

Input Output

In such type of reasoning based question, you are given a word and number arrangement. With each subsequent operation, the arrangement of the words and numbers changes following a particular pattern. These operations are performed until a final arrangement is reached or is performed in a loop. You are required to identify the hidden pattern in the rearrangement and apply it to the questions.



Types of Input-Output operations asked

In this topic, there are primarily four types of operations that usually feature in exams. The four operations are as follows:

- **Ordering:** Either the words are arranged alphabetically (forward/ reversed) or numbers are arranged in ascending/ descending order. The arrangement is usually based on the first letter of every word. Sometimes it is based on the last letter of every word. Both words and numbers could be arranged individually or simultaneously in each step. The rearrangement can start from the left or right side of the sentence and sometimes even simultaneously from both the ends. The rearrangement could either start with a word or a number etc.

Example 1: Input: Cat Rail Snow Moon Fear

Step 1: Snow Cat Rail Moon Fear

Step 2: Snow Rail Cat Moon Fear

Step 3: Snow Rail Moon Cat Fear

Step 4: Snow Rail Moon Fear Cat

This is the final arrangement and STEP IV is the last step for this input.

What will be the last step of the following input?

INPUT: Care Steel Brick Nap Bomb Cry

- **Solution:** The given rearrangement has a pattern that can be followed from the input step to the final step, which is Step IV. Observe carefully. The rearrangement follows the following patterns:
 - The rearrangement is taking place from left to right.
 - The rearrangement is taking place one word at a time.
 - The rearrangement is done on the basis of descending alphabetic order based on the first letter of the word.

NOTE :

To understand the pattern, often it is sufficient to look at the input, 1st, 2nd and final steps of the arrangement.

Now, if we apply the same pattern rules to the second input, we can immediately tell what the output (final step after rearrangement) would be:

Input: Care Steel Brick Nap Bomb Cry

Output: Steel Nap Cry Care Brick Bomb

- **Mathematical Operations:** Some mathematical operations (like squaring the number, adding the digits within the number, some common number

added/subtracted/multiplied/divided to each number etc.) are applied on the numbers in each step.

Example 2: Input : 26 34 56 78 63 99

Step 1: 20 34 56 78 63 90

Step 2: 20 30 56 78 60 90

Step 3: 20 30 50 70 60 90

Step III is the final step. Explain the operation.

Solution: In this example, the unit's digits of the left-most and right-most number are simultaneously being subtracted from the numbers themselves. This is followed by the number to the right of the left-most one, and to the left of the right-most one.

- **Shifting or interchanging:** In this type the positions of characters/alphabets/words etc., in the input changes according to questions, following a particular pattern which repeats itself e.g. 'shift 1st character to last' or 'interchange 1st & last' etc.

Example 3: A computer rearranges a particular input using some operations 01, 02, 03, and 04.

Input :

I am not coming home for dinner

Step 01: dinner not am coming home for I

Step 02: not dinner coming am home I for

Step 03: for coming dinner am home I not

Step 04: coming for am dinner home not If

Step 4 gives "I know you will not come back" what step will have "you back I come not will know"

Solution: Since the words remain unchanged here, so this is case of either rearrangement or shifting. Let us number each word for our convenience.

I = 1, am = 2, not = 3, coming = 4, home = 5, for = 6, dinner = 7

Input : 1 2 3 4 5 6 7

Step 01: 7 3 2 4 5 6 1

Step 02: 3 7 4 2 5 1 6

Step 03: 6 4 7 2 5 1 3

Step 04: 4 6 2 7 5 3 1

So, the logic being followed is:-

Step 01 = Swap 1st & last; 2nd & 3rd

Step 02 = Swap 1st & 2nd, last two & 3rd and 4th

Step 03 = Swap 1st & last, 2nd & 3rd.

Step 04 = 1st & 2nd, last two, & 3rd and 4th.

Since after two steps, the operation is repeated, hence you can guess the 5th, 6th, 7th steps.

- **Others:** Input-Output section may also consist of questions like making an alphabet capital, replacing alphabet by corresponding number etc. If words (of the input) do not change in the output, the operation is either reordering or shifting. In this case, check for rearrangement first. If it is not the operation performed then check for shifting next. If words (of the input) do change in the output, the operation is either Mathematical (if numbers are used) or fall into category of other operations (if alphanumeric data is used).

Important Insights

- At most 'n-1' steps are required to rearrange and input with 'n' words/digits.

- Number of words/digits arranged until the particular step is greater than or equal to the particular step number.
- If input is not given, we cannot determine the previous step from a given step or we cannot determine input from a given step.
- Do not write complete words while solving. To save time, write the first letter or as many letters of each word as you need to uniquely identify it.

Illustration: A word and number arrangement machine when given an input line of words and numbers rearranges them following a particular rule in each step. The following is an illustration of input and rearrangement.

Input: good more 63 39 28 for again 66

Step 1 : 66 good more 63 39 28 for again

Step 2 : 66 again good more 63 39 28 for

Step 3 : 66 again 63 good more 39 28 for

Step 4 : 66 again 63 for good more 39 28

Step 5 : 66 again 63 for 39 good more 28

Step 6 : 66 again 63 for 39 good 28 more

As per this rule answer the following questions.

Example 4: Input: Chanakya Wind 23 43 56 Heir Beach 71

How many steps will be required to complete the rearrangement?

- **Solution:** The rearrangement follows the following pattern:
 - The rearrangement is taking place from left to right.
 - The rearrangement is taking place one word/number at a time.
 - The rearrangement is done on the basis of ascending alphabetic order based on the first letter and decreasing order of numbers.

- Also the numbers and alphabets are arranged alternatively, starting with numbers.
- The numbers/words are brought at their right position through shifting.
- Let us take here the first letters of the word and then proceed.

Input: C W 23 43 56 H B 71

Step 1: 71 C W 23 43 56 H B

Step 2: 71 B C W 23 43 56 H

Step 3: 71 B 56 C W 23 43 H

Step 4: 71 B 56 C 43 W 23 H

Step 5: 71 B 56 C 43 H W 23

Step 6: 71 B 56 C 43 H 23 W

Hence, there are six steps for this.

Solution: Whenever shifting is done using ordering, (increasing/decreasing) we can never revert to the previous step, as we cannot determine from which place we have picked the character. So the answer is option 4th

Input-Output : Key Learning

- Input-Output questions are more commonly asked in banking and other government exams. The above tips will help you solve them in less time.
- If input is not given, we cannot determine the previous step from a given step or we cannot determine input from a given step.