REVERSE VALUE	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	6	5	4	2	1

Circular Arrangement





Type 1: Letter Coding

In letter coding, the letters of a word are systematically substituted with other alphabets, following a specific rule like adding a subtracting and you have to deduce the code for another word by applying the same set of operations.

Ex: If in a certain code language, IMPETUS is written as JLQDUTT and PENSIVE is written as QDORJUF, then how will CHANGED be written in that language?

Sol:

The pattern followed here is:

I	M	P	E	T	U	S
+1	-1	+1	-1	+1	-1	+1
J	L	Q	D	U	T	T

and

P	E	N	S	I	V	E
+1	-1	+1	-1	+1	-1	+1
Q	D	O	R	J	U	F

Similarly,

C	H	A	N	G	E	D
+1	-1	+1	-1	+1	-1	+1
D	G	B	M	H	D	E

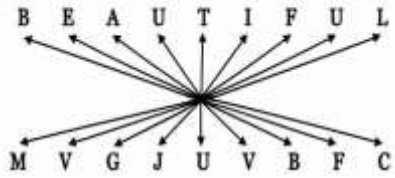
Hence, DGBMHDE is the correct answer.

Ex: If in a certain code language BEAUTIFUL is coded as MVGJUVBFC, then how PHENOMENON will be coded in the same code language?

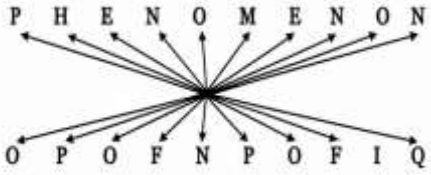
Sol:

The pattern which follows here is:

Addition of 1 in the positional value of each letter in the cross pattern.



Same pattern will be followed for PHENOMENON:



Hence, the correct answer is OPOFNPOFIQ.

Type-2: Opposite Letter Based Coding

Ex: In a specific code, if FLING is coded as UORMT, how will STICK be coded?

Sol:

- FLING → UORMT
  - ✓ F → U (Reverse of 6th letter of the alphabet)
  - ✓ L → O (Reverse of 12th letter of the alphabet)
  - ✓ I → R (Reverse of 9th letter of the alphabet)
  - ✓ N → M (Reverse of 14th letter of the alphabet)
  - ✓ G → T (Reverse of 7th letter of the alphabet)

Now applying this same logic to STICK:

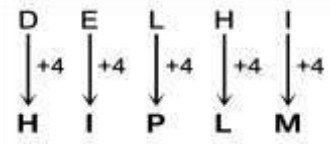
- STICK
  - ✓ S → H (Reverse of 19th letter of the alphabet)
  - ✓ T → G (Reverse of 20th letter of the alphabet)
  - ✓ I → R (Reverse of 9th letter of the alphabet)
  - ✓ C → X (Reverse of 3rd letter of the alphabet)
  - ✓ K → P (Reverse of 11th letter of the alphabet)

Thus, STICK will be coded as HGXRP.

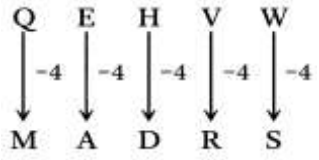
Type-3: Forward Order Letter Coding

Ex: If DELHI is coded as HIPLM, what will be the code for QEHVEW?

Sol:



Similarly,



Type-4: Ascending Order Letter Coding

Ex: In a certain code language, 'BEHOLD' is written as 'BDEHLO' and 'INDEED' is written as 'DDEEIN'. How will 'COURSE' be written in that language?

Sol:

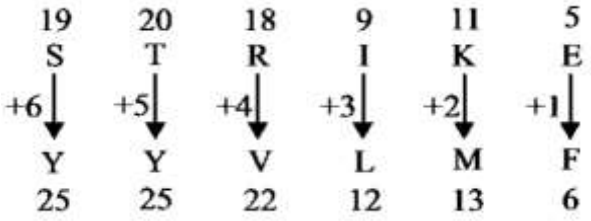
- BEHOLD → BDEHLO: The letters are rearranged by sorting the letters in ascending order: B, D, E, H, L, O:
  Rearranged output is: BDEHLO
- INDEED → DDEEIN: Rearranged output: DDEEIN

Now, following this pattern, COURSE will be written as CEORSU.

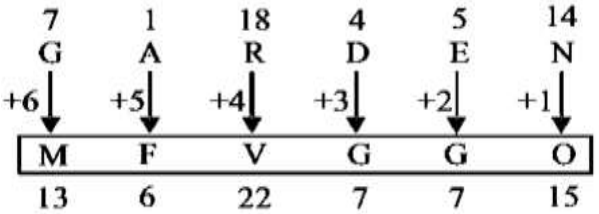
Type-5: Descending Order Letter Coding

Ex: In a certain code language, if 'STRIKE' is written as 'YYVLMF', how will 'GARDEN' be written in that language?

Sol: The first, second, third, fourth, fifth, and sixth letters of the word 'STRIKE' are in an increasing order of six, five, four, three, two, and one, but in a descending sequence.



Similarly,



Type-6: Consecutive Even Number Pattern Coding

Ex: In a certain code language, the word 'CLAIM' is written as 'EPGQW'. What will be the code for the word 'FIGHT' in the same code language?

Sol: The change from each letter of "CLAIM" to "EPGQW" follows a particular pattern:

1. C → E: C + 2 → E
2. L → P: L + 4 → P
3. A → G: A + 6 → G
4. I → Q: I + 8 → Q
5. M → W: M + 10 → W

Now, applying the same pattern to the word 'FIGHT':

1. F → H: F + 2 → H
2. I → M: I + 4 → M
3. G → M: G + 6 → M
4. H → P: H + 8 → P
5. T → D: T + 10 → D

So, the code for 'FIGHT' is 'HMMPD'.

Type-7: Decreasing Order Letter Coding

Ex: In a certain code language, if the word 'TRAIN' is coded as 'SQZHM', how will the word 'DATE' be coded in the same code language?

Sol:

Let's analyse the pattern used to encode the word "TRAIN" as "SQZHM":

1. T → S: T - 1 → S
2. R → Q: R - 1 → Q
3. A → Z: A - 1 → Z
4. I → H: I - 1 → H
5. N → M: N - 1 → M

So, each letter is shifted by -1 (decreased by 1).

Now, applying the same pattern to the word 'DATE':

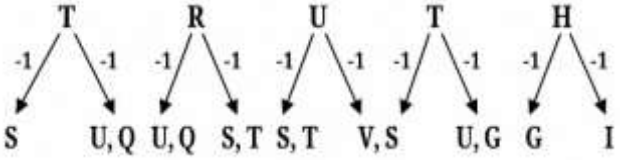
1. D → C: D - 1 → C
2. A → Z: A - 1 → Z
3. T → S: T - 1 → S
4. E → D: E - 1 → D

Thus, the word "DATE" will be coded as 'CZSD'.

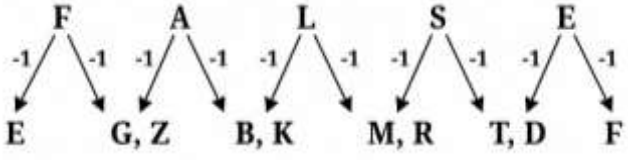
Type-8: Pair of Letters Based Coding

Ex: If the word 'TRUTH' is coded as 'SUQSTVSUGI', what will be the code for 'LIES' in the same code language?

Sol:



Similarly,



Type-9: Number Coding

Ex: In a certain code, if 'HOTEL' is coded as 300, what will be the code for 'HOSTEL'?

Sol:

Code = (sum of positional value of alphabets) x (number of alphabets)

HOTEL = (8 + 15 + 20 + 5 + 12) × (5) = 60 ×5 = 300

HOSTEL = (8 + 15 + 19 + 20 + 5 + 12) × (6) = 79 ×6 = 474

So, code for HOSTEL is 474.

Type-10: Word Coding

Ex: If "wall" is called "window," "window" is called "door," "door" is called "floor," "floor" is called "ceiling," and "ceiling" is called "ventilator," where will a person be standing?

Sol: The chain of transformations is as follows:

Wall → Window → Door → Floor → Ceiling → Ventilator.

So, a person would be standing where the ceiling is called "ventilator." Thus, the correct answer is Ceiling.

Ex: If "eraser" is called "box," "box" is called "pencil," "pencil" is called "bag," and "bag" is called "book," then what will a student use for writing?

Sol: The chain of transformations is as follows:

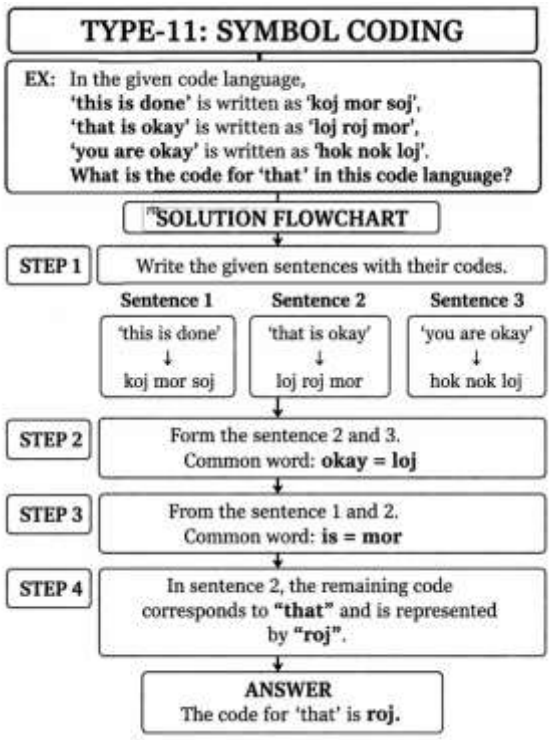
Eraser → Box → Pencil → Bag → Book.

The student writes with a pencil, which is now called "bag." Hence, the correct answer is Bag.

Type-11: Symbol Coding

Ex: In the given code language, 'this is done' is written as 'koj mor soj', 'that is okay' is written as 'loj roj mor', and 'you are okay' is written as 'hok nok loj'. What is the code for 'that' in this code language?

Sol:



Ex: Direction: Study the following information carefully and answer the given questions.

'fate red mobile peace' is coded as 'ka la ho ga'

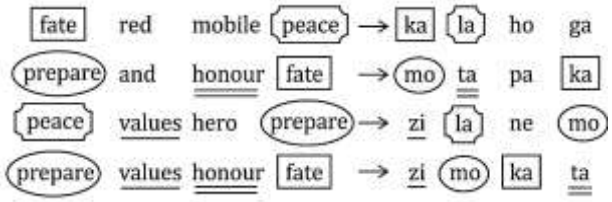
'prepare and honour fate' is coded as 'mo ta pa ka'

'peace values hero prepare' is coded as 'zi la ne mo'

'prepare values honour fate' is coded as 'zi mo ka ta'

1. **What is the code for 'fate' in the given code language?**
   a. ta
   b. Ka
   c. zi
   d. Mo
2. **What is the code for 'peace' in the given code language?**
   a. ta
   b. Mo
   c. la
   d. Either pa or mo
3. **What is the code for 'prepare' in the given code language?**
   a. mo
   b. Ta
   c. pa
   d. ka

Ans:



1. Code for fate is “ka”.
2. Code for peace is “la”.
3. Code for prepare is “mo”.

Ex: In a certain code language, 'MOST' is written as '134' and 'FUR' is written as '90'. How will 'SUCCESS' be written in that language?

Sol:

Logic: Addition of alphabet positional value × 2 = Code

'MOST' is written as '134'

M (13) + O (15) + S (19) + T (20) = 67 × 2 = 134

And, 'FUR' is written as '90'

F (6) + U (21) + R (18) = 45 × 2 = 90

Similarly, 'SUCCESS' be written as

S (19) + U (21) + C (3) + C (3) + E (5) + S (19) + S (19) = 89 × 2 = 178

Hence, the correct answer is "178".

Ex: In a certain code language, 'LIBERTY' is coded as '4221824364050'. How will 'SLAVERY' be coded in that language?

Sol:

Step 1: Arrange letters according to the alphabet’s series.
Step 2: All consonant place values multiply by 2 and it is coded as numeric values.
Step 3: Opposite letter place values of vowels are coded as numeric values.

'LIBERTY' is coded as '4221824364050'.

Step 1: LIBERTY Alphabetical order → BEILRTY.

Step 2: All consonant place values multiply by 2 and it is coded as numeric values.

Step 3: Opposite letter place values of vowels are coded as numeric values.

SLAVERY Alphabetical order - AELRSVY.

Hence, the correct answer is "26222436384450".

Ex: N = 28 and ORE = 76, then how will you code PALE?

Sol: N = 14; 14 × 2 = 28

ORE 15+18+5 38: 38×2 = 76

Similarly. PALE 16+1+12+5= 34; 34 × 2 = 68

Type - 12: Coding Matrices

Ex: **Directions: Study the following information carefully and answer the questions that follow:**

- ✓ There is a matrix of 4*4. The rows are represented as %, $, # and @ from the first to the fourth in the same order and the columns are represented as 1 to 4 from the first to the fourth in the same order.

Following operations are to be performed in the given order to obtain the whole matrix.

1. One diagonal of matrix is IBPS and the other diagonal is 2019 in the same order. Both have their first element in the first Column and 4th column respectively.
2. The immediate neighbor of any alphabet in the same row is the alphabetical position of that number.
3. The remaining places are to be filled by taking the difference between the two numbers surrounding that place in the same row.

In the obtained matrix, the value of the sum of all digits in the second column would be less than that of the third column.

The compiler of a PC will respond to the input by calculating the value of the string as per the following conditions.

1. If there are equal number of even and odd numbers in the string, then value of the string will be the absolute difference between all the even numbers and all the odd numbers.
2. If there are equal number of alphabets and numbers in the string, then the value of string will be the absolute difference between the alphabetical position of all the alphabets and all the numbers.
3. If there is only one even number in the string, then the value of string will be the addition of all the numbers in that string.
4. If there is a vowel in the string, then value of the string will be the alphabetical position of that vowel.
5. If none of the above-mentioned conditions follow, then the value of the string will be obtained by subtracting the lowest number from the highest number in that string.

Note:

1. The value of an input is obtained by adding the values of all the strings and then the digits in that value is added up to the point where it becomes a single digit number and then it is taken as an input.
2. If only a single string is given, then the digits in that value is added up to the point where it becomes a single digit number and then it is taken as input.
3. If the value of an input is a prime number, then the program will be executed.

If the value of an input is an even number, then program will not be executed.

If the value of an input is both even and prime number, then program will be executed but it will show an error.

If the value of an input is other than the above-mentioned values, then PC will hang.

Let us assume a matrix:

	1	2	3	4
%	1	2	C	4
$	J	6	7	8
#	9	10	T	12
@	O	14	15	16

AA = $3 @2 %1 #2,

BB = @1 $3 %2

$3 denotes value in second row and column 3 which will be equal to 7.

Therefore AA = 7 14 1 10

So, this is satisfying condition 1. Hence the sum = (14 + 10) – (7 + 1) = 16

BB = O 7 2

So, this is satisfying condition 4. Thus, frequency = alphabetical position of

O = 15

The values of AA and BB are added, and the final frequency is 16 + 15 = 31

which is a two digit number, So again adding them 3 + 1 = 4, which is a non-

prime even number so the program will not be executed.

Consider the following four strings for all questions:

AA = $2 #1 @3 #3

BB = @1 %4 @3 %3

CC = $4 @2 #4 %1

DD = %4 @2 @4 #2

It is given that signal BB is incorrect and the program was executed but showed an error, then what could be the correct string for it?

Sol:

MATRIX BASED PUZZLE – SOLUTION GUIDE

1. MATRIX CONSTRUCTION RULES

1. One diagonal is IBPS (top-left to bottom-right) and the other diagonal is 2019 (top-right to bottom-left).
2. Immediate neighbor of any alphabet in the same row is the alphabetical position of that number.
3. Remaining places are filled by taking the difference between the two numbers surrounding that place in the same row.

	1	2	3	4
%				
$				
#				
@				

2. STEP-BY-STEP MATRIX FORMATION

Step 1: Place the diagonals

	1	2	3	4
%	I	–	–	9
$	–	B	–	1
#	–	P	–	0
@	2	–	S	–

IBPS → I (9), B (2), P (16), S (19)

2019 → 2, 0, 1, 9

Step 2: Fill immediate neighbors with alphabetical positions

	1	2	3	4
%	9	2	3	9
$	19	2	3	1
#	16	16	1	0
@	2	15	19	19

A=1, B=2, C=3, ..., S=19, T=20, ...

Step 3: Fill remaining places by difference

	1	2	3	4
%	9	7	6	9
$	19	2	1	1
#	16	16	1	0
@	2	15	19	19

Example:
% row → 9–2 = 7
3–1 = 2? (but already filled), 9–0 = 9

Check: Sum of digits in Column 2 = 7 + 2 + 16 + 15 = 40 | Sum in Column 3 = 6 + 1 + 1 + 19 = 27 ➡ 40 > 27 ✓

3. HOW PC CALCULATES VALUE OF A STRING

1. Equal even and odd numbers	2. Equal alphabets and numbers	3. Only one even number	4. Contains a vowel	5. None of the above
Value = |Sum of even numbers – Sum of odd numbers|	Value = |Sum of alphabet positions – Sum of numbers|	Value = Addition of all numbers in the string	Value = Alphabetical position of that vowel	Value = Highest number – Lowest number
	A 1	2	AEIOU	

NOTE

- Add values of all strings.
- If result is more than one digit, add its digits till single digit.
- If single string, apply the same.

PROGRAM EXECUTION RULES

- Prime number → Program will be executed.
- Even number (not prime) → Program will not be executed.
- Even and prime → Program executed but shows an error.
- Other numbers → PC will hang.

4. EXAMPLE EXPLAINED

AA = $3 @2 %1 #2

Using matrix:

	1	2	3	4
%	9	7	6	9
$	19	2	1	1
#	16	16	1	0
@	2	15	19	19

Values → 7, 15, 9, 1
Odd: 7 + 15 = 22
Even: 9 + 1 = 10
Value = |22 – 10| = 12
Digits sum = 1 + 2 = 3

Total Value
3 + 6 = 9
Digits sum = 9

BB = @1 $3 %2

Values → 2, 1, 7
Contains vowel 'O'
Value = Alphabetical position of O = 15
Digits sum = 1 + 5 = 6

9 is NOT prime and NOT even → PC will hang.

5. QUESTION SOLVING

Given:

- Signal BB is incorrect.
- Program was executed but showed an error.

Rule Applied: Executed but shows an error → Value is both even and prime (Only 2 satisfies this).
So, required value after processing must be = 2.

Check Each Option for BB

Option	String	Value (Final)	Result
A	@1 %4 @3 %3	6	Even → Not correct
B	#3 @4 @2 %3	6	Even → Not correct
C	@1 %4 @3 $4	7	Prime → Not correct
D	#4 $3 $2 #4	8	Even → Not correct
E	None of the above	–	None gives 2

Hence, the correct answer is (E) None of the above.

TRICKS & TIPS

- Diagonals first: IBPS ↘ and 2019 ↖
- Neighbors = Alphabet positions
- Middle cells = Difference of neighbors
- Quickly identify vowels (A,E,I,O,U)
- For rule-based strings, check conditions in order
- Remember: Only 2 is both even and prime

3 CHAPTER

Mathematical Inequalities

General Introduction

- In these questions, you'll see mathematical expressions with two, three, or four letters connected by symbols. Below these expressions, there are a few conclusions. Each symbol in the expressions has a specific meaning, and you need to figure out which conclusions are correct based on the given information.

Sr. No.	Mathematical Symbol	Meaning	Example	Explanation
		Greater than	P > Q	➢ P is greater than Q. ➢ P is neither smaller nor equal to Q.
		Less than	P < Q	➢ P is smaller than Q. ➢ P is neither greater nor equal to Q.
		Equal to	P = Q	➢ P is equal to Q. ➢ P is neither greater nor smaller than Q.
		reater than or equal to	P ≥ Q	➢ P is greater than or equal to Q. ➢ P is not smaller than Q.
		ess than or equal to	P ≤ Q	➢ P is smaller than or equal to Q. ➢ P is not greater than Q.

Things to remember when determining the truth or falsity of conclusions:

- If the given statements lead to a conclusion, that conclusion is true. If it doesn't, the conclusion is false.
- If $a > b > c$, then $a > c$ will always be true.
- If $a < b < c$, then $a < c$ will always be true.
- If $a < b > c$, you can't determine the relationship between a and c, so the conclusion about their relationship is false.
- If $a > b < c$, you can't determine the relationship between a and c, so the conclusion about their relationship is false.
- If combinations like $a \leq b > c$ or $a < b = c$, you can't determine the relationship between a and c, so the conclusion about their relationship is false.
- If $a \geq b$ or $b \leq a$, then either $a > b$ or $a = b$ is true.
- If $a \geq b = c$, then either $a = c$ or $a > c$ is true.
- If $a = b \leq c$ or $a \leq b = c$, then either $a < c$ or $a = c$ is true.

Type-1: Direct Inequality

In these questions, the relationships between certain elements are given in the form of statements. Your task is to check whether the conclusions are correct by understanding the relationships between these elements.

Ex: Direction: In the following question assuming the given statements to be true, find which of the conclusion(s) among given conclusions is/are definitely true and then give your answers accordingly.

Statement: $E < F \leq G > H \geq K$

Conclusions:

I. $F > H$

II. $G < E$

Sol: Given statement: $E < F \leq G > H \geq K$

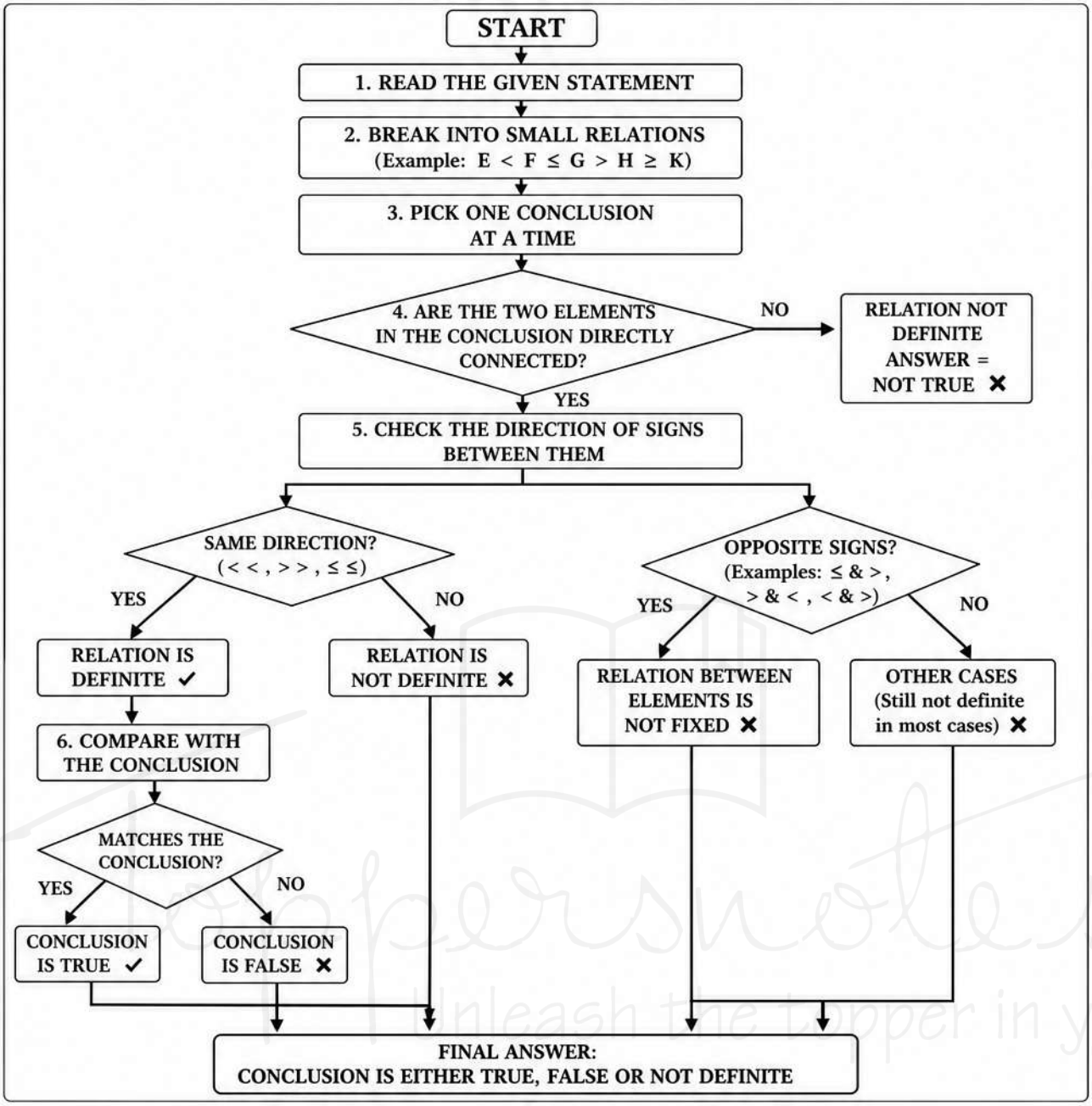
Conclusions:

I. $F > H \rightarrow$ False
(As $E < F \leq G > H \geq K \rightarrow F \leq G > H \rightarrow$ no clear relation between F and H can be determined as there are opposite signs between F and H. So, it is false)

II. II. $G < E \rightarrow$ False (as $E < F \leq G > H \geq K \rightarrow E < F \leq G \rightarrow E < G$. So, it is false)

Hence, neither conclusion I nor II is true.

FLOWCHART: HOW TO SOLVE INEQUALITY QUESTIONS



APPLY ON THE GIVEN QUESTION

Statement: E < F ≤ G > H ≥ K

Conclusion I: F > H	Conclusion II: G < E
Check relation between F and H	Check relation between G and E
F ≤ G > H (Opposite signs)	From statement: E < F ≤ G ⇒ E < G (G > E)
Relation between F and H is NOT definite	Given conclusion G < E is opposite
Conclusion I is NOT TRUE ✗	Conclusion II is NOT TRUE ✗

FINAL ANSWER: NEITHER I NOR II FOLLOWS

QUICK RULES (SUMMARY)

CASE	CONDITION	RESULT
1	Directly connected and same direction (< < , > > , ≤ ≤)	Relation is definite. Check with conclusion.
2	Directly connected and opposite signs (≤ & > , > & < , < & >)	Relation not fixed. Conclusion not true.
3	Not directly connected	Relation not definite. Conclusion not true.
4	If conclusion opposite to definite relation	Conclusion is false.

QUICK TRICKS TO REMEMBER

- First break the statement into small parts.
- Always check if the two elements are directly connected.
- Same direction signs give definite relation.
- Opposite direction signs give not definite relation.
- Do not make assumptions.