

## **REASONING ABILITY - HIGH LEVEL**

1. Seating Arrangement
2. Coding – Decoding
3. Mathematical Inequalities
4. Blood Relations
5. Syllogism
6. Ranking and Arrangement
7. Scheduling
8. Direction and Distance
9. Data Sufficiency
10. Input & Output
11. Order and Ranking
12. Analytical Ability
13. Series
14. Alphabetical Operations
15. Numerical Operations
16. Miscellaneous

# 1. SEATING ARRANGEMENT

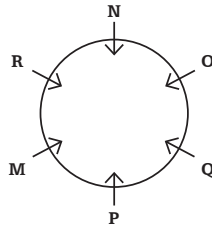
Here, we deal with the questions having information regarding arrangement. We are given with some objects and then we have to arrange them according to the information provided. Objects are arranged either in a row or in a circle on the basis of such given constraints. In some questions we will also deal with other arrangements like Square / Pentagon / Hexagonal.

## TYPE 1 : Arrangement around a closed path

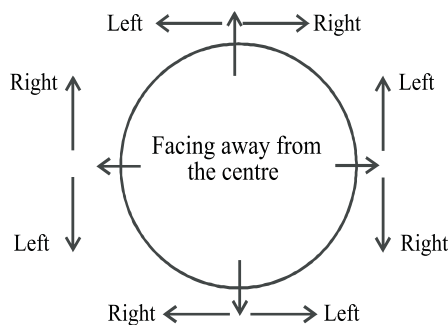
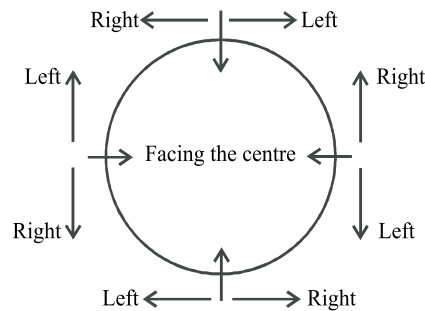
In such questions some clues are given regarding arrangement. You have to apply these clues on a circle by using the information. You have to find the solutions to questions associated with them.

### Example:

Six persons M, N, O, P, Q and R are playing cards sitting in a circle facing the centre. R is sitting between M and N; and Q is sitting between O and P. P is sitting immediate right of M.

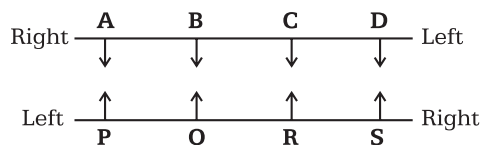


### Directions for seating arrangements (Circular)

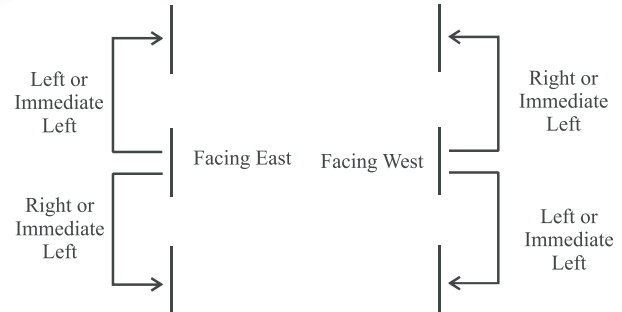
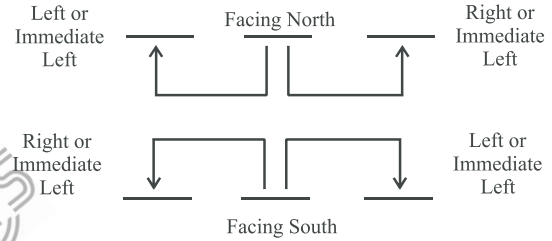


## Type 2 : Arrangement in a Line or others.

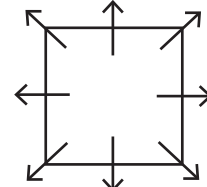
When A, B, C, D are facing south direction and P, Q, R, S are facing North direction in a line, then their positions of right and left will be



## Linear arrangements

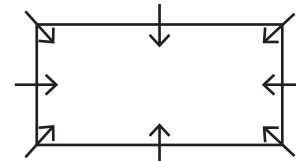


## TYPE 3 : Square type arrangement



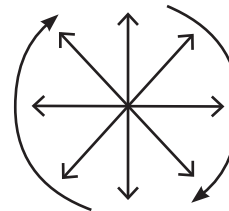
Facing away from the Center

## TYPE 4 : Rectangular type arrangement

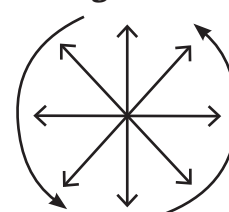


Facing to the Center

## Clock-wise Arrangement



## Anti-Clock wise Arrangement



## 2. CODING – DECODING

The following table is the only short cut to solve Coding-Decoding questions fast in exams.

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

### Opposite letters

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

The Coding and Decoding is classified into six types. They are:

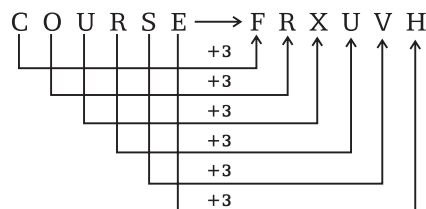
1. Letter coding      2. Number coding
3. Mixed coding      4. Mixed number coding
5. Decoding            6. Symbols coding

**Letter Coding:** A particular letter stands for another letter in letter coding.

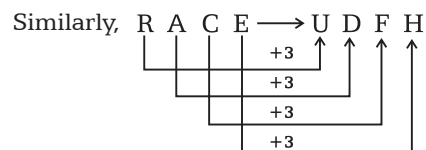
Eg. : If COURSE is coded as FRXUVH, how is RACE coded in that code ?

- A) HFDU                      B) UCEF  
 C) UDFH                      D) UDHF  
 E) UDFG

**Explanation :**



In the given code, each letter is moved three steps forward than the corresponding letter in the word.



Hence, the answer is 'C'

**Number Coding :** In these questions, either numerical code values are assigned to a word or alphabetical code values are assigned to numbers. The candidate is required to analyse the code as per directions.

**Example:** If in certain code **ROPE** is coded as 6821, **CHAIR** is coded as 73456. What will be the code for **CRAPE**?

- A) 73456                      B) 76421  
 C) 77246                      D) 77123  
 E) None of these

**Explanation :**

|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
| R | O | P | E | C | H | A | I | R |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 6 | 8 | 2 | 1 | 7 | 3 | 4 | 5 | 6 |

Hence,

|   |   |   |   |   |
|---|---|---|---|---|
| C | R | A | P | E |
| ↓ | ↓ | ↓ | ↓ | ↓ |
| 7 | 6 | 4 | 2 | 1 |

So CRAPE is coded as 76421. Hence, the answer is B.

**Example:** In a certain code. 3456 is coded as **ROPE** and 15546 is coded as **APPLE**. Then how is 54613 coded

- A) RPPEO                      B) ROPEA  
 C) POEAR                      D) PAREO  
 E) None of these

**Explanation :**

|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
| 3 | 4 | 5 | 6 | 1 | 5 | 5 | 4 | 6 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| R | O | P | E | A | P | P | L | E |

### 3. MATHEMATICAL INEQUALITIES

#### DIRECT INEQUALITY

In Direct Inequality, we use symbols like  $<$ ,  $>$ ,  $=$ ,  $\leq$  and  $\geq$

| Symbol | Meaning                                                         |
|--------|-----------------------------------------------------------------|
| $>$    | First element is greater than second element                    |
| $<$    | First element is smaller than second element                    |
| $=$    | First element is equal to second element                        |
| $\geq$ | First element is greater than or equal to second element        |
| $\leq$ | First element is smaller than or equal to second element        |
| $\neq$ | First element is greater than or smaller than to second element |

| No. | STATEMENT         | CONCLUSION |
|-----|-------------------|------------|
| 1   | $A > B > C$       | $A > C$    |
| 2   | $A > B \geq C$    |            |
| 3   | $A \geq B > C$    |            |
| 4   | $A = B > C$       |            |
| 5   | $A > B = C$       |            |
| 6   | $A < B < C$       | $A < C$    |
| 7   | $A < B \leq C$    |            |
| 8   | $A \leq B < C$    |            |
| 9   | $A = B < C$       |            |
| 10  | $A < B = C$       |            |
| 11  | $A \geq B \geq C$ | $A \geq C$ |
| 12  | $A = B \geq C$    |            |
| 13  | $A \geq B = C$    |            |
| 14  | $A = B \leq C$    | $A \leq C$ |
| 15  | $A \leq B = C$    |            |
| 16  | $A = B \leq C$    |            |

|    |                |                                               |
|----|----------------|-----------------------------------------------|
| 17 | $A < B > C$    | We cannot compare the two elements of A and C |
| 18 | $A \leq B > C$ |                                               |
| 19 | $A < B \geq C$ |                                               |
| 20 | $A > B < C$    |                                               |
| 21 | $A > B \leq C$ |                                               |
| 22 | $A \geq B < C$ |                                               |

#### CODED INEQUALITY

In coded Inequality, symbols like  $\$, \#, \%, \text{Gr}, @$  are used.

**Statement 1 :**  $P \$ Q$  means P is not smaller than Q.  
So P can be either equal to Q or greater than Q.  $P \geq Q$

**Statement 2 :**  $P @ Q$  means P is neither smaller than nor equal to Q.  
So P is greater than Q.  $P > Q$ .

**Statement 3 :**  $P \# Q$  means P is neither greater than nor equal to Q.  
So P is smaller than Q.  $P < Q$ .

**Statement 4 :**  $P \text{Gr} Q$  means P is neither greater than nor smaller than Q.  
So P is equal to Q.  $P = Q$ .

**Statement 5 :**  $P \% Q$  means P is not greater than Q.  
So P can be either equal or smaller than Q.  $P \leq Q$ .

Then we have to form a table.

|                       |                           |
|-----------------------|---------------------------|
| $\$ \Rightarrow \geq$ | $@ \Rightarrow >$         |
| $\# \Rightarrow <$    | $\text{Gr} \Rightarrow =$ |
| $\% \Rightarrow \leq$ |                           |

Now we decoded the symbols and we clearly know what is the meaning of each symbol.

**Priority 1 :**  $<$  or  $>$

**Priority 2 :**  $\geq$  or  $\leq$

**Priority 3 :**  $=$

Whenever in a statement you get both the Priority 1 in opposite order ( $A > B < C$ ) there will be a conflict and thus no conclusion. Hence the answer will be false.

The two signs come in same direction, the answer will be true.

Example:  $A > B > C$  or  $A < B < C$   
 $A \geq B \geq C$  or  $A \leq B \leq C$

## 4. BLOOD RELATIONS

### Introduction

The questions which are asked in this section depend upon 'Relation'. You should have a sound knowledge of the blood relation in order to solve the questions.

To remember easily, the relations may be divided into two sides given below:

#### I. Relations of Paternal Side:

|                   |                |
|-------------------|----------------|
| Father's father   | → Grand father |
| Father's mother   | → Grand mother |
| Father's brother  | → Uncle        |
| Father's sister   | → Aunt         |
| Children of uncle | → Cousin       |
| Wife of uncle     | → Aunt         |
| Children of aunt  | → Cousin       |
| Husband of aunt   | → Uncle        |

#### II. Relations of Maternal Side:

|                            |                         |
|----------------------------|-------------------------|
| Mother's father            | → Maternal grand father |
| Mother's mother            | → Maternal grand mother |
| Mother's brother           | → Maternal uncle        |
| Mother's sister            | → Aunt                  |
| Children of maternal uncle | → Cousin                |
| Wife of maternal uncle     | → Maternal aunt         |

#### Others

|                                  |                   |
|----------------------------------|-------------------|
| Son's wife                       | → Daughter in law |
| Daughter's husband               | → Son in law      |
| Husband's (or) wife's father     | → Father-in-law   |
| Husband's (or) wife's mother     | → Mother-in-law   |
| Husband's (or) wife's brother    | → Brother-in-law  |
| Husband's (or) wife's sister     | → Sister-in-law   |
| Sister's husband                 | → Brother-in-law  |
| Brother's (or) sister's son      | → Nephew          |
| Brother's (or) sister's daughter | → Niece           |

#### Symbols

|   |          |
|---|----------|
| + | → Male   |
| - | → Female |
| ↔ | → Couple |

### Types of Blood Relation Question

#### 1. Pointing or Introducing

In this type of questions, a person points at or introduces someone, through conversation or by any other way.

##### Example :

Kapil said "She is the wife of my mother's father's only grand child". How is the lady related to Kapil?

##### Explanation :

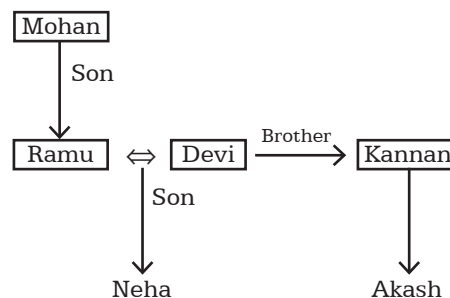
Kapil's mother's father means Kapil's grandfather. Kapil's grandfather has only one grand child, That is Kapil. Hence the she is wife of Kapil.

#### 2. Family Tree

##### Example :

Ramu is the son of Mohan. Ramu married Devi. Kannan is brother of Devi. Mohan has only one son. Neha is son of Ramu. Kannan is the father of Akash. What is the relationship between Kannan and Neha?

##### Explanation :



Neha is nephew to Kannan (or) Kannan is Maternal uncle to Neha.

#### 3. Coded Relation

In this type of questions, family members are represented as particular codes or symbols.

##### Example :

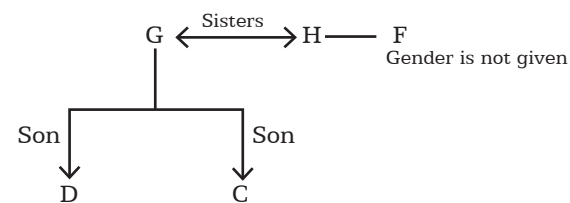
- 'P \$ Q' means P is the sister of Q
- 'P % Q' means P is the brother of Q
- 'P & Q' means P is the mother of Q
- 'P @ Q' means P is the son of Q

Find the relationship between F and D from the following expression.

D % C @ G \$ H \$ F

##### Explanation:

- D % C means D is the Brother of C
- C @ G means C is the Son of G
- G \$ H means G is the Sister of H
- H \$ F means H is the Sister of F



Hence F can be either uncle or Aunt of D.

## 5. SYLLOGISM

| Statement I |   | Statement II |   | Conclusion   |
|-------------|---|--------------|---|--------------|
| A           | + | A            | = | A (All)      |
| A           | + | E            | = | E (No)       |
| I           | + | A            | = | I (Some)     |
| I           | + | E            | = | O (Some not) |
| E           | + | A            | = | O (Some not) |
| E           | + | I            | = | O (Some not) |

### Possibility Rules

| Statement               | Conclusion                        |
|-------------------------|-----------------------------------|
| <b>All A are B</b>      | Some B are not A is possibility   |
|                         | All B are A is possibility        |
| <b>Some B are not A</b> | All A are B is possibility        |
|                         | No A are B is a possibility       |
|                         | No B are A is a possibility       |
| <b>Some A are B</b>     | All A are B is possibility        |
|                         | All B are A is possibility        |
|                         | Some A are not B is a possibility |
|                         | Some B are not A is a possibility |

### Conversion Rules

|              |              |
|--------------|--------------|
| All A are B  | Some B are A |
| No A is B    | No B is A    |
| Some A are B | All B are A  |
| Some A are B | Some B are A |

### Terms & Meanings

| Terms                                                       | Meaning | Examples                                                                                                                                                                              |
|-------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Atleast, Most, Many, Few, Maximum, Minimum, Often, Alot, Of | Some    | Atleast some A are B<br>$\Rightarrow$ Some A are B<br>Most A are B<br>$\Rightarrow$ Some A are B<br>Many A are B $\Rightarrow$ Some A are B<br>Few A are B $\Rightarrow$ Some A are B |

|                    |                  |                                                                            |
|--------------------|------------------|----------------------------------------------------------------------------|
| Only               | Only A is B      | All B is A                                                                 |
| Not every          | Some A are not B | Not every A is B<br>$\Rightarrow$ Some A are not B                         |
| Not all            | Some A are not B | Not all A is B<br>$\Rightarrow$ Some A are not B                           |
| "If then" "And" if | All A are B      | If it is an A then it is a B<br>$\Rightarrow$ All A are B                  |
| None Except        | Only A are B     | None except A are B<br>$\Rightarrow$ Only A are B $\Rightarrow$ All B is A |
| All except         | No A are B       | All except A are B $\Rightarrow$ No A are B                                |
| All but            | No A are B       | All but A are B $\Rightarrow$ No A are B                                   |

### Different Concepts of Syllogism

1. Only few A is B means "Some A is B" (or) "Some A is not B".
2. Only A is B means "All B is A".
3. All A are not B means "No A is B".

|              |                                                     |
|--------------|-----------------------------------------------------|
| All          | Any, Every, Each.<br>100% – All A are B             |
| Some         | Atleast, Almost, Most only few, Many – Some A are B |
| Some not     | Hardly, Rarely – All A are not B                    |
| No           | Never, None, can never – A are not B                |
| Only A are B | All B are A                                         |
| Possibility  | can be, may be, might be                            |

## 6. RANKING AND ARRANGEMENT

### PRACTICE QUESTIONS

**Directions (Qns. 1 - 6):** Read the following information carefully and answer the questions.

K, L, M, N, O, P, Q and R live on eight different floors of a building but not necessarily in the same order. The lower most floor of the building is numbered one, the one above that is numbered two and so on till the top most floor is numbered eight. Each of them also likes a different Super Hero namely Batman, Superman, Captain America, Thor, Hulk, Wolverine, Nova and Ironman but not necessarily in the same order.

- ◆ The one who likes Thor lives on an even-numbered floor. Only three people live between the one who likes Thor and M.
- ◆ Only two people live between M and N. N does not live on the lower most floor. Only three people live between N and the one who likes Hulk.
- ◆ O lives immediately above K. O lives on an even-numbered floor. K does not like Hulk. K lives neither on the floor numbered three nor five.
- ◆ Only two people live between K and the one who likes Nova.
- ◆ Only one person lives between the one who likes Nova and Ironman. The one who likes Ironman lives below the one who likes Nova.
- ◆ L lives immediately above Q. Only one person lives between Q and the one who likes Captain America.
- ◆ The one who likes Wolverine lives immediately above the one who likes Batman.
- ◆ P does not like Thor. K does not like Superman

1. Which of the following pairs represent those who live immediately above and immediately below N ?  
 A) R & L                      B) L & M  
 C) K & Q                      D) R & Q  
 E) K & L
2. Four of the following five are alike in a certain way as per the given arrangement and so form a group. Which of the following does not belong to that group ?  
 A) K - Floor numbered five  
 B) Q - Floor numbered six  
 C) L - Floor numbered two  
 D) N - Floor numbered seven  
 E) R - Floor numbered eight
3. Which of the following Super Heroes does R like ?  
 A) Captain America      B) Superman  
 C) Nova                      D) Thor  
 E) Batman
4. Which of the following Super Heroes does P like ?  
 A) Ironman                      B) Wolverine  
 C) Batman                      D) Captain America  
 E) Other than those given as options

5. N lives on which of the following floor numbers?

- A) Five                              B) Three  
 C) Seven                          D) One  
 E) Other than those given as options

6. As per the given arrangement, P is related to Nova and N is related to Wolverine in certain way. To which of the following is M related to in the same way ?

- A) Superman                      B) Batman  
 C) Captain America              D) Thor  
 E) Hulk

**Explanation: (1 - 6)**

On the basis of given information and conclusions / sub-conclusions drawn from them we can organise the data in the following manner:

| Floor Number | Person | Super Hero      |
|--------------|--------|-----------------|
| 8            | O      | Wolverine       |
| 7            | K      | Batman          |
| 6            | R      | Thor            |
| 5            | N      | Captain America |
| 4            | L      | Nova            |
| 3            | Q      | Superman        |
| 2            | M      | Ironman         |
| 1            | P      | Hulk            |

1. A)
2. B)

Except Q, Floor No. 6 all others have a gap of one floor between them.

K (Floor No. 7) → Floor No. 5

Q (Floor No. 3) → Floor No. 6

L (Floor No. 4) → Floor No. 2

N (Floor No. 5) → Floor No. 7

R (Floor No. 6) → Floor No. 8

3. D)

4. E) P likes Hulk

5. A)

6. C)

P is related to Nova

P is Floor No. 1

(Nova) L is Floor No. 4  $\Rightarrow P \xrightarrow{+3} L$

N is related to Wolverine

N is Floor No. 5

(Wolverine) O is Floor No. 8  $\Rightarrow N \xrightarrow{+3} O$

Similarly,

M is Floor No. 2  $M \xrightarrow{+3} N$

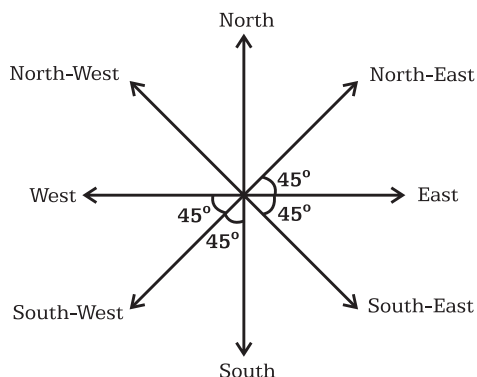
N likes Captain America

Hence, M is related to Captain America

## PRACTICE QUESTIONS

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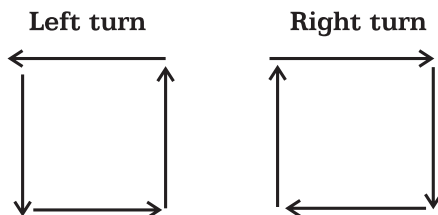
## 8. DIRECTION AND DISTANCE



### Types of Direction and Distance

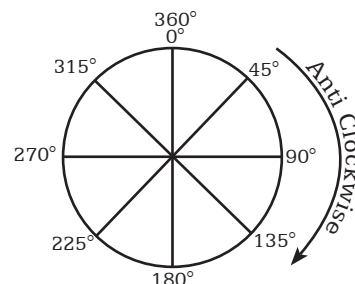
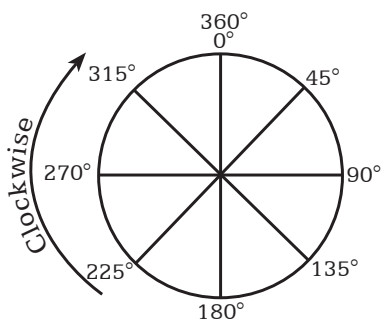
#### 1. Turns and Rotations

In these type of questions rotations such as Clockwise or Anticlockwise and turns such as left or right taken by people will be given. The final position of will be asked.



Right turn  $\Rightarrow$  Anti-clockwise

Left turn  $\Rightarrow$  Clockwise



#### 2. Coded direction based question

In these type of question, the directions are given in a certain coded language.

**Example:** A @ B (11) means A is 11 m in the North of B.

A \* B (26) means A is 26 m South of B.

#### 3. The directional reference point

In these type of question particular direction and particular distance will be given. Final direction, final distance or distance between any two points will be asked.

#### 4. Shadow based questions

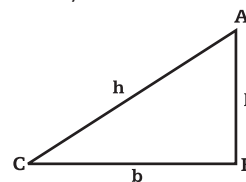
In these type of questions will be asked based on shadow. shadows always fall on the opposite side of the sun. From sunrise to afternoon, such as before 12 PM, the shadow will fall in the west direction. Whereas from afternoon to evening, such as after 12 PM, the shadow will fall in the east direction. No shadow will be formed at 12 PM.

#### To find shortest Distance

In any right - angled triangle,

$$\text{Hypotenuse}^2 = \text{Perpendicular}^2 + \text{Base}^2$$

Where h = Hypotenuse,



P = Perpendicular, b = Base,

$$h^2 = b^2 + p^2$$

## 9. DATA SUFFICIENCY

Data sufficiency questions in logical reasoning comprise a few conditions and candidates need to analyse which of the given conditions may help get an answer to the question.

Data sufficiency is the process of determining if the provided information is adequate for the purpose. In data sufficiency questions, you don't have to solve the problem, you just need to check whether or not you can solve the problem using just given the data.

Data sufficiency is an important part of 'Reasoning' section. These type of questions consist of problems on any reasoning topics like Blood Relation, Coding-Decoding, Direction Ability, Ranking, Seating arrangement, Floor puzzle, scheduling order & Ranking etc., followed by statements containing clues to solve the question.

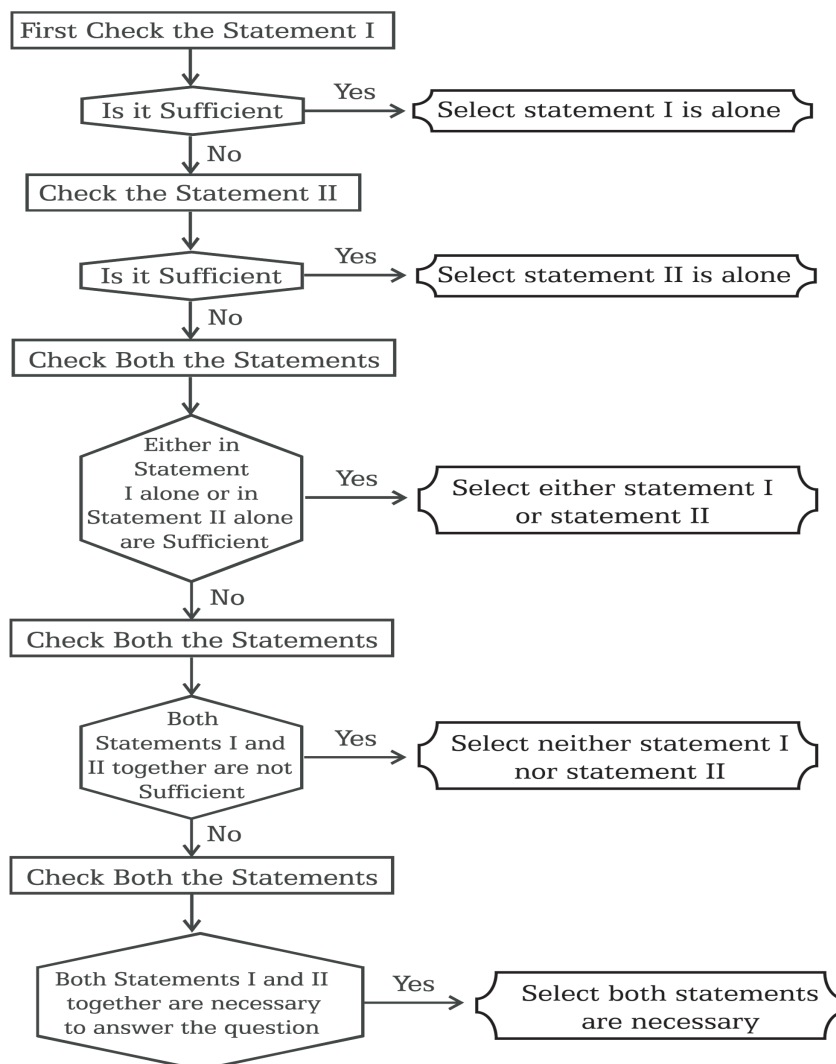
The candidates are supposed to find out which of the given statements is or are sufficient to solve the given question.

We have to make sure whether the question can be solved with the help of information provided in the statement I or statement II or together in the statement I and II.

Read the given statements. Take the first statement and combine it with main statement. Try to find the answer. If you are unable to find the answer using second step then combine second statement and combine it with main statement and try to find answer.

If you are unable to find answer using second statement then add both statements with main statement and try to find the sufficient answer.

### Directions for Data Sufficiency questions



## 10. INPUT & OUTPUT

In this type of questions, a sequence of symbols or numbers is given as input and the task is to analyze the pattern and identify the logic used to transform the input into the corresponding output.

Input-output questions consist of the pattern which is either based on numbers or alphabets.

### Rearrangement based ordering

In these type of questions, words or numbers will be arranged alphabetically (forward or backward). Candidates will arrange the words and numbers simultaneously in each step.

### Based on interchanging the positions and numbers

In these type of specific position of numbers will be changed keeping the remaining one unchanged.

### Based on Mathematical operations

In these type, some basic mathematical operations such as adding, dividing, subtracting, multiplying, square root, square cube, etc will be applied in each step.

### Based on Single shift

In these type, letters, numbers rearranging and alphanumeric series will take place from only one end either from the right end or left end.

### Based on Double shifting

In these type, letters and number series will take place from both end right and left simultaneously.

### Important arrangement

- ◆ By arranging the given words in forward or Backward alphabetical order.
- ◆ By arranging the given numbers in ascending or descending order.
- ◆ By writing a particular set of words in reverse order, stepwise.
- ◆ By changing places of words or numbers according to a set pattern.

#### Example 1: Based on Mathematical Operations

**Input:** 567 873 751 239 912 376

**Step I:** 567 378 157 239 129 226

The digits of each number are assembled in ascending order.

567 is already in ascending order.

$876 \Rightarrow 378, 751 \Rightarrow 157,$

239 is already in ascending order

$912 \Rightarrow 129, 376 \Rightarrow 367$

**Step II:** 29 17 02 15 07 15

The middle number is subtracted from the product of the first and last digit.

$$(5 \times 7) - 6 = 29, (3 \times 8) - 7 = 17$$

$$(1 \times 7) - 5 = 02, (2 \times 9) - 3 = 15$$

$$(1 \times 9) - 2 = 07, (3 \times 7) - 6 = 15$$

**Step III:** 21 97 01 25 05 15

#### First pair

First and Second digits interchanged.

$$29 \ 17 \Rightarrow 21 \ 97$$

#### Second pair

$$02 \ 15 \Rightarrow 01 \ 25$$

#### Third pair

$$01 \ 15 \Rightarrow 05 \ 15$$

**Step IV:** 03 16 01 07 05 06

Sum of the digits in the III step.

Step IV is the last step of the rearrangement.

### Shifting Arrangement

**Input:** Raman person is a good.

**Step I:** a Raman person is good.

**Step II:** a good Raman person is

**Step III:** a good is Raman person

**Step IV:** a good is person Raman. Step IV is the last step.

In each step one word is arranged one step at a time from left to right in ascending alphabetical order.

#### Example: Single shifting arrangement

**Input:** 22 can 59 nest 87 soil 15 lamp house 43

**Step I:** Can 22 59 nest 87 soil 15 lamp house 43.

**Step II:** Can 15 22 59 nest 87 soil lamp house 43.

**Step III:** Can 15 house 22 59 nest 87 soil lamp 43.

**Step IV:** Can 15 house 22 lamp 59 nest 87 soil lamp 43.

**Step V:** Can 15 house 22 lamp 43 59 nest 87 soil.

**Step VI:** Can 15 house 22 lamp 43 nest 59 soil 87.

Step VI is the last step.

In the first step, word is arranged in the left side alphabetical order and in second step number is arranged in the left side in ascending order.

#### Example: Double shifting arrangement

**Input:** money 40 good and 60 74 will

**Step I:** 74 money 40 good 60 will and

**Step II:** 74 60 money 40 will and good

**Step III:** 74 60 40 will and good money

**Step IV:** 74 60 40 and good money will

Step IV is the last step.

In each step the numbers are arranged in decreasing order on the left side and words are arranged in alphabetical order on the right side.

# 11. ORDER AND RANKING

## PRACTICE QUESTIONS

**Directions (Qns. 1 & 2) :** Read the following information carefully and answer the questions given below :

Six persons D, I, F, G, H and E are standing in a queue according to their heights in descending order. F is taller than H, who is shorter than G and as tall as I. E is shorter than only D. Who is taller than F. G is either shorter than or as tall as F.

- How many persons are there between G and D ?  
A) None B) One  
C) Two D) Three  
E) Cannot be determined
- How many persons are definitely taller than G ?  
A) None B) Two  
C) Three D) Four  
E) One

**Explanation: (1 & 2)**

$D > E > F \geq G > H = I$

- E) 2. B)
- E, F, G, H and I are five friends. Each of them has a different height. G is taller than E and I and shorter than only F. I is taller than only one person. Who is the shortest ?  
A) H B) E  
C) F D) Either H or E  
E) G

**Explanation:**

**Ans: (D)**

According to the information two possibilities are there

(i)  $F > G > E > I > H$

(ii)  $F > G > H > I > E$

Hence, either H or E is the shortest

- In a class, Anu ranks 9th from the top. Somi is 4 ranks ahead of Bala and 2 ranks behind Anu. If there were 5 girls after Bala, how many girls were there in the class ?  
A) 20 B) 19  
C) 18 D) 21  
E) None of these

**Explanation:**

**Ans: (A)**

8 girls → 

|     |
|-----|
| Anu |
|-----|

 | 

|      |
|------|
| Somi |
|------|

 | | | 

|      |
|------|
| Bala |
|------|

 | | | | |

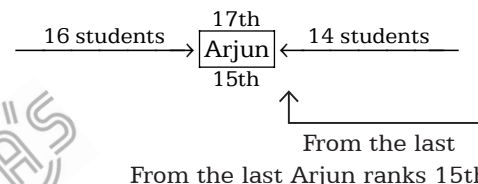
$8 + 1 + 1 + 1 + 3 + 1 + 5 = 20$

Total No. of girls in the class = 20

- Arjun ranks 17th in a class of 31 students. What is his rank from the last ?  
A) 15 B) 16  
C) 14 D) 17  
E) 13

**Explanation:**

**Ans: (A)**



From the last Arjun ranks 15th

**Directions (Qns. 6 - 8) :** Six persons A, B, C, D, E and F are standing in a queue to buy platform tickets

F is behind B and A is in front of C. D and A have two persons between them E is not near D.

- Who is in front ?  
A) A B) B  
C) C D) D  
E) E
- Where is C ?  
A) Between A and E B) In the last  
C) On Second number D) Between A and D  
E) Between A and F
- Very soon seven more persons joined the queue. Who is no. 11th from the last ?  
A) B B) C  
C) D D) E  
E) F

**Explanation: (6 - 8)**

D B F A C E

| | | | |

- D) 7. A)

8. E) D B 

|   |
|---|
| F |
|---|

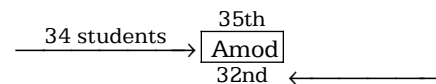
 A C E | | | | |

From the last

- In a class A mod ranks 35th from the top and 32nd from the bottom. How many students are there in the class ?  
A) 66 B) 67  
C) 78 D) 23  
E) 25

**Explanation:**

**Ans: (A)**



Total No. of students in the class

$34 + 1 + 31 = 66$

- Madhubala is taller than Mugdha but shorter than Geetha who is not as tall as Raveena. Sudha is shorter than Geetha but not as short as Mugdha. Who among them is the shortest ?  
A) Mugdha B) Sudha  
C) Data inadequate D) Madhubala  
E) None of these

## 12. ANALYTICAL ABILITY

### PRACTICE QUESTIONS

**Directions (Qns. 1 - 5) :** Read the given information carefully and answer the given questions.

- I. Six friends Rocky, Dhruv, Lakshman, Niladri, Shashi and Himanshu Study in different colleges namely, C, D, E, F, G and H. They are attending a ten days rafting course-each one wears different coloured helmet i.e., Yellow, Red, Pink, Green, Purple and Blue though not necessarily in the same orders.
- II. The one wearing Blue helmet Studies in college 'F' and one wearing green helmet studies in college 'C'.
- III. Himanshu does not study in college 'E' or 'G'.
- IV. Rocky wears pink helmet and studies in college 'D'.
- V. Niladri does not study in college 'G' and purple colour helmet does not belong to college 'E'
- VI. Shashi studies in college 'H' and neither Niladri nor Dhruv studies in college 'F'.
- VII. College 'G' has not purple or Yellow coloured helmet and Lakshman studies in college 'C'.

1. Which is the colour of college 'E' ?  
 A) It can not be ascertained  
 B) Pink  
 C) Green  
 D) Blue  
 E) None of these
2. Which of the following is true ?  
 A) Shashi wears Red helmet  
 B) Red colour helmet is worn by college G's student.  
 C) College 'H' has Green helmet  
 D) Niladri studies in college 'G'  
 E) None of these
3. Which of the following "colour of helmet-college-person" combination is correct ?  
 A) Red-G-Dhruv  
 B) Yellow-E-Shashi  
 C) Green-E-Niladri  
 D) Blue-F-Lakshman  
 E) None of these
4. Which of the following is incorrect ?  
 A) Lakshman is wearing Green coloured helmet  
 B) Niladri studies in college 'G'  
 C) Shashi doesnot wear Pink coloured helmet  
 D) Student of college 'G' wears Red coloured helmet.  
 E) None of these
5. Which of the following sequence of colleges represents Rocky, Dhruv, Lakshman, Niladri, Shashi and Himanshu in the same order ?  
 A) D, G, C, F, H, E  
 B) D, C, G, E, H, F  
 C) D, C, G, F, G, E  
 D) D, G, C, E, H, F  
 E) None of these

**Explanation: (1 - 5)**

On the basis of given information and conclusions drawn from them we can draw the following table.

| Person   | College | Colour |
|----------|---------|--------|
| Rocky    | D       | Pink   |
| Dhruv    | G       | Red    |
| Lakshman | C       | Green  |
| Niladri  | E       | Yellow |
| Shashi   | H       | Purple |
| Himanshu | F       | Blue   |

1. E) 2. B) 3. A) 4. B) 5. D)

**Directions (Qns. 6 - 10) :** Read the following information carefully and answer the questions given below.

- I. Five persons - J, K, L, M and N Participate in a quiz contest.
- II. One is master of sports, one is master of current events and one is master of art and culture.
- III. J and M are unmarried ladies and do not hold command in any subject.
- IV. N is the husband in a married couple.
- V. K is the brother of L and is neither master of current events nor art and culture.

6. Who is the master of Sports ?  
 A) M  
 B) L  
 C) J  
 D) K  
 E) None of these
7. Who is the master of art and culture ?  
 A) N  
 B) L  
 C) K  
 D) M  
 E) None of these
8. Who is the master of current events ?  
 A) N  
 B) M  
 C) J  
 D) L  
 E) None of these
9. Who is the wife of N ?  
 A) K  
 B) J  
 C) Data inadequate  
 D) L  
 E) None of these
10. The three ladies are  
 A) J, K and M  
 B) J, K and L  
 C) J, L and M  
 D) K, L and M  
 E) None of these

## 13. SERIES

### NUMBER SERIES

In one type of such questions, a series of numbers is given with one or two numbers missing represented by a blank space or a question mark. The candidate has to select from the option choices the correct option that will come in place of the blank or question mark. The given sequences of numbers will be in a same particular way i.e.; according to definite pattern. Candidates are required to find out the way in which the sequence is formed and therefore work out the missing numbers to complete the series.

There are a large variety of patterns / logics that are possible and the candidates require a proper understanding of various patterns of number sequences to be able to do well in such problems. The best way of approaching a number series problems is to first observe the difference between the terms.

#### PRIME NUMBER SERIES

4, 9, 25, 49, 121, 169 ?

- A) 324                      B) 289  
C) 225                      D) 196

**Explanation :**

**Ans : B**

The given series is a consecutive square of prime numbers. The next prime number is 289.

#### DIFFERENCE SERIES

55, 50, 45, 40 ? 30

- A) 33                      B) 34  
C) 35                      D) 36

**Explanation :**

**Ans: C**

The difference between the number is 5.

#### MULTIPLICATION SERIES

5, 20, 80, 320, 1280 ?

- A) 5120                      B) 5220  
C) 4860                      D) 3642

**Explanation :**

**Answer : A**

The numbers are multiplied by 4 to get the next number.

#### DIVISION SERIES : 16, 24, 36, ?, 81

- A) 52                      B) 54  
C) 56                      D) 58

**Explanation :**

**Ans : B**

Previous number  $\times \frac{3}{2}$  = Next number

$16 \times \frac{3}{2} = 24$ ;  $24 \times \frac{3}{2} = 36$ ;  $36 \times \frac{3}{2} = 54$ ;  $54 \times \frac{3}{2} = 81$

#### $n^2$ SERIES : 1, 4, 9, 16, 25, 36, 49, ?, 81

- A) 100                      B) 121  
C) 64                      D) 144

**Explanation :**

**Ans : C**

The series is  $1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 7^2$ . Hence  $8^2 = 64$

**( $n^2+1$ ) SERIES : 101, 401, 901, 1601, 2501, ?, 4901**

A) 2201

B) 3301

C) 4401

D) 3601

**Explanation :**

**Ans : D**

$10^2 + 1, 20^2 + 1, 30^2 + 1, 40^2 + 1, 50^2 + 1$ , The next number is  $= 60^2 + 1 = 3601$

#### **( $n^2-1$ ) SERIES 99, 80, 63, ?, 35**

- A) 48                      B) 84  
C) 46                      D) 64

**Explanation :**

**Answer : A**

$10^2 - 1, 9^2 - 1, 8^2 - 1$  The next number is  $7^2 - 1 = 48$

#### **( $n^2+n$ ) SERIES : 2, 6, 12, 20, 30, ?, 56**

- A) 32                      B) 34  
C) 42                      D) 24

**Explanation :**

**Ans : C**

$1^2 + 1, 2^2 + 2, 3^2 + 3, 4^2 + 4, 5^2 + 5$  The next number is  $6^2 + 6 = 42$

## LETTER SERIES

### ONE LETTER SERIES

Such series consists of one letter in each term and this series is based on increasing or decreasing positions of corresponding letter according to English alphabet.

**B, C, A, D, Z, E, ..... F, Y, G**

- A) U                      B) Y  
C) W                      D) V

**Explanation :**

**Ans : B**

The sequence consists of two series B, A, Z, Y, X and C, D, E, F, G.

### TWO LETTER SERIES

The first letters of the series follow one logic and the second letters follow another logic.

**DG, HK, LO, PS, TW ; ?**

- A) XA                      B) ZA  
C) XB                      D) None of these

**Explanation :**

**Answer : A**

First and second letters follow a sequence of +4

### THREE LETTER SERIES

Such series consists of 3 letters in each term. The first letters follow one logic, the second letters follow another logic and the third letters follow some other logic.

**DJS, HNW, LRA, PVE, ..... XDM**

- A) T Z I                      B) S A F  
C) U X H                      D) None of these

**Explanation :**

**Answer : A**

First, second and third letters follow a sequence of +4 series.

## 14. ALPHABETICAL OPERATIONS

Assigning numbers to the alphabets A to Z in different ways and then creating logical questions for competitive examinations has been in practice for quite sometime. Generally 1 to 26 is assigned to English Alphabets either from the left to right or right to left as the basic method. However while setting the questions some ingenuity is followed in assigning numbers to alphabets to make the questions logically more inquisitive.

However, even when the numbers assigned are in the normal course, that is 1 to 26 from right → left → right pattern, it is generally difficult to remember the relevant number of an alphabet. Therefore, to make it easier to remember the relevant numbers of an alphabet, we suggest the following methods:

1. EJOTY – They are 5, 10, 15, 20 and 25th letters of the alphabets from left to right order.

2. VQLGB – They are 5, 10, 15, 20 and 25th letters of the alphabets from right to left order.

### EXAMPLES

#### Example 1 :

Which is the 17th letter from the left ?

**Explanation:** If EJOTY order is remembered and applied, then it can be solved in no time. It can be derived in two ways.

1. O is 15 – add 2 = O + P + Q = Q is 17<sup>th</sup> letter.

2. T is 20 – subtract 3 = T, –S, –R, –Q

In this, option 1 is easier to follow.

#### Example 2 :

Which is the thirteenth letter from the right ?

**Explanation:** It can again be solved in two ways by VQLGB formula. The nearest number in this are 15 or 10.

1. 15 is L = 15 – 2 = 13 that L – M – N

2. 10 is Q = 10 + 3 = 13 that is Q – P – O – N

So, the thirteenth letter from right is N.

#### Example 3 :

Which is the fifth letter to the left of the 17th letter from the left ?

**Explanation:** Applying EJOTY formula the 17th letter from the left is Q. The fifth letter to the left of Q is L. Because it is both leftward, subtract 5 from 17 and you get 12. The twelfth letter from the left is L. {J(10) + K(11) + L(12)}.

#### Example 4 :

If BEAR can be written as 36219, what will it be for CARE ?

**Explanation:** Here the number 3 is given for B, that means the numbering has commenced from 2 to 27. Thus, the word CARE can be written as 42196.

#### Example 5 :

If BEAR can be written as 26, what will it be for CARE?

**Explanation:** The number 26 is the total of the value of each alphabet in BEAR. Thus, CARE will be 27.

Thus, the following test questions based on alphabets are set applying different logic for each question.

### Types of Alphabet operation

#### 1. Alphabetical order of words

Arranging words in alphabetical order implies 'to arrange them in the order as they appear in a dictionary'.

**Example:** If the following five words are arranged in alphabetical order, which word will come in the middle ?

- A) Draw                      B) Read  
C) Play                      D) Back  
E) Want

#### Explanation:

Back, Draw, Play, Read, Want.

'Play' comes in the middle.

**Ans: (C)**

#### 2. Letter-word problems

How many such pairs of letters are there in the words 'INSTRUCTION' which have as many letters between them in the word as in the English alphabet?

- A) One                      B) Two  
C) Three                      D) Four  
E) None of these

#### Explanation:

**Ans: (D)**



| Alphabetical order | Given letters | Number of letters in between | Direction |
|--------------------|---------------|------------------------------|-----------|
| ST                 | ST            | Nil                          | Forward   |
| NO                 | ON            | Nil                          | Backward  |
| C D E F G H I      | I N S T R U C | Five                         | Backward  |
| N O P Q R S T      | N S T R U C T | Five                         | Forward   |

### 3. Rule–Detection

#### Example:

1. Number of letters skipped in between adjacent letters in the series is two.

- A) MPSVYBE                      B) QSVYZCF  
C) SVZCGJN                      D) ZCGKMPR

#### Explanation:

**Ans: (A)**

M N O P Q R S T U V W X Y Z A B C D E

2. Which letter is fifth to the right of the eighteenth letter from the right in the alphabetical series?

- A) C                      B) D  
C) E                      D) M  
E) N

#### Explanation:

**Ans: (E)**

From Z the 18th letter is I. Counting from I towards the right the fifth letter is 'N'.

## 15. NUMERICAL OPERATIONS

Questions related to Numerical Operations and the way of solving questions are discussed in this chapter. Simple Numerical Operations such as Addition, Subtraction, Multiplication and Division, ascending order and descending order series are implied in the various number sequence.

In this type of questions, a number or a set of number or a series of digits is given and the candidates are asked to find out digits following certain given conditions.

**Examples :**

1. How many 5's are there in the following sequence which are preceded by 3 but not followed by 8?

4 5 8 3 2 7 3 5 1 7 8 9 3 5 8 3 1 3 5 2

- A) 4                                      B) 3  
C) 2                                      D) 1  
E) 5

**Explanation:**

**Ans: (C)**

|   |   |       |
|---|---|-------|
| 3 | 5 | Not 8 |
| 3 | 5 | 1     |
| 3 | 5 | 2     |

2. How many even numbers are there in the following series, each of which is preceded by an odd number but not followed by an even number?

5 3 4 8 9 7 1 6 5 3 2 9 8 7 3 5

- A) None                                      B) 1  
C) 2                                      D) 3  
E) 4

**Explanation:**

**Ans: (D)**

| Odd number | Even number | Odd number |
|------------|-------------|------------|
| 1          | 6           | 5          |
| 3          | 2           | 9          |
| 9          | 8           | 7          |

**Direction (Qns. 3 – 5) : Study the sets of numbers given below and answer the questions which follow.**

562, 784, 321, 423

3. If the positions of first and last digits in number are interchanged, which of the following will be the highest number ?

- A) 562                                      B) 784  
C) 321                                      D) 423  
E) 410

**Explanation:**

**Ans: (B)**

$562 \Rightarrow 265$  ;  $784 \Rightarrow 487$  ;  $321 \Rightarrow 123$  ;  $423 \Rightarrow 324$

The highest number =  $487 \Rightarrow 784$

4. If the digits of last two numbers are interchanged, what will be the difference between the highest number and the lowest number ?

- A) 436                                      B) 463  
C) 364                                      D) 346  
E) 332

**Explanation:**

**Ans: (A)**

$562 \Rightarrow 526$  ;  $784 \Rightarrow 748$  ;  $321 \Rightarrow 312$  ;  $423 \Rightarrow 432$

The highest number = 748 ; The lowest number = 312

$\therefore$  Difference is 436

5. If two is added from each of the numbers, which of the following numbers will be the sum of the second digit of the lowest number and the second digit of the second highest number ?

- A) 4                                      B) 8  
C) 16                                      D) 32  
E) 24

**Explanation:**

**Ans: (B)**

$562 + 2 = 564$  ;  $784 + 2 = 786$  ;  $321 + 2 = 323$  ;  $423 + 2 = 425$

Second highest number = 564

The lowest number = 323

$6 + 2 = 8$

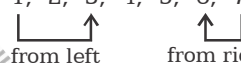
6. If the digits in the number 5, 7, 6, 1, 3, 4, 2 are arranged in ascending order, what will be the difference between the digits which are second from the right and third from the left in the new arrangement ?

- A) 4                                      B) 5  
C) 3                                      D) 6  
E) 9

**Explanation:**

**Ans: (C)**

Ascending Order :

1, 2, 3, 4, 5, 6, 7      Difference =  $6 - 3 = 3$   


7. If the 2 is added only with odd numbers of 5, 8, 9, 11, 7, 3, 2, 13 and 1 is added only with the even numbers of the same above. Then arrange the numbers in descending order. What will be third from the right when the new arrangement ?

- A) 7                                      B) 5  
C) 13                                      D) 3  
E) 11

**Explanation:**

**Ans: (A)**

$$\begin{array}{cccccccc} 5 & 8 & 9 & 11 & 7 & 3 & 2 & 13 \\ +2 & +1 & +2 & +2 & +2 & +2 & +1 & +2 \\ \hline 7 & 9 & 11 & 13 & 9 & 5 & 3 & 15 \end{array}$$

New arrangement

Descending order – 15, 13, 11, 9, 9, 7, 5, 3

