Direction Sense

Direction sense problems are another category of the problems asked. The ability of the students to understand directions is tested in these type of problems.

Before we start looking at the examples or the exercise we need to understand certain parts of the concepts and the types of problems that are usually asked in this category.

Concepts and Types of Problems :

1.   Directions on a board or on paper are universal and can be shown as per convenience. The only point to remember is whichever direction is taken as East, West will be directly behind, North to the left hand side while facing East and South to the right hand side. If this convention is followed, taking East in whichever way, the others would automatically get decided.

2.   Another point to know is Clockwise and Anticlockwise. Clockwise will always be as per the movement of the Clock while Anticlockwise is the exact opposite of the ways the hands of a clock move. Many a times left and right will be used instead of Clockwise and Anticlockwise.

3.   Rotation or turn by a particular angle is also an aspect that needs to be known. Generally, students are comfortable while dealing with turns of 90 degrees or it's multiples but make mistakes when the angle is 45 degrees or 135 degrees. Understanding the above is simple.

Let us take an example of a turn of 135 degrees. When a turn of 135 degrees is to be effected, it can be taken as 90 degrees and a further 45 degrees. Similarly, if a turn of 45 degrees is to be effected, it can be seen as half of a 90 degree turn.

Types of Problems : There are 3 different types of problems that are asked as a part of Direction based Questions. Let us look at all of them through an example.

Example : A man started from his house facing the North direction, Walked straight for 10 m , took a right turn walked for 5 m took another turn to walk for 12 m and then stopped.

Q1 : In which direction is he walking?

Let us first depict the directions the way we would use in the problem.

North

West   East

South

If he walks for 10 m along the north direction and then takes a right turn, he would be walking along the East direction for 5 m. Now if he again takes a right turn, he will be moving along the South direction.

Q2 : In which direction is he with respect to the starting point?

Many students do not differentiate between Q1 and Q2 and thereby end up making mistakes. The 2nd question is different from the first because in the 2nd question, we have to find the final position with reference to the starting point. The answer to the 2nd question will be South-East.

Q3 : How far is he from the starting point?

To answer the above question, we will be invariably using the properties of right angle triangle. As per the question, his position with reference to the starting point is as follows:

5

2
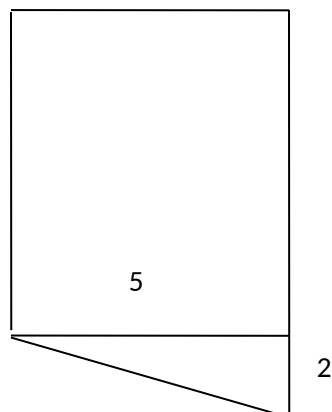
We need to calculate the distance shown above. Required answer is √ 25+4

= √29 m

Direction Sense

Practice Exercise Level 1 :

Q1 : A man starts from his house facing the East direction, walks straight for 7 m, takes a left turn to walk 5m, takes a right turn to walk 5 m and stops. How far is from the starting point?

a.   12 m   b. 14 m   c. √21 m   d. 13 m

Q2 : Rohit's house faces the West direction. He goes out from the back door of his house, walks for 8m, takes a right turn to walk 10 m, takes another right turn to walk 10 m and stops. In which direction is he with respect to the starting point?

a.   South   b. South-West   c. West   d. South-East

Q3 : A man is standing facing the South-East direction. He takes 145 turns each of 45 degrees in the clockwise direction and finally a 90 degree turn in the anti-clockwise direction. Which direction is he facing now?

a.   East   b. South-East   c. South-West   d. West

Q4 : Mohan and Ram are standing 5 m apart facing the East direction with Mohan to the right of Ram. They both walk straight for 7m. Mohan takes a right turn walks for 5m, takes another right, walks for 7m and stops. Ram takes a left turn walks for 7m, takes a right turn walks for 5m and stops. What is the distance between them?

a.   24 m   b. 12√2 m   c. 20 m   d. 12 m

Q5 : Sunita starts from her house and takes a right, left and right turn to reach School. If she comes from her school to her house along the same path, what will be the order of turns required?

a.   Left,Right,Right

b.   Right,Left,Right

c.   Left,Right,Left

d.   None of These

Q6 : Amit starts from his School facing the West direction, walks straight for 8m and then takes a 45 degree turn to his left, walks for 5m and stops. In which direction is he walking?

a.   South-West   b. South   c. South-East   d. None of These

Q7 : Town A is to the North of Town B which in turn is South-West to Town C. In which direction of Town C is Town A located?

a.   North-West   b. South-West   c. West   d. Cannot be Determined

Q8 : On a bright Sunny morning, 2 friends Vishal and Shashwat are standing facing each other. If the shadow of Vishal falls to his right, then which is the direction that Shashwat is facing?

a.   East   b. West   c. North   d. South

Q9 : A boy starts from his house, walks straight for 10m, takes a left turn to walk 4 m, takes a right turn to walk 5m and finally takes a left turn walks for 3m and stops. How far is he from the starting point?

a. $\sqrt{226}$ b. $\sqrt{74}$ c. $\sqrt{26}$ d. $\sqrt{274}$

Q10 : Kartik walks out of the front of his house that faces the West direction, walks straight for 9m, takes a 135 degree turn in the anticlockwise direction, walks for 5m and then takes a 45 degree turn in the clockwise direction and stops. In which direction is he walking?

a.   South   b. South-West   c. West   d. None of These

Coding Decoding

In Coding Decoding problems, a word is given in a coded form. The student has to understand the basis of coding ie decode the given word and on the same basis do the coding for another given word. Coding Decoding problems can also be categorized into certain types and we will try to look at each one of them.

Concepts and Types of Problems:

Type 1 : A word is given in a coded form and another word is asked to be coded using the same basis. The basis of coding the original word can be further categorized. We would like to understand some of the popular techniques used for the basis of coding.

a.   The alphabets of the original word shifted by certain places in the series.

Example If APPLE is coded as BQQMF, then how will MANGO be coded in the same language?

We can see that the basis is shifting of each alphabet by 1.

Therefore MANGO will be coded as NBOHP

The basis need not be +1. It can be -1 as in the following example

Example If APPLE is coded as ZOOKD, then how will MANGO be coded in the same language?

MANGO will be coded as LZMFN as the basis of coding is -1.

The Basis could also be an increment or decrement of +1 or -1

Example If APPLE is coded as BRSPJ, then how will MANGO be coded in the same language?

The differences will be 0,1,2 and so on.

MANGO will be coded as NCQKT.

In all of the examples above, the coding was being done in the forward direction. This may not always be true.

Coding in a problem can be done in the reverse direction or a combination of forward and reverse direction. In both cases, examples of questions in the forward direction will be equally applicable.

b.   The alphabets of the original word used in a certain order as the basis of coding.
Example If MANGO is coded as OGNAM, then APPLE will be coded as ELPPA.

Example If MANGO is coded as AMNOG then APPLE will be coded as PAPEL.
Notice that while the middle alphabet remains the same, the others are taken in pairs and exchanged.

Example If MANGO is coded as OMGAN, then APPLE will be coded as EALPP.
Example If DECIDE is coded as EDICED, then DIRECT will be coded as IDERTC.

Example If DECIDE is coded as CEDEDI, then DIRECT will be coded as RIDTCE.

In such examples, if the original word is 6 alphabets long, then invariably the word asked in the question is also of the same length.

c.   Examples where Reverse Equivalent of the alphabets are used.
A B C D E F G H I J K L M
Z Y X W V U T S R Q O N

The reverse alphabet for A is Z, that for B is Y and so on
Example If USED is coded as FHVW then EQUAL will be coded as VJFZO

d.   Examples where the position of the alphabet is used.
For Example if TUBE is coded as 202125, then CYCLE is coded 3253125

Type 2 : In this type of problems, a language is used in coded form. One has to understand the code and then answer the questions asked. This Category can be further divided into the following problems.

a.   If Red is called Blue, Blue is called Yellow, Yellow is called Violet, Violet is called Pink and Pink is called Brown in a certain language, then what will be the colour of the sky as per this language?

These type of problems are easy to attempt using a little logic. We know that colour of the sky is actually Blue and in this language Blue is called Yellow. Therefore, the colour of the sky will be Yellow as per this language.

The problem is the same even if the problem is worded as "If Red is Blue, Blue is Yellow and so on…….

b.   Let us look at another example

If Red means Blue, Blue means Yellow, Yellow means Violet, Violet means Pink and Pink means Brown in a certain language, then what will be the colour of sky as per this language?

For many students, there is no difference between example a and b whereas they are actually 2 different questions. Our answer in the second example should be one that actually means Blue and therefore our answer will be Red.

Please learn to differentiate between Types a and b.

c.   Let us look at a 3rd example

Ma La Ke means we are sad

La Min Se means Sad is joy

Min Kab ma means joy we must

Which word in the language means are ?

If we compare statements 1st and 2nd, then La stands for sad. Similarly, if we compare statements 1st and 3rd, then Ma means we and if we compare statements 2nd and 3rd, then Min means joy.

Therefore, Ke in the language means are.

A question like the one above is also formed using digits instead of words as the basis of coding.

Type 3 : In this type, an Input Output Machine rearranges a given group of words in a particular sequence based on logic. We need to understand the logic being used and find the answers to the rearrangement of another given group of words. Sometimes, numbers are used in these problems instead of words.

For Example : Input : today go all we market will to
Step 1 : go today all we market will to
Step 2 : go to today all we market will
Step 3 : go to we today all market will
Step 4 : go to we all today market will
Step 5 : go to we all will today market
Step 5 is the final step for this sentence. It is also called the Output.

Can we identify the logic being used by the machine. It is arranging the words in increasing order of their length from left to right. Also, for words of the same length, it is arranging the words in the increasing order of their first alphabet.

In all the types mentioned above, numbers or digits can be used as the basis of coding instead of alphabets or words.

Coding Decoding

Practice Exercise Level 1 :

Q1 : If ATTRACT is coded as UCFXFZY , then how will DENOTES be coded in the same language?

a.   TFHIYTV   b. FTHIYTV   c. HTFIYTV   d. TFIHYTV

Q2 : If PRICE is coded as RPIEC in a certain language, then how will STAND be coded in the same language?

a.   ASTND   b. TSAND   c. TSADN   d. STNDA

Q3 : IF APPLE is coded as 11616125 in a certain language, then how will MANGO be coded in the same language?

a.   13112715   b. 13114715   c. 13117215   d. None of These

Q4 : If RETIRE is coded as TERERI in a certain language, then how will SUFFIX be coded in the same language?

a.   SUIXFF   b. FUSXIF   c. XIFFUS   d. None of These

Q5 : If BEGIN is coded as ACDFFHHJMO in a certain language, then how will ALTER be coded in the same language?

a.   ZBKNSUDFQS   b. ZBKNSTDFQS   c. ZBKMSUDFQS d. None of These

Q6 : If Bus is called Train, Train is called Ship, Ship is called Aeroplane, Aeroplane is called Cycle and Cycle is called Car in a certain language, then what can fly as per this language?

a.   Aeroplane   b. Ship   c. Cycle   d. None of These

Q7 : If Intelligent means Smart, Smart means talkative, talkative means Foolish and Foolish means Quick in a certain language, then what will a dumb person be called in this language?

a. Talkative   b. Foolish   c. Quick   d. Cannot be Determined

Q8 : If Red is Blue, Blue is Green, Green is Pink, Pink is Violet and Violet is Brown in a certain language, then what will be the colour of Grass as per this language?

a. Green   b. Blue   c. Red   d. Pink

Directions for Questions 9-11 : An Input-Output Machine converts a given Input into Output using a certain logic. You have to understand the logic and answer the questions that follow.

Input : Deer and Panther form of the Zoo.
Step 1 : and deer panther form of the zoo.
Step 2 : and deer form panther of the zoo.
Step 3 : and deer form of panther the zoo.
Step 3 is the final output in this case.

Q9 : In how many steps will the input "wind blows around from east to south" get converted into the output?

a. 4   b. 5   c. 6   d. 7

Q10 : What will be the result obtained after the 2nd step?

a. around wind blows east from to south

b. around blows wind east from to south

c. around blows wind from east to south

d. None of These

Q11 : If the result after the 3rd step is "against comfortably India won the match Pakistan", then what will be the Input?

a. won the match Pakistan against comfortably India

b.   won the match Pakistan comfortably against India

c.   won the comfortably match Pakistan against india

d.   Cannot be Determined.

Directions for Questions 12-15 : In a certain language "kal tum hum" means "we are together", "Hum ni tak" means "together to go" and "tak kal man" means "round we go".

Q12 : Which word in the language means "are"?

a.   Kal   b. tum   c. hum   d. Cannot be Determined

Q13 : What does the word "man" in the language represent?

a.   we   b. go   c. round   d. Cannot be Determined

Q14 : What will be the meaning of "man kal ni" in this language?

a.   Round we to

b.   Go we to

c.   Round we together

d.   Round we are

Q15 : Which word in the language means "go"?

a.   man   b. kal   c. tak   d. ni

Series Completion

Concepts : Series and analogies are designed to measure a student's ability to find logical patterns, which may be based on simple mathematical and logical rules and properties.

Number Series : A Sequence of numbers is given, where one needs to identify the pattern between the numbers. This pattern needs to be applied in the series to find out the missing number. There can be infinite ways to create a series, but all the numbers within a series should have the same relationship between them.

Due to the various patterns that can be used to create a number series, this can often be a difficult and time consuming question type. To solve problems on number series, one should be familiar with the basics of numbers ie multiplication tables, squares, cubes, powers, factorials etc.

a.   Based on Difference

This is the most basic and common form of series. It is based on the difference between consecutive terms of the series which can be either constant or based on a Mathematical pattern of it's own. If the numbers obtained after the first level of substraction do not show any pattern among them, take the difference of these numbers. The numbers obtained after second level of substraction may now show a pattern. Continue this process till a pattern is observed. Ocassionally, the difference between the terms may be based on special numbers such as prime numbers, factorials, powers or roots.

Example 1: 336,305,268,227,184,?

The difference between the 1st and 2nd term is 336-305=31

The difference between the 2nd and 3rd term is 305-268=37

The difference between the 3rd and 4th term is 268-227=41

The difference between the 4th and 5th term is 227-184 = 43

The difference between any 2 consecutive terms are all consecutive prime numbers.

Therefore the 6th term must be 184-47=137

Example 2 : 1,3,6,10,15,?

The difference between consecutive terms is 2,3,4,5 and therefore, the 6th term must be 15+6=21

The above series can also be seen as 1,(1+2),(1+2+3),(1+2+3+4) and so on which again tells us that there could be multiple logic used to form the same series.

b.   **Based on Product :** A product based series is one where the pattern is identified by a process of multiplication or division. Common patterns used in these problems are powers, factorials and multiples. A feature of such problems is that the value of consecutive terms increases/decreases quite sharply. However, first level substraction may often help in identifying the underlying pattern.

The series based on product can be further classified into the following types:

1.   Product : The series may be based on simple application of factors or multiples.

Example 1 : 6,15,35,77,?

The 1st term is 2x3, the 2nd term is 3x5, the 3rd term is 5x7 and the 4th term is 7x11 ie the series is the product of consecutive prime numbers.

The next term will be 11x13 = 143

Example 2 : 6,3,3,4.5,9,?

The 2nd term can be written as 1st term x 0.5, the 3rd term can be written as 2nd term x 1, the 4th term can be written as 3rd term x 1.5 and so on.

Required value will be 9x2.5 = 22.5

2.   Power : In power based problems, the increase in the value of consecutive terms will be higher as compared to pure product based problems.

Example 1 : 2,6,30,230,?

The given series can be written as (1^1+1), (2^2+2), (3^3+3), (4^4+4)

Required answer will be 5^5+5 = 3130

3.   Factorial : The values of the factorial of the first few natural numbers is used as the basis for this series.

Example 1 : 1,2,4,9,28, ?

The given series can be written as 0!+0, 1!+1, 2!+2, 3!+3, 4!+4

The answer therefore will be 5!+5 = 120+5 = 125

c.   **Alternating Series :** An alternating series is a combination of two or more series. Each series can have different patterns applied to it and then combined to form a series. In a combination of 2 or more series, alternate terms follow the same pattern.

Example 1 : 3,4,7,9,11,14,15,?

As can be observed, there are 2 different series, one with a constant difference of 4 (terms being 3,7,11 and 15) and the other with a constant difference of 5(4,9,14…). The answer therefore will be the next term of the 2nd series mentioned ie 19.

d.   **Miscellaneous :** These can involve a combination of patterns or series and cannot be directly classified.

Example 1 : 10,103,18,187,?

a.   979   b. 26   c. 9   d. 251

The difference of consecutive terms does not form a logical series. Let us look at the sum of the digits of each term.

10=1+0=1

103=1+0+3=4

18=1+8=9

187=1+8+7=16

Thus, the sum of digits of each term is the square of consecutive natural numbers.

Hence, the next term of the series should be such that the sum of it's digits is 5^2 ie 25.

Therefore, 979 is the correct answer choice.

Letter Series : A Letter series generally uses the position of a letter in the alphabet or some other property of letters such as vowels/consonants etc.

In questions on letters, one should replace the letter by it's corresponding position in the alphabet thereby making the pattern simpler to understand. Like number series, a letter series can also have alternating patterns.

Example 1 : Find the next 2 terms of the series L,M,O,N,R,O…..

The position of the alphabets is 12,13,15,14,18,15

We observe that there are 2 alternating series ie 12,15,18…… and 13,14,15……

Hence the next 2 terms in the series should have positions 21 and 16 respectively.

The next 2 terms should be U and P respectively.

Alphanumeric Series: These include a combination of alphabets, numbers and symbols. Questions can be asked individually or as part of a group question.

Example 1 : Find the missing term. 1k1,1M3,1Q7,1S9

The position of each alphabet is K:11, M:13, Q:17, S:19

We can see that the numbers on the side of the letter when taken together, represent the position of the letter in the alphabet. Also, the numbers are consecutive prime numbers starting from 11.

Hence, the next term should correspond to the next prime number ie 23. The letter at the 23rd position of the alphabet is W and therefore the next term should be 2W3.

Series Completion

Practice Exercise Level 1 :

Directions for Questions 1-5 : Find the missing term in the Series

Q1 : 5,8,7,15,11,29,17,50,?

a.   27   b. 55   c. 25   d. 52

Q2 : 6,19,77,?, 2317

a.   286   b. 387   c. 721   d. 386

Q3 : 235,237,240,?,252,263

a.   247   b. 245   c. 241   d. 244

Q4 : 5,9,18,34,?,95

a.   57   b. 61   c. 59   d. 55

Q5 : 7,26,?,124,215,342

a.   63   b. 64   c. 62   d. 61

Directions for Qs 6-7:

There is an alphanumeric series given below. Answer the questions on the basis of this series.

A37B719C9D5DKL6R6S7S

Q6 : How many letters are immediately preceeded and immediately followed by the same digit?

a.   1   b. 2   c. 3   d. 0

Q7 : How many digits are immediately preceeded as well as immediately followed by the same letter?

a.   0   b. 1   c. 2   d. 3

Q8 : J,F,?,A,M,J,J

a. N b. D c. K d. M

Q9: M,T,W,?,F,S,S

a. H b. L c. N d. T

Q10 : E,F,?,K,O,T

a. G b. I c. J d. H

Q11 : BC5, E5, GK18, M13,?

a. QS36 b. UV43 c. TU42 d. Q17

Q12 : PJ:36::TN:?

a. 25 b. 49 c. 36 d. 64

Q13 : AD: WZ::FI: ?

a. RU b. RT c. TU d. SU

Q14 : JpUi:lRwK::FgTq:?

a. hJvS b. hlvT c. hlvS d. None of These

Q15 : 343 : 56 : : 512 : ?

a. 72 b. 66 c. 71 d. 68