Chapter 8

Puzzles

CHAPTER HIGHLIGHTS

- *Distribution*
- *Order Sequence*
- *Selections*
- *Questions on Routes/Networks*

Puzzles

In this type of problems, you have to match two or more 'variables'. (Variable means a 'subject' as used in the discussion of linear arrangement.) In double line-up, the data given may talk of four people living in four houses each of a different colour. What we need to find out is the colour of the house of each of the four persons. There is no first position or second position of the houses.

Sometimes, double line-up is also called as 'distribution'. An example of data given for this variety of questions is:

'Each of the four persons A, B, C, and D wears a different coloured shirt—red, pink, blue, and white. A has a red shirt and D does not have a pink shirt'.

From the statement, it becomes clear that no person among A, B, C, and D can have shirts of two different colours among red, pink, blue, and white.

As discussed in the questions on single line-up, questions can be solved easily by representing the given data pictorially. In case of double line-up, it will help us if we represent the data in the form of a matrix or a table.

Let us see how to draw a matrix for the data given.

Names	Colours			
	Red	Pink	Blue	White
A	✓			
B				
C				
D		×		

As it is given that A has red shirt, it is clear that he does not have any other colour shirt. Similarly B, C, D do not have red shirt. So, in all the other cells in the row belonging to A, we put a cross ('×'). Then, the table will look as follows:

Names	Colours			
	Red	Pink	Blue	White
A	✓	×	×	×
B	×			
C	×			
D	×	×		

In this manner, we can fill up the cells on the basis of the data given to us. Once, we use up all the data, we will draw any conclusions that can be drawn and then answer the questions given in the set.

Let us Take a Few Examples

Direction for questions 1 to 5: These questions are based on the following information.

P, Q, R, S, T, U, V, an d W are eight employees of a concern. Each is allotted a different locker, out of eight lockers numbered 1 to 8 in a cupboard. The lockers are arranged in four rows with two lockers in each row.

Lockers 1 and 2 are in the top row from left to right, respectively, while lockers 7 and 8 are in the bottom row—arranged from left to right, respectively. Lockers 3 and 4 are in the second row from the top—arranged from right to left, respectively. So are lockers 5 and 6—arranged from right to

left, respectively—in the second row from the bottom. P has been allotted locker 1 while V has been allotted locker 8. T's locker is just above that of Q which is just above that of R, whereas W's locker is in the bottom row.

Solved Examples

Example 1: Which of the following cannot be the correct locker number–occupant pair?
(A) 3-Q (B) 7-W (C) 4-U (D) 6-R

Example 2: If U's locker is not beside Q's locker, whose locker is just above that of W?
(A) U (B) S (C) R (D) Q

Example 3: Which of these pairs cannot have lockers that are diagonally placed?
(A) P-Q (B) S-R
(C) U-R (D) Either (B) or (C)

Example 4: Which of the following groups consists only occupants of odd numbered lockers?
(A) Q, R, W (B) R, V, W
(C) T, R, Q (D) P, T, Q

Example 5: If U's locker is in the same row as that of R, and S exchanges his locker with V, then who is the new neighbour of V in the same row? (Assume that nothing else is disturbed from the original arrangement)
(A) P (B) Q (C) R (D) U

Solutions for questions 1 to 5:
Let us first try to locate the lockers in the cupboard as per the conditions given. Then, we will do the allotment to the persons.

Lockers 1 and 2 are in the top row and lockers 7 and 8 are in the bottommost row. In these two rows, the lockers are numbered from left to right. In the other two rows, the lockers are numbered from right to left.

L	R	
1	2	Top Row
4	3	
6	5	
7	8	Bottom Row

Now let us look at the conditions given for the allotment of the lockers.

P has locker 1. V has locker 8.

1-P	2
4	3
6	5
7	8-V

Locker of W is in the bottom row → W's locker must be 7.

1-P	2
4	3
6	5
7-W	8-V

T's locker is just above that of Q, which is just above that of R → The lockers of T, Q, and R must be 2, 3, and 5, respectively (there are no other group of lockers which satisfy this condition).

1-P	2-T
4	3-Q
6	5-R
7-W	8-V

S and U have lockers 4 and 6 left for them.

Thus, on the basis of the data given to us, we can show the final arrangement of lockers as below:

1-P	2-T
4-S/U	3-Q
6-U/S	5-R
7-W	8-V

Now we can answer the questions easily on the basis of the above.

Example 1: By looking at the final arrangement of lockers above, we find that choice (D) does not represent the correct combination of locker number-occupant pair.

Hence, the correct option is (D).

Example 2: If U's locker is not beside Q's locker, then U's locker must be locker 6. So, it is U's locker that will be immediately above W's.

Hence, the correct option is (A).

Example 3: R's locker is in the same row as that of exactly one of S or U and diagonally placed to the other one. Hence, 'either S-R or U-R' is the answer.

Hence, the correct option is (D).

Example 4: The odd-numbered lockers 1, 3, 5, and 7, which belong to P, Q, R, and W, respectively. Of the choices, we find that Q, R, W appear in choice (A). Hence, this is the correct choice.

Hence, the correct option is (A).

Example 5: U's locker is in the same row as that of R, which means that locker 6 belongs to U. So, locker 4 belongs to S. Now, V and S exchange lockers. Then, the new neighbour of V is Q.

Hence, the correct option is (B).

Direction for questions 6 to 10: These questions are based on the following information.

There are four trees—lemon, coconut, mango, and neem—each at a different corner of a rectangular plot.

A well is located at one corner and a cabin at another corner. Lemon and coconut trees are on either side of the gate, which is located at the centre of the side opposite to the side, at whose extremes, the well and the cabin are located. The mango tree is not at the corner where the cabin is located.

Example 6: Which of the following pairs can be diagonally opposite to each other in the plot?
(A) Neem tree and lemon tree
(B) Cabin and neem tree
(C) Mango tree and well
(D) Coconut tree and lemon tree

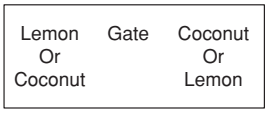
Example 7: If the lemon tree is diagonally opposite to the well, then the coconut tree is diagonally opposite to the
(A) Mango tree (B) Well
(C) Cabin (D) Gate

Example 8: If the coconut tree and the neem tree cannot be at adjacent corners of the plot, then which of the following will necessarily have to be at diagonally opposite corners of the plot?
(A) Coconut tree and well
(B) Lemon tree and cabin
(C) Lemon tree and coconut tree
(D) Lemon tree and well

Example 9: Which of the following must be TRUE?
(A) Cabin and well are not at adjacent corners.
(B) Cabin and coconut tree cannot be at the adjacent corners.
(C) Neem tree and well are at adjacent corners.
(D) Neem tree and well are not at adjacent corners.

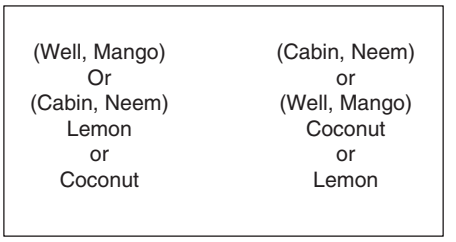
Example 10: Which of the following is definitely FALSE?
(A) Mango tree is adjacent to the well at one corner.
(B) Neem tree is adjacent to the cabin at one corner.
(C) Coconut tree is at the corner adjacent to the well.
(D) Lemon tree is not on the same side of the plot as the gate.

Solutions for questions 6 to 10:
Lemon and coconut trees are on either sides of the gate.



The well and the cabin are at either end of the wall opposite to the gate.

Mango tree and cabin are not at the same corner. So, neem tree and well are not at the same corner. This means that mango tree and the well are at the same corner and neem tree and the cabin are at the same corner.



Example 6: Let us take each choice and check with the above diagram to see if it is possible or not.

Neem and lemon trees can be diagonally opposite each other. Hence, this is the correct answer choice. (In an exam, you do not need to check the other choices since the first choice is correct. But, for the sake of clarity and proper understanding, we will check all the choices.)

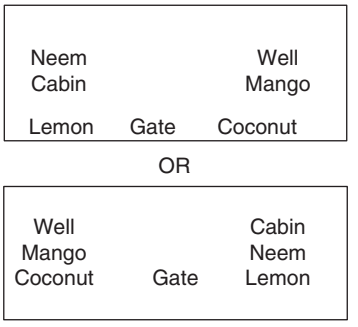
From the diagram given, we can see that cabin and neem tree cannot be located diagonally opposite each other.

Mango tree and well cannot be located diagonally opposite to each other.

Coconut and lemon trees cannot be located diagonally opposite each other.

Hence, the correct option is (A).

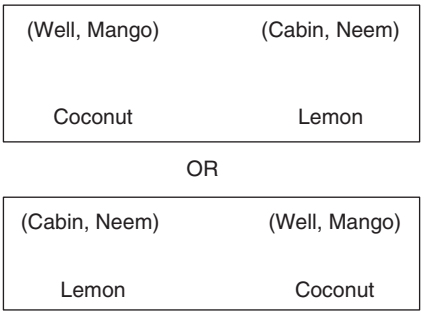
Example 7: If lemon tree is diagonally opposite to the well, then we can have the following two possible arrangements.



The coconut tree is diagonally opposite the cabin and neem.

Hence, the correct option is (C).

Example 8: Since coconut and neem trees cannot be at adjacent corners, the following arrangements are possible.



From these diagrams, we find that choice (D) is the correct answer.

Hence, the correct option is (D).

Example 9: We can check each statement with the diagram that we drew initially. We find that the statement in choice (C) which says that neem tree and the well are at the adjacent corners is true. Hence, choice (C) is the correct answer.
Hence, the correct option is (C).

Example 10: We check each statement with the diagram that we drew initially to find out which of the statements has to be false.

We find that choice (D) has to be false.

Hence, the correct option is (D).

Direction for question 11: Select the correct answer from the given choices.

Example 11: A, B, C, and D play four different games among baseball, cricket, kabaddi and volleyball. A does not play baseball or cricket. B does not play kabaddi or volleyball. C plays volleyball and D plays either baseball or volleyball. Who plays cricket?
(A) A (B) B (C) C (D) D

Solution for question 11:

C plays volleyball. A does not play cricket and D does not play cricket as he plays either baseball or volleyball.
∴ B should play cricket.

Hence, the correct option is (B).

Order Sequence

The term 'order sequence' is self-explanatory. In questions for this category, you will be asked to deal with relative positions of subjects. The absolute values of the subjects is not what you should be interested in. It is comparison between different subjects that you have to deal with. The data also specify the relationships like 'A is greater than B' or 'C is not less than D', and so on. You have to decide the positions of the subjects in ascending or descending order on the parameters given. The subjects of comparison can be people or things.

In short, data will be given to compare the quality or quantity. The parameters on which the subjects are compared can be heights or weights of people, the money with them, complexion, sizes of things, etc.

In such questions, you will come across typical statements like 'A is taller than B,' 'B is not shorter than C', and so on. You may use the following symbols to symbolically represent the conditions given and, then later, represent all the subjects pictorially.

Greater than	>
Less than	<
Greater than or equal	≥
Less than or equal	≤.

'Not greater than' is the same as 'less than or equal to'. Similarly, 'not less than' is the same as 'greater than or equal to'.

Words like 'Who, And, Which, But' used in the data play a significant role in analysing the data. 'And' and 'But' play the same role, whereas 'Who' and 'Which' play the same role.

Let us take one statement.

'A is taller than B, who is shorter than C and taller than D but shorter than E, who is taller than F and G but shorter than H'.

By using appropriate symbols, the above statement can be represented as follows.

$$A > B;\ B < C;\ B > D;\ B < E;\ E > F;\ E > G;\ E < H$$

Questions on the given data can be as follows.

1. Who is the tallest?
2. Who is the shortest?
3. Who is the second tallest in the group? etc.

Let us take some examples.

Direction for questions 12 to 16: Read the information given and answer the questions that follow.

A, B, C, D, and E are five cars while P, Q, and R are three motorcycles. A is the fastest of the cars and R is the slowest of the motorcycles. C is costlier than D and Q but cheaper than B. Among cars, A is not the costliest. D is cheaper than E and there is no car whose cost lies between the cost of these two. E is faster than three of the cars and all the motorcycles. Q is costlier than R but cheaper than P, who is faster than Q.

Example 12: Which of the following cars cannot stand exactly in the middle position among cars as far as their cost is concerned?
(A) A (B) C
(C) E (D) D

Example 13: Which of the following statements is true about the motorcycles?
(A) P is the costliest as well as the fastest motorcycle.
(B) The fastest motorcycle is not the costliest motorcycle.
(C) The slowest motorcycle is also the cheapest motorcycle.
(D) Both (A) and (C)

Example 14: If P is costlier than E, how many cars are cheaper than P?
(A) 1
(B) 2
(C) 3
(D) Cannot be determined

Example 15: If P is cheaper than A, which is not costlier than E, which of these is the cheapest of all the cars and motorcycles put together?
(A) R
(B) Q
(C) E
(D) Cannot be determined

Example 16: Which of these is the slowest of the cars, if B and C are faster than D?
(A) B (B) D (C) E (D) A

Solutions for questions 12 to 16:
Let us first write down all the comparisons given for costs and speeds. Then we will tabulate them.

Speed
A → fastest car
E → Faster than three of the cars ➔ E is the second fastest car
R → slowest motorcycle
P > Q
Cost
C > D
C > Q
B > C
A → Not the costliest among cars
E > D → No other car lies between these two
Q > R
P > Q

Now let us tabulate these data.
Speed
Cars

Fastest	A	E				Slowest

Motorcycles

Fastest	P	Q	R	Slowest

Cost
Cars

Costliest	B C E D	Cheapest

Here, we know that A is not the costliest car but we do not know where it will fit in. It can come anywhere after B except between E and D.

Motorcycles

Costliest	P	Q	R	Cheapest

In addition, we have to also keep in mind that C > Q in cost. (From this, we can conclude that B > Q, B > R, C > R in cost.)

Example 12: In terms of cost of the cars, A can come between B and C or between C and E or to the right of E. In each of the cases, the middle car will be C, A, and E, respectively. Hence, among the cars given, D cannot be in the middle.
Hence, the correct option is (D).

Example 13: By looking at the tables, we can make out that choices (A) and (C) are both correct, and, hence, the correct answer is choice (D).
Hence, the correct option is (D).

Example 14: If P is costlier than E, we can also conclude that it is costlier than D but we cannot conclude anything about the relationship between the cost of P and that of B, C and A.
Hence, the correct option is (D).

Example 15: Since A is not costlier than E, it means that A is at the same level of E or cheaper than E. We cannot conclude which of these two positions A is in. Hence, we cannot conclude which the cheapest of all the vehicles is. {Please note that if A is the cheapest car, then R will be the cheapest of all the vehicles. However, if A is at the same level as E in cost, then there is a possibility of R or D being the cheapest of all the vehicles.}
Hence, the correct option is (D).

Example 16: If B and C are faster than D, then the order will be as follows:

1	2	3	4	5
A	E	B/C	C/B	D

Hence, D is the slowest of all the cars.
Hence, the correct option is (B).

Direction for questions 17 to 21: Read the information given and answer the questions that follow.

J, K, L, M, and N are five boys in a class. They are ranked in the order of heights—from the tallest to the shortest—and in order of cleverness—from the cleverest to the dullest. K is taller than N, but not as clever as J and L, whereas M is the cleverest of all but shorter than J. While L is shorter than M but taller than K, L is not as clever as J. No two persons got the same ranks in any of these parameters.

Example 17: Who is the third in the order of heights?
(A) J (B) N (C) K (D) L

Example 18: If N is not the last in at least one of the two comparisons, which of the following is the dullest of all the five?
(A) K (B) L (C) M (D) J

Example 19: If L is the third in order of cleverness, who is the dullest of all?
(A) M
(B) N
(C) L
(D) Cannot be determined

Example 20: Who among the following is cleverer as well as taller than K?
(A) L and J only (B) N
(C) L and N (D) J, L and M

Example 21: How many people are definitely shorter than K?
(A) 1 (B) 2
(C) 3 (D) None of these

Solutions for questions 17 to 21:
Let us first write down all the conditions given and then tabulate the data.

Cleverness
J > K
L > K
M is the cleverest.
J > L

Height
K > N
J > M
M > L
L > K

Now, let us put together all the information we have.

Cleverness

Cleverest	M J L K	Dullest

We do not know where N will come in the order of cleverness but he will definitely be after M.
Height

Tallest	J M L K N	Shortest

Example 17: From the table, we can clearly see that L is ranked third in order of heights.
Hence, the correct option is (D).

Example 18: N is the last in terms of height. Since we are given that he is not the last in at least one of the lists, he cannot be the last in cleverness. So, K is the dullest of all.
Hence, the correct option is (A).

Example 19: If L is the third in the order of cleverness, as can be seen from the table, either N or K can be the dullest.
Hence, the correct option is (D).

Example 20: By looking at the tables we made and from the answer choices, we find that L, J, and M are taller as well as cleverer than K.
Hence, the correct option is (D).

Example 21: Only N is shorter than K.
Hence, the correct option is (A).

Direction for question 22: Select the correct alternative from the given choices.

Example 22: P, Q, R, S, and T are five girls competing in a running race. R and P have at least two girls ahead of each of them. T and P do not have more than one girl behind each of them. Who arrives at the finishing line after two girls as well as before two other girls, if no two girls finish the race at the same time?
(A) Q (B) S (C) T (D) R

Solution for question 22:
R and P have at least two girls before them ➔ R and P have to be in two out of 3rd, 4th, and 5th positions.
T and P have not more than one girl behind each of them ➔ T and P have to be in the 4th or 5th positions.
These two statements together mean that R will have to be in the third position.
Hence, the correct option is (D).

Selections

In this category of questions, a small group of items or persons has to be selected from a larger group satisfying the given conditions. The conditions will specify as to when a particular item or person can be included or cannot be included in the subgroup. For example, the condition may specify that two particular persons should always be together or that two particular persons should not be together.
Sometimes, the conditions given for selection or non-selection of items or persons may be based on logical connectives if-then, either-or, unless, etc. You should be careful in interpreting the logical connectives used in the conditions.

Direction for questions 23 to 27: These questions are based on the following information.
Amit, Bittu, Chintu, Dumpy, Falgun, Hitesh, Ronit, Purav, and Saurav are nine players from among whom three teams consisting of 4 members, 3 members, and 2 members, respectively, must be formed subject to the following conditions.
Chintu must have three more players with him while Dumpy must have only two more with him.
Chintu and Saurav cannot be in the same team.
Purav and Bittu cannot be in the same team.
Ronit and Hitesh must be in the same team.

Example 23: If Dumpy, Falgun, Purav form the team of 3 members, then which of the following must be TRUE?
(A) Hitesh must be in a team with Bittu.
(B) Saurav must form a two-member team with Amit or Chintu.
(C) Saurav must form a two-member team with Bittu or Amit.
(D) Chintu should form a team of 4 members with Hitesh, Ronit, and Amit.

Example 24: If Dumpy takes Amit as a part of his three-member team, which of the following must go into Chintu's team?
(A) Bittu and Hitesh (B) Hitesh and Ronit
(C) Purav and Ronit (D) Purav and Falgun

Example 25: If Chintu and Falgun are together and Saurav is in the team of two members, then how many sets of different teams are possible?
(A) 4 (B) 3 (C) 2 (D) 1

Example 26: If Chintu does not have Purav in his team and the two member team consists of Saurav and Amit, then Chintu should take
(A) Hitesh, Bittu, and Ronit.
(B) Bittu but not Ronit.
(C) Bittu and Falgun.
(D) Hitesh and Ronit.

Example 27: If Purav is in the same team as Chintu and Falgun, then Saurav must be in the same team as
(A) Bittu
(B) Bittu and Amit.
(C) Amit
(D) Bittu and Dumpy.

Solutions for questions 23 to 27:
It is given that:
Chintu must form a team of 4 members only
Dumpy must form a team of 3 members only.
Since Chintu and Dumpy are in two different teams, let us, for convenience, denote the two teams as the respective teams of these two persons. Let us call the team with four members as the first team and the team with three members as the second team. The third team should have two persons.

Number of members		
4	3	2
Chintu	Dumpy	Saurav
	Saurav	

Now let us take the other conditions and fill them up in the table.
Chintu and Saurav cannot be in the same team.
➔ Saurav will be in the second or the third team.

Purav and Bittu cannot be in the same team.
Hitesh and Ronit must be in the same team.
We cannot represent these two conditions right now in the table but we will use them as we go along.

Example 23: If Dumpy, Falgun, Purav form the team of 3 members, then Saurav should be in the third team.
Since Hitesh and Ronit must be in the same team, they have to be in the first team. That leaves only Amit or Bittu to be with Saurav in the third team.
Hence, the correct option is (C).
(Also, note that we can eliminate choice (B) easily.)

Example 24: Dumpy takes Amit as a member of his team.
If we take Hitesh and Ronit as the two members of the third team, then Saurav has to be in the second team, in which case we will have both Purav and Bittu coming into the same team—the first team—which is not possible.
Since Saurav cannot be in Chintu's team and Purav and Bittu cannot be in the same team, the three people required for Chintu's team will **have to be** Hitesh and Ronit check-font Falgun or Purav or Bittu.
Hence, the correct option is (B).

Example 25: Let us analyse the conditions. It is given that Chintu and Falgun are together, whereas Saurav is in the team of two members. Let us fill up these details in the box that we made and then see in how many ways we can fill up the remaining cells in the box.

Chintu	Dumpy	Saurav
Falgun		

First let us look at Hitesh and Ronit who must be in the same team.
They can go into the first team or the second team. Let us consider these two cases.

Case 1: Hitesh and Ronit go into the first team.
Then, one out of Bittu and Purav will to go into the third team and the other into the second team. This gives rise to two ways of forming the teams: one with Bittu in the second team and the other with Bittu in the third team.

Case 2: Hitesh and Ronit go into the second team.
In this case too, one out of Bittu and Purav will go into the third team and the other into the second team. Hence, this will also give rise to two ways of forming the teams.
Hence, there are total four ways of forming the teams.
Hence, the correct option is (A).

Example 26: Let us use the table that we built in the initial analysis and fill up the details that we have in this problem. Since the two member team is already formed and Chintu does not take Purav, hence Purav will have to go into the second team.

Chintu	Dumpy	Saurav
	Purav	Amit

Since Ronit and Hitesh have to be in the same team, they should go into the first team. Since Bittu cannot go with Purav, he should also be in the first team. This leaves Falgun for the second team. Thus, we can fill up the table as follows:

Chintu	Dumpy	Saurav
Ronit	Purav	Amit
Hitesh	Falgun	
Bittu		

Hence, the correct option is (A).

Example 27: If Purav is with Chintu and Falgun, then Bittu cannot be with them. Since Ronit and Hitesh should be together, the only other person left is Amit. These four members form the first team.

If Hitesh and Ronit together form the two member team, then Bittu and Saurav will be part of the three member team.

Instead, if Hitesh and Ronit are in the three-member team, then Saurav and Bittu will form the two-member team.

In either case, Saurav and Bittu are together in one team. Hence, the correct option is (A).

Direction for questions 28 to 31: These questions are based on the following information.

A, B, C, D, E, F, and G are seven players. They form two teams of two players each and one team of three players. A and B cannot be in the same team. B and C cannot be in the same team whereas E and F must be in the same team. G and D cannot be in the same team.

Example 28: If C, D, and A form a team of three players, which of the following can be the members of one of the other teams?

(A) A and E (B) G and B
(C) E and F (D) Both (B) and (C)

Example 29: If E, F, and G form a team of three members, then in how many ways can the remaining two teams of two players each be formed?

(A) 2 (B) 4 (C) 3 (D) 1

Example 30: If D and A are not in the same team, then altogether in how many ways can the teams of two members be formed?

(A) 4 (B) 7 (C) 8 (D) 5

Example 31: If B, E, and F form a team of three members, which of the following cannot be the two teams of two members each?

(A) AC, GD (B) AD, CG
(C) AG, CD (D) Both (A) and (B)

Solutions for questions 28 to 31:

Let Team I be of 3 players, Team II be of 2 players, and Team III be of 2 players.

It is given that A and B cannot be together. We will represent it as A × B.

Similarly, we have B × C and G × D.

E and F must be in the same team. So, E and F can form a team of 2 members on their own or can form a team of 3 members with another person.

Let us now take up the questions and work them out.

Example 28: Given that C, D, A form a team of 3 members, one of the other teams **has** to have E and F together. Hence, B and G should form one team.

Hence, the correct option is (D).

Example 29: Given that E, F, G form a team of 3 players. Since A and B or B and C cannot be in the same team, we must necessarily have A and C together in one team and B and D in the other team. So the teams can be formed only in one way.

Hence, the correct option is (D).

Example 30: Given that A and D are not in the same team. Hence, A × B, B × C, G × D, and A × D.

We already know that E and F must be in the same team. They may form a team of 3 members or they themselves be a team of 2 members. Let us consider these two possibilities and then fill up the other teams. They can be formed as follows:

	Team I	Team II	Team III
1.	A E F	B D	C G
2.	A E F	C D	B G
3.	B E F	A G	C D
4.	C E F	A G	B D
5.	D E F	A C	B G
6.	G E F	A C	B D
7.	A C G	B D	E F

Thus the teams can be formed in 7 ways.

Hence, the correct option is (B).

Example 31: If B, E, F form a team of 3 members, then the two members teams must be formed from A, C, D, G. The teams can be AD and CG or AG and CD. As D and G cannot form a team, AC and GD cannot be formed. Choice (A). {Please note that we can answer this question from the answer choices—from choice (A), we find that G and D are together in one team which is not possible. Thus, choice (A) is the answer.}

Hence, the correct option is (A).

Direction for question 32: Select the correct alternative from the given choices.

Example 32: At least two boys out of A, B, C, and D and at least two girls out of P, Q, R, and S have to be chosen to form a group of 5 members.

Neither A nor C can go with Q.

Neither P nor S can go with B.

Q and R cannot be together.

Which of the following is an acceptable team?

(A) ARCQP
(B) ASQPD
(C) ASQRP
(D) PSRAD

Solution for question 32:

The required group of 5 members must be formed with at least two boys from A, B, C, D and at least 2 girls from P, Q, R, S.

Answers 1, 2, and 3 can be ruled out as A and Q cannot be together.

In choice (D), P, S, R, A, D can be together without violating any of the given conditions.

Hence, the correct option is (D).

Questions on routes/networks involve different points or locations between which there is some movement or communication. The way the movement or communication is effected is described in the data/conditions. Sometimes, these are also referred to as 'maps' because the routes given resemble a map.

The data given in these types of questions may not always have the word 'route' or 'network' in them but a network is indicated by some sort of connectivity between two 'points'. The way the statements are worded is important. The wording includes statements like

1. Some poles are connected through wires.
2. Some towers send signals to one another.
3. Some cabins, market, cities, etc. are connected via. passages or roads and so on.

The connectivity between the two 'points' can be only one-way or two-way. In one-way connectivity, the flow will be in only one direction, whereas in two-way connectivity, the flow will be in both directions between the points.

Read the data carefully and then draw the diagram or network. The words 'from' and 'to' play an important role in these questions, and, hence, care should be taken while interpreting the data. While drawing a diagram, arrow marks can be used very effectively to indicate the direction of connectivity as explained below.

1. If the statement mentions that there is a one-way route from city A to B then it can be represented as follows.

   A ⟶ B

2. If the statement mentions that cities X and Y have roads on which you can travel in either direction, it means that it is a two-way connectivity. Then it can be represented as follows.

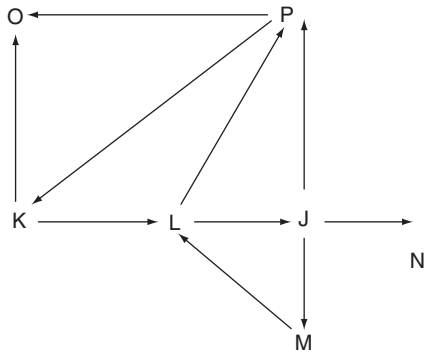
   X ⟷ Y

3. If the statement mentions that all the projected roads are one-ways and there is a route from point K to P and then from P to K, then it should be represented as follows.

   P ⇄ K

   i.e. from P to K is one route and from K to P is another route.

   Now, consider the following network.



In this network, let us say that a person starts from J and he wants to reach K. We want to find out the number of distinct routes he can take without touching any point twice. Starting from J, the possible directions of movement are from J to N, J to M, and J to P, but if he goes from J to N then coming back or travelling in some other direction is not possible. Hence, the person has only two options for movement from J (J to M and J to P). Now, if he goes to M, he has to go to L from M. At L, it appears that he has two options—he can go to P or to J. But, since he started from J and as he cannot touch any point twice, he cannot go to J. So, there is only one option at L—that is going to P. So, to reach P from J, there are two options—one directly to P from J and the other via. M and L. Once he reaches P, he has only one way of reaching K—along the diagonal PK. If he goes to O from P, then he cannot travel to K from O (the route is one way in the O to K). Thus, the total number of ways from J to K is two (JPK and JMLPK).

Thus, one has to look at all the possible routes carefully in the above-discussed manner.

In the aforementioned example, if the route between J and L is two-way and then we have to find out the number of ways to reach O stating from J, the routes we have will be as follows:

JPO, JPKO, JMLPO, JMLPKO, JLPO, JLPKO

This gives us a total of six distinct ways of reaching O from J.

Direction for questions 33 to 37: Read the following information and answer the questions given below.

P, Q, R, S, T, U, V are seven places on a map. The following places are connected by two-way roads: P and Q; P and U; R and U; R and S; U and V; S and T; Q and R; T and V. No other road exists.

Example 33: The shortest route (the route with the least number of intermediate places) from P to V is
(A) P-R-V (B) P-T-V
(C) P-Q-R-U-V (D) P-U-V

Example 34: How many distinct routes exist from S to U (without touching any place more than once)?
(A) 3 (B) 2 (C) 1 (D) 4

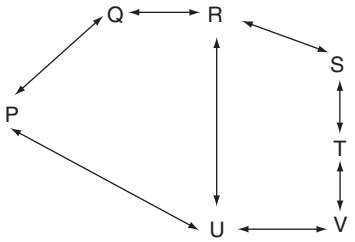
Example 35: The route covering the maximum number of places and going from P to R does not pass through
(A) U (B) T (C) S (D) Q

Example 36: If U to V and S to R are only one-way routes, then which of the following places lose contact with P?
(A) V
(B) T
(C) S
(D) No place loses contact with P

Example 37: If the number of places to which a place is connected directly considered as the measure of importance, then which of the following places is of the highest importance?
(A) Q (B) P (C) R (D) S

Solutions for questions 33 to 37:

The route map of the places is as follows:



Example 33: As is seen, P-U-V is the shortest way (with only one intermediate point) from P to V.

Hence, the correct option is (D).

Example 34: To travel from S to U, the routes available are: S-R-U; S-T-V-U, and S-R-Q-P-U—a total of 3 routes.

Hence, the correct option is (A).

Example 35: First let us write down the route from P to R with the maximum number of intermediate points. By observation, we find that it is P-U-V-T-S-R. It does not touch Q.

Hence, the correct option is (D).

Example 36: If U to V and S to R are only one-way routes, from the figure, we find that all places can still be reached from P. Hence, none of the places loses contact with P.

Hence, the correct option is (D).

Example 37: For each of the places given in the choices, Q, P, R, and S, let us see how many places are directly connected.

Q is directly connected to 2 places.
P is directly connected to 2 places.
R is directly connected to 3 places.
S is directly connected to 2 places.

Hence, the correct option is (C).

Direction for questions 38 to 41: Read the following information and answer the questions given.

Five cities P, Q, R, S, and T are connected by different modes of transport as follows:

P and Q are connected by boat as well as by rail.
S and R are connected by bus and by boat.
Q and T are connected only by air.
P and R are connected only by boat.
T and R are connected by rail and by bus.

Example 38: Which of the following pair of cities are connected by any of the routes directly [without going through any other city]?

(A) P and T (B) T and S
(C) Q and R (D) None of these

Example 39: Which mode of transport would help one to reach R starting from Q but without changing the mode of transport?

(A) Boat (B) Rail (C) Bus (D) Air

Example 40: If a person visits each of the places starting from P and gets back to P, which of the following places must he visit twice?

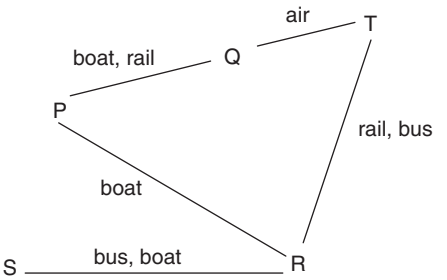
(A) Q (B) R
(C) S (D) T

Example 41: Between which two cities among the pairs of cities given below are there maximum travel options available? (If there is more than one route possible between two cities, consider the route with least number of cities enroute.)

(A) Q and S (B) P and R
(C) P and T (D) Q and R

Solutions for questions 38 to 41:

Example 38:



P and T are connected through Q.
T and S are connected through R
Q and R are connected through T or P. Q and S are connected through R and P or T. So, none of the pairs in the choices are directly connected.

Hence, the correct option is (D).

Example 39: From Q to P, he can reach by boat.
From P to R also he can travel by boat.

So, a person should travel by boat to reach R from Q without changing the mode of transport.

Hence, the correct option is (A).

Example 40: If a person wants to visit all the places and again return to P, then he can go in the order of P→ Q → T → R → S and then
S → R → P (OR)
P → R → S and then
S → R → T → Q → P
He must visit R twice.

Hence, the correct option is (B).

Example 41: One has to travel between any of the two cities with a restriction that if there is more than one possible route, he has to go by the least number of cities enroute. It is better to take the pair of cities given in each of the choices.

Choice (A) Q and S: A person can go from Q to T to R to S (or) Q to P to R to S or vice versa. In both the routes, there are two cities enroute. We can calculate the number of options in the entire route by multiplying the options available in each segment of the route.

For the route Q-T-R-S, the number of options = $1 \times 2 \times 2 = 4$
For the route Q-P-R-S, the number of options = $2 \times 1 \times 2 = 4$

Choice (B) P and R: The route between P and R has only one mode of travel, that is boat.

Choice (C) P and T: A person can go by PQT in either way or by PRT in either way. If it is by PQT, then the options are boat–air or rail–air, i.e. two ways. If it is by PRT, then the options are boat-rail or boat-bus in either way. Hence, they are only two options.

Choice (D) Q and R: If a person travels between Q and R, then he can go by QTR or by QPR. If he goes by QTR, then the options are air–rail or air–bus, that gives two options or if he goes by QPR, then the options are rail–boat or boat–boat, that will again give us two options.

So, it is very clear that Q and S have maximum number of travel options available between them.

Hence, the correct option is (A).

***Direction for question* 42:** Select the correct alternative from the given choices.

Example 42: Four computers P, Q, A, and B are interconnected for the transmission of data. A and B each can send data to both P and Q but B cannot receive data from A. P and Q can have data flow in both directions between them but they cannot transmit the data so received to B but can otherwise send the data directly to B. Which of the following routes can be followed if B has to receive data from A?

I. AQPB II. APB
III. AQB IV. APQB
(A) I and III (B) II and III
(C) III and IV (D) All four

Solution for question 42:

AQPB and APQB can be eliminated because P and Q cannot send the data to B.
The paths AQB and APB do not violate any conditions and hence can be possible routes to send data from A to B.

Hence, the correct option is (B).

Exercises

Direction for questions 1 to 3: These questions are based on the following information.

Each of the seven delegates A through G came to India to attend a conference from seven different countries—China, Japan, Malaysia, England, Australia, Germany, and Poland.

(i) China, Japan, and Malaysia are the only Asian countries.
(ii) A and B are from Asian countries, whereas D is neither from England nor from Australia.
(iii) E and F are from non Asian countries but neither of them came from either Australia or England.
(iv) C is not from England and the person from Poland is not F.
(v) A is from China.

1. Who is from Germany?
(A) E (B) C (C) F (D) G

2. Who is from Malaysia?
(A) B (B) D
(C) A (D) Either (A) or (B)

3. Which country did G come?
(A) England
(B) Australia
(C) Poland
(D) Cannot be determined

Direction for questions 4 to 6: These questions are based on the following information.

Bingo, Pingo, Tingo, Hingo, and Mingo are five friends, each of whom is working in a different company among C_1, C_2, C_3, C_4 and C_5 and they belongs to the same city but a different locality—l_1, l_2, l_3, l_4, and l_5.

(i) The persons who are working with C_1 and C_2 are from l_3 and l_4
(ii) Bingo is from l_5 but does not work for C_5.
(iii) Tingo is not from l_4 but works for C_2.
(iv) Pingo works neither for C_5 nor in C_3 and is not form l_2.
(v) The person working for C_3 is from l_1.
(vi) Mingo does not work for C_3.

4. For which company does Hingo work?
(A) C_3 (B) C_4 (C) C_5 (D) C_2

5. Who is from l_4?
(A) Mingo (B) Hingo
(C) Tingo (D) Pingo

6. Who works for C_4?
(A) Bingo (B) Mingo
(C) Pingo (D) Hingo

Direction for questions 7 to 9: These questions are based on the following information.

A team of three is to be selected from six persons Amar, Bhavan, Chetan, Dawan, Ekta, and Farheen under the following constraints:

(i) If Amar or Bhavan is selected, then Chetan must not be selected.
(ii) If Chetan or Dawan is selected, then at least one of Ekta and Farheen must be selected.

7. If Dawan is selected, then who must not be selected?
(A) Amar
(B) Bhavan
(C) Chetan
(D) None of these

8. If Amar is selected, then in how many ways the team can be selected?
(A) 5 (B) 6 (C) 4 (D) 7

9. If Bhavan is selected, then who must be selected?
(A) Dawan
(B) Ekta
(C) Farheen
(D) Either (B) or (C)

Direction for questions 10 to 12: These questions are based on the following information.

Three girls Anjali, Bharathi, and Chandrika and four boys Kiran, Lala, Manoj, and Naveen are to be divided into two teams under the following constraints.

(i) Each team must have at least one girl and at least one boy and at least three persons in total.
(ii) If Anjali and Bharathi are selected in a team, then the team must have only one boy.
(iii) Kiran and Lala cannot be in the same team.
(iv) Chandrika and Naveen can be in the same team, only if Bharathi is selected in that team.

10. If Kiran and Chandrika are in the same team, then in how many ways can the other team be selected?
(A) 6 (B) 3 (C) 4 (D) 5

11. If Manoj is not in the same team as Bharathi, then in how many ways can the teams be selected?
(A) 3 (B) 4 (C) 5 (D) 6

12. If three boys are selected into one team, then in how many ways can the teams be selected?
(A) 4 (B) 5 (C) 3 (D) 6

Direction for questions 13 to 15: These questions are based on the following information.

Seven persons—P, Q, R, S, T, U and V, who are of different ages, are comparing their ages. We know the following information.

(i) P is younger than R, who is not older than S.
(ii) S is younger than only two persons.
(iii) Q is not the oldest but older than fourth youngest person.
(iv) T is older than only U.

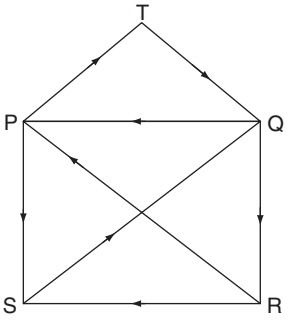
13. Who is oldest?
(A) S (B) T (C) U (D) V

14. Who is the third youngest?
(A) V (B) P (C) R (D) S

15. Who is the fourth eldest?
(A) R (B) P (C) S (D) V

Direction for questions 16 to 19: These questions are based on the diagram given.

Five cities P, Q, R, S, and T are connected by one-way rail routes as shown. One takes one hour duration to travel between any two directly connected cities.



At station S, for every 2 hours, one train departs and the departure time of the first train is 6:00 a.m. Similarly, at station R, for every 3 hours, one train departs in each route and the departure time of the first train is 4 a.m.

At station Q, one train departs for every 2 hour in each route and the departure time of the first train is 7 a.m.

At station P, train departs for every 1 hour in each route and the departure time of the first train is 8 a.m.

At station T, for every 3 hours, one train departs and the departure time of the first train is 5:30 a.m.

16. What is the least time will it take to reach P from R, if one takes the longest route without visiting any station more than once?
(A) 6 hours (B) 3 hours
(C) 5 hours (D) 4 hours

17. If a person reaches Q at 1:00 p.m. from R, which of the following can be the time at what time he must have started from R if that person takes the shortest route?
(A) 10:00 a.m. (B) 9:00 a.m.
(C) 11:00 a.m. (D) None of these

18. A person wants to travel from R to T and he takes the longest route without visiting any station more than once. If he starts at 4:00 a.m., then for how much time he has to wait for the trains altogether in all stations before reaching T.
(A) 2 hours (B) 3 hours
(C) 2 hours (D) 1 hour

19. If a person starts from P at 10:00 a.m. to reach S and he takes the longest route without visiting any station more than once then at what time will he be reachings?
(A) 1:00 p.m. (B) 4:00 p.m.
(C) 5:00 p.m. (D) 2:00 p.m.

Direction for question 20: This question is based on the information given.

Five cities Ahmedabad, Bangalore, Calicut, Delhi, and Indore are connected by one-way routes from Ahmedabad to Bangalore, Delhi to Ahmedabad, Indore to Delhi, Delhi to Calicut, Ahmedabad to Calicut, Bangalore to Calicut, Calicut to Indore, Indore to Bangalore, and Ahmedabad to Indore.

20. In how many ways a person can travel from Delhi to Indore without visiting any city more than once?
(A) 5 (B) 3 (C) 6 (D) 4

Direction for questions 21 and 22: Select the correct alternative from the given choices.

21. There are 15 identical coins out of which fourteen are of equal weights and one coin lighter than each of the other coins. What is the minimum number of weighings required using a common balance to definitely identify the counterfeit coin?
(A) 3 (B) 4
(C) 5 (D) None of these

22. Beside a lake, there are three temples and a flower garden. Whenever some flowers are dipped into the lake, the flowers gets triplet. A person brought some flowers from the garden and dipped then into the lake. He placed x flowers in front of the first temple and dipped the remaining flowers into the lake. He placed x flowers in front of the second temple and dipped the remaining flowers into the lake. Now, he placed x flowers in front of the third temple and has no flowers. Which of the following numbers can be the value of x?
(A) 9 (B) 18 (C) 27 (D) 36

Direction for questions 23: These questions are based on the following letter – multiplication in which each letter is represents a unique non-zero digit.

A	B	C		
×	C	B	A	
C	D	E	F	C

Also, it is known that D = 3C and F = 4B

23. What is the value of D?
(A) 3
(B) 6
(C) 9
(D) Cannot be determined

Direction for questions 24 and 25: These questions are based on the following data.

Each individual of a city called 'Josh' belongs exactly to one of the two types, viz., Yes-type or No-type. Yes-type people always give the true reply, while the No-type always lies. Answer the following questions based on the information.

24. You met three residents A, B, and C, of the city and asked them, 'who among you are married?' and got the following replies.
A: I am married to B.
B: I am married to C.
C: I am not married to A.
If it is further known that A is married to one of B and C and there is exactly one married couple among the three, then which of the following is definitely true?
(A) C is married to A.
(B) B is married to A.
(C) A is of Yes-type.
(D) B is of No-type.
(E) A is of No-type.

25. You approached three inhabitants A, B, and C of the city and asked them, 'Who is of No-type among you?', and got the following replies.
A: B is of No-type.
B: C is of No-type.
C: A is of No-type.
It can be concluded that:
(A) A is a No-type.
(B) B is a No-type.
(C) C is a No-type.
(D) Either A or B is of No-type.
(E) Data inconsistent.

Answer Keys

1. C	**2.** D	**3.** A	**4.** A	**5.** D	**6.** A	**7.** D	**8.** A	**9.** D	**10.** D
11. D	**12.** A	**13.** D	**14.** B	**15.** A	**16.** B	**17.** A	**18.** D	**19.** C	**20.** D
21. A	**22.** C	**23.** C	**24.** D	**25.** C					