LOGICAL REASONING

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1.DIRECTION SENSE TEST

- **There are four main directions:** North (N), East (E), West (W), South(S)

- **There are Four Cardinal Directions as shown in the diagram:**

  North-East (NE), North-West (NW), South-East (SE), South-West (SW)
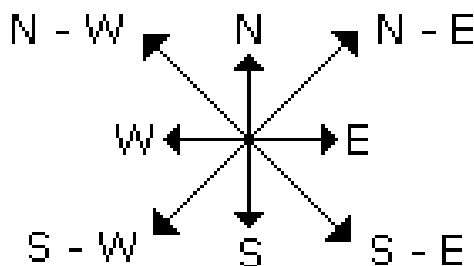
- Angle between North and East is 90'(Clockwise)
- Angle between North and Northeast is 45'(Clockwise)

- **Shadow's position:**

  Morning (or) Sunrise (or) Dawn – WEST

  Evening (or) Sunset (or) Dusk – EAST

  Noon – No Shadow

Some Important Points:

1. At the time of sunrise if a man stands facing the east, his shadow will be towards west.

2. At the time of sunset the shadow of an object is always in the east.

3. If a man stands facing the North, at the time of sunrise his shadow will be towards his left and at the time of sunset it will be towards his right.

4. At 12:00 noon, the rays of the sun are vertically downward hence there will be no shadow.

Types of Problems:

- Facing Directions
- Distance Travelled
- Shadow Based Problems

1) Ramesh is facing North. He turns 135' in anti clock direction and then 180' in clock wise direction. Which direction is he facing now?

a) South East   b) South   c) North East   d) North

Answer: c) North East

Explanation:

135' (anticlockwise) - 180' (clockwise) = 45' (clockwise). He turns 45' clockwise from North.

2) Neha starts walking towards west. After walking 125 meter, she turns to the left and walks 65 meter straight .Again she turns to the left, walks a distance of 85 meters straight, again she turns to the left and walks a distance of 65 meters. How far is she from starting point?

a)45 meter   b)75 meter   c) 40 meter   d) 180 meter

Answer: c) 40 meter

Explanation:

125– 85 = 40 meter from starting point

3)   A man turns 4km towards west, then he turns right and travels 3km.What is the shortest

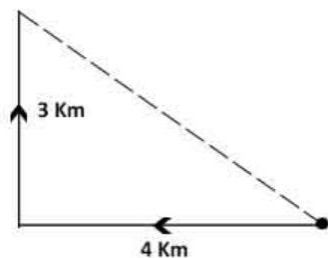 **distance between his start point and end point?**

Solution: By Pythagoras theorem,

(Shortest distance)^2=4^2 +3^2 =16+9=25 =5km

4)   One morning after sunrise Amit while going to college met Narendra at road crossing. Narendra's shadow was exactly to the right of Amit. If they were face to face, which direction was

Amit facing? a)South   b) North   c)East   d) West
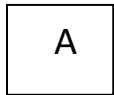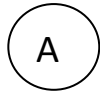
Answer: a) South

Explanation:

In morning the shadow falls towards the west. Narendra's shadow falls to the right of the Amit. So Amit is facing South.

2. BLOOD RELATIONS

Mother's or Father's Father	Grand father
Mother's or Father's Mother	Grand mother
Mother's or Father's Son	Brother
Mother's or Father's Daughter	Sister
Mother's or Father's Brother	Uncle
Mother's or Father's Sister	Aunt
Husband or Wife's sister & Brother's wife	Sister in law
Husband or Wife's brother & Sister's husband	Brother in law
Son's Wife	Daughter in law
Daughter's Husband	Son in law
Brother's or Sister's Son	Nephew
Brother's or Sister's Daughter	Niece
Uncle or Aunt's Son/Daughter	Cousin
Grandson's or Granddaughter's Daughter/Son	Great Grand Daughter/Son
Husband or Wife	Spouse
"Real" brother or sister	Siblings

There is a standard set of symbols which help one decode family relationship, Below is list of such symbols. Family Tree Notations:

| A | ---> **A is Male**

(A)   ---> **A is Female**

A ----- B   ---> **A and B are siblings**

A ═══════ B ---> **A and B are spouses**

A
│
│   ---> **A is the Parent of B.**
│
B

Conditions:

- Don't judge the genders on the name basis.
- Using the hints like "he", "she", the gender must be considered.
- Be aware of the word "Only".

Relations from one generation to next:

Generation I	Grandfather, grandmother, maternal grandfather, maternal grandmother
Generation II	Mother, father, uncle, aunt, maternal uncle, maternal aunt
Generation III	Self, sister, sister-in-law, brother, brother-in-law
Generation IV	Son, daughter, nephew, niece
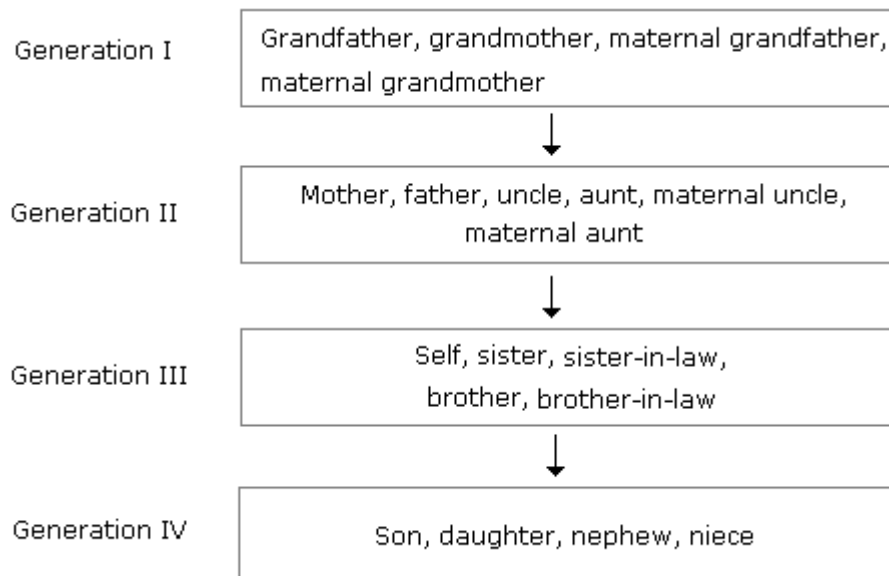
Some Examples:

1) A is sister of B. C is the father of B. D is the wife of C and E is the father of D. How is E related to B?

a) uncle   b) grandmother   c) Father   d) Grandfather
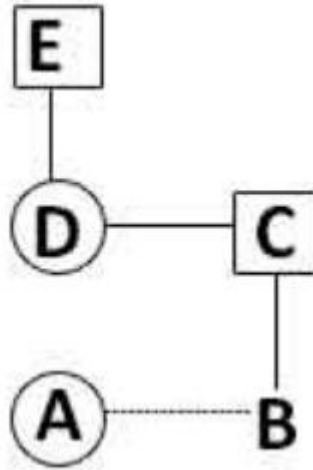
Answer : D

Solution :From the diagram above, it is clear that,

E is grandfather of B. Hence, option D is correct answer.

2. Pointing to a man, a woman said, "He is the only son of my mother's mother". How is the woman related to the man?

a) Aunt   b) daughter   c) Niece   d) Sister

Answer : C

Solution: Son of my mother's mother means he is my mother's brother so that man is paternal uncle of women, and she is niece of that man. Hence, option C is correct answer.

3. CODING DECODING

Coding involves representing English alphabets with other symbols so as to hide the correct meaning. Coding has two main type of questions. i. e.

Letter Coding and Word Coding

Letter Coding: In Letter coding, an English word and its corresponding code are given. While there is a one-to-one relationship between the given letters, the kind of relationship is certainly not fixed.
- Letter Movement
- Direct Coding
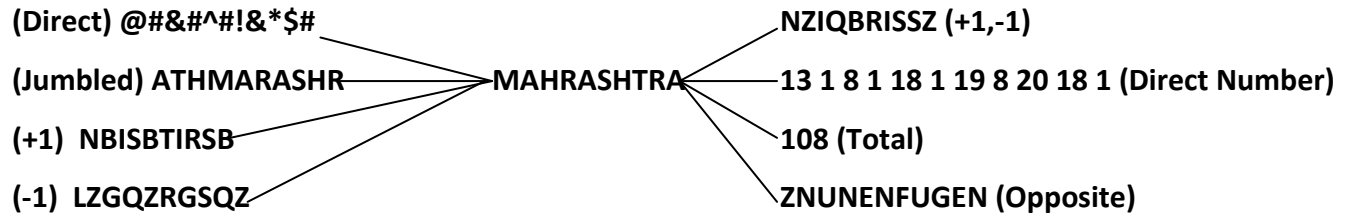- Reverse Coding

Alphabet Numbers

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

Opposite Letters

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

Sample Coding

(Direct) @#&#^#!&*$#

(Jumbled) ATHMARASHR ———→ MAHRASHTRA ←——— NZIQBRISSZ (+1,-1)

(+1) NBISBTIRSB

(-1) LZGQZRGSQZ

13 1 8 1 18 1 19 8 20 18 1 (Direct Number)

108 (Total)

ZNUNENFUGEN (Opposite)

Sample Pattern
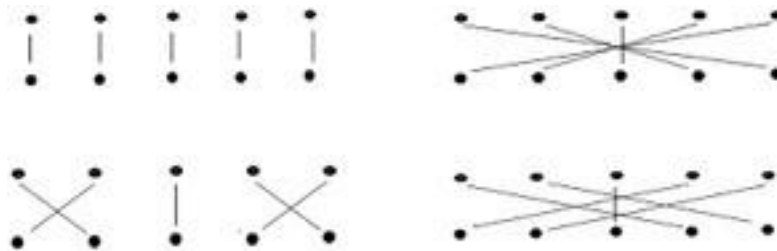
Examples

- **In certain language "SIMPLE" is coded as "VLPSOH", how is "DIFFICULT" coded in that language?**

a) GLIILFYOW   b) G L I I L F Y O S   c) GLNKPUGK   d) UGKPUUGL

Answer: a) GLIILFYOW

Explanation:

Add 2 letters (D+2 =G, I+2=L,F+2=I, C+2=F etc…)

- **If white is called blue, blue is called red, red is called yellow, yellow is called green, green is called black, black is called violet and violet is called orange, what would be the colour of clear sky?**

a)Yellow   b)Red   c)Blue   d)None of these

Answer : Red

Explanation:

Originally color of clear sky is blue. Here Blue is coded as Red.

4. ODD ONE OUT

Odd One Out in Numbers:

Try to check for the difference between numbers or multiplication, division pattern.

Q) 36, 54, 18, 27, 9, 18.5, 4.5

    a) 4.5   b) 18.5   c) 54   d) 18

Answer: b) 18.5

Solution: Alternate numbers are divided by 2

Odd One Out in Alphabets:

Q) GC, JN, MI, PT, SO

    a) PT   b) GC   c) JN   d) So

Answer: PT

Odd One Out in Words:

Q)   Mars, Earth, Saturn, Sun, Neptune, Mercury

     Odd One: Sun

5. SYLLOGISMS

Types of Statements

The four basic statements in syllogism are,

- All As are B   (Eg. All Mobiles are cameras)

- Some As are B   (Eg. Some cats are dogs)

- No A is B   (Eg. No rabbit is a pig)

- Some As are not B   (Eg. Some cats are not humans)

These statements can be classified into two categories as shown in below table.

	Universal	Particular
Positive	All cats are dogs	Some dogs are birds
Negative	No bird is a big	Some pigs are not birds

Alternate Words

All, every, any, none, not a single, only etc	Universal (Positive or Negative)
Some, many, a few, quite a few, not many, very little, most of, almost, generally, often, frequently, etc.	Particular (Positive or Negative)

Basic Diagrams

| (i) | (ii) | (iii) | (iv) |
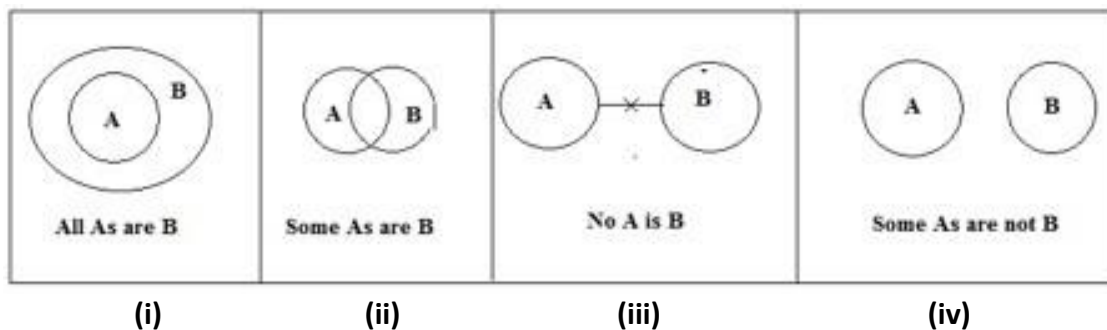
For (i) statement, i.e. All As are B,

Circle A should be inside B or A and B can be equal. But circle A should not exceed B.

For (ii) statement, i.e. Some As are B, Circle A and B should be connected always. It should not separate.

For (iii) statement, i.e. No A is B, We should not connect circle A and circle B.

For (iv) statement, i.e. Some As are not B, We can connect circle A and circle B.

Complementary pair

In the Complementary pair, subject and predicate should be same in both the conclusions. If one conclusion is true, definitely the other conclusion will be false and vice versa. There are two complementary pairs in syllogism.

Pair I : All As are B & Some As are not B

If "All As are B" is true, definitely "Some As are not B" is false. If "Some As are not B" is true, definitely "All As are B" is false.

Pair II: No A is B & Some As are B

If "No A is B" is true, definitely "Some As are B" is false. If "Some As are B" is true, definitely "No A is B" is false.

Procedure:

Step 1: Draw the basic diagram for the given statements.

Step 2a: If all are positive conclusions, Check those conclusions in basic diagram and decide which one is true or false. Don't draw any other diagram if all are positive in conclusion.

Step 2b: If there is negative conclusion and it is true in basic diagram, try to make it false by drawing its complementary pair. While drawing alternate diagram, it should not violate any other given statements. If you are able to draw alternate diagram, without violating any statement. Then the negative statement is false.
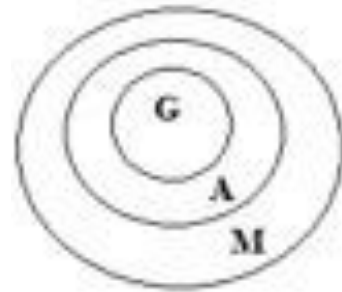
Examples: (Positive Conclusions)

Q.1.

Statements

1. All grapes are apples
2. All apples are mangoes

Conclusions

1. All grapes are mangoes
2. All mangoes are grapes
3. Some grapes are mangoes
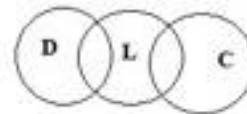
Answer: (1) and (3) are true

Q.2

Statements
1. Some doctors are lawyers
2. Some lawyers are circle

Conclusion
1. Some doctors are circle
2. All doctors are circle
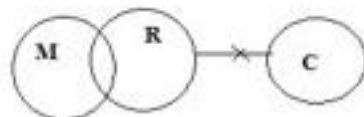
Answer : Both (1) and (2) are false

Q.3.

Statements

1. Some mobiles are rows
2. No row is circular

Conclusion

1. All circular are mobiles
2. Some circular are mobiles

Answer: Both (1) and (2) are false Explanation:

Basic diagrams for above questions. Verify the conclusion only in below basic diagram.(Because all are

positive conclusion)

Examples (Negative Conclusion)

Q.1.

Statements

1. All months are weeks
2. Some week are days

Conclusions

1. No month is day
2. Some weeks are months

Answer : (2) is true

Q.2

Statements

1. All right are left
2. No left is top

Conclusion

1. Some tops are right
2. No top is right

Answer : Only (2) is true

Q.3.

Statements

1. All goats are good
2. Some good are watch

Conclusion

1. Some watch are goat
2. No watch is goat

Answer : Either (1) and (2) are true

Explanations

Q.1 "No month is a day" is negative conclusion and it is true in basic diagram. So you have to make it false by drawing its complementary pair. Refer Alternate diagram. While drawing alternate diagram, it is not violating any statements. So the negative conclusion "No month is a day" is false in alternate diagram. Hence the conclusion is false.

Q.2 "No top is a right" is negative conclusion and it is true in basic diagram. So you have to make it false by drawing its complementary pair. While drawing alternate diagram, it is violating the given statements. So you can't draw alternate diagram. So the negative conclusion "No top is a right" will always true.

Q.3 "No watch is a goat" is negative conclusion and it is true in basic diagram. So you have to make it false by drawing its complementary pair. Refer Alternate diagram. While drawing alternate diagram, it is not violating any statements. So the negative conclusion "No month is a day" is false in alternate diagram and its complementary is true. So you have to mark either (1) or (2).

| Q.1 | Q.2 | Q.3 |

Basic Diagram — Alternate Diagram — Basic Diagram — Basic Diagram — Alternate Diagram
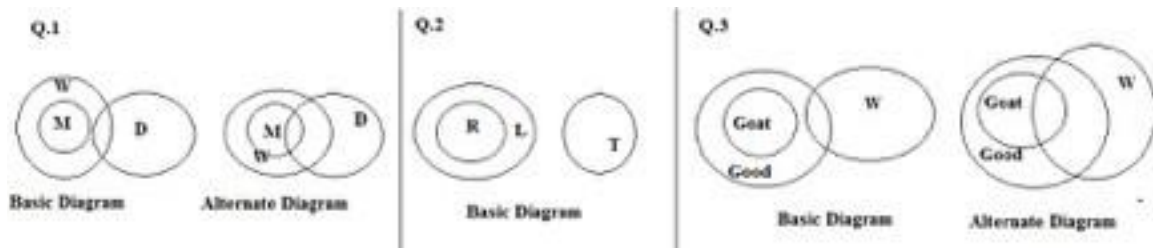
6. SEATING ARRANGEMENT

General Guidelines

1. Understand the entire question and statements quickly and correctly

2. Determine the usefulness of each information and classify them accordingly into

- Definite Information
- Comparative information
- Negative Information

3. Identify the statements that give definite information.

For instance let us take three statements and evaluate them

-Statement (a): Ajay is to the left of Bhanu.

The data in the statement is basic but not definite as the statement only says that Ajay is to the left of Bhanu. But, it does not specify where Ajay is located from Bhanu.

-Statement (b): Ajay is second to the left of Bhanu.

The data in the statement is definite as it clearly states that Ajay is placed second to the left of Bhanu.

-Statement (c):Tanmay is between Ramesh who plays football and Pankaj in order of seating in a row.

It can be understood as 'Tanmay is between Ramesh and Pankaj. So, they may be seated as RTP or PTR (so, the data is not definite) and 'Ramesh plays football'.

1. Search for the connecting information.
2. Figure out the seating arrangement by clearly identifying the directions

Linear Arrangement
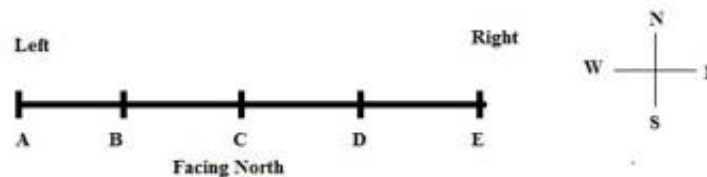
If they are facing North,

1.   B,C,D,E are right of A but only B is immediate right of A.

2.   D,C,B,A are left of E but only D is the immediate left of E.

3.   A is the immediate left of B while E is the immediate right of D.

If they are facing South,

1.   B,C,D,E are left of A but only B is immediate left of A.

2.   D,C,B,A are right of E but only D is the immediate right of E.

3.   A is the immediate right of B while E is the immediate left of D.

Arrangement Puzzle

Tips for how to solve Arrangement Puzzle

Focus on Family-tree first: You can't successfully start placing people in the seating arrangement if you don't know the family tree. Usually people in the seating arrangement are referred to as: wife of C, son of D. So it is better if you know who is who and then start with the seating arrangement. To do this, read all conditions in the question carefully from the beginning and ignore all statement about who is sitting where.

Find starting points: Starting Points help in identifying the position of specific persons. Generally, the question begins with negative information which doesn't highlight the exact position. Remember, statements starting with "Neither/Nor" can only reveal relative positions and can never be a starting point. You must read all the statements carefully to be able to arrive at the starting point.

Find connecting dots: Connecting dots are small pieces of information which help in the further arrangement based on the position of people already seated.

Solve questions purely on blood relations first: If you are unable to solve the final seating arrangement but have already drawn the family tree, the answer the relevant questions. Don't leave the entire block just because you couldn't solve it completely.

ARRANGEMENTS

Seating arrangement is arranging people in their perspective position based on the data specified in the given question. Arrangements can be made in any form like row, circle, triangle, square, rectangle etc. The position can be inferred by the direction and that directions deter- mine the types of seating arrangement

1. Linear Arrangement
2. Circular Arrangement
3. Rectangular / Square Arrangement
4. Hexagonal Arrangement

In order to solve seating arrangement questions, first of all diagram should be made. By doing so questions are easily and quickly solved.

7.DATA SUFFICIENCY

Data Sufficiency problem consists of a question followed by two statements, labeled as Statement (1) and Statement (2), in which certain data are given. You have to decide whether the data given in the statements are sufficient for answering the question.

Using the data given in the statements upheld your knowledge of mathematics and everyday facts (such as the number of days in July or the meaning of counterclockwise), you must indicate from the following answer options that whether:

1. Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked;
2. Statement (2)   ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked;
3. Both statements (1) and (2) TOGETHER are sufficient to answer the question asked; but NEITHER statement ALONE is sufficient.
4. EACH statement ALONE is sufficient to answer the question asked;
5. Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

A statement is sufficient when it guarantees exactly one answer to that question.

TIPS TO SOLVE DATA SUFFICIENCY PROBLEMS:

•   Never try to reach final answer as it is not asked. You need to find whether the information provided is enough to solve the given problem or not.

•   Never make any assumption. Use only universal rules { eg. a + b = a + b - (a U b) }
•   Try to solve questions by using above strategies
•   Solve question step by step. First try to find answer using first statement then second and finally with both then mark the answer

•   Even if you find answer with only one statement, then try to find answer with remaining statement as sometimes there is an option that answer can be find with both statements separately.

•   Move on quickly and mark answer can't be found in case you are unable to reach any conclusion with information provided.

The Data Sufficiency questions do not require the exam aspirant to find the exact answer. Infact the only thing that they require is to determine whether the statements provided in the question contain enough information for answering it.

Example 1: *A, B, C, D, and E scored different marks in different exams. From statements given below determine who has secured the last position.*

Statement I: D has scored fewer marks than C and E.

Statement II: B has scored more marks than A.

Options:

1. Data in statement 1 is sufficient alone to determine the answer.

2. Data in statement 2 is sufficient alone to determine the answer.

3. Data in either of the statements is sufficient to determine the answer.

4. Data provided in both the statements together are not sufficient to determine the answer.

5. Data in both statements are required to determine the answer.

Solution:

From the statement I, you can determine that marks scored by D < marks scored by C and E. While from the statement II you can see that marks scored by N > marks scored by M. No statement alone can determine who has scored the least marks. Using two statements together you can see that either D or M must have scored the least marks. But there is no definite answer. And thus option (4) is the correct answer.

Example 2: *What is Reena's rank in the class?*

I. There are 26 students in the class.

II. There are 9 students who have scored less than Reena.

(1) if the data in statement I alone are sufficient to answer the question;
(2) if the data in statement II alone are sufficient to answer the question;
(3) if the data either in I or II alone are sufficient to answer the question;
(4) if the data even in both the statements together are not sufficient to answer the question;
(5) if the data in both the statements together are needed;
Exp: Option (5)

From I and II, we conclude that there are 16 students above Reena in rank. Thus, Reena's rank is 17th in the class. So, both the statements are necessary.

8.MATHEMATICAL INEQUALITY

Mathematical Inequality (Positive)

Symbol	Meaning	Example
>	Greater than	A > B -- A is greater than B
<	Less than	A < B -- A is less than B
≤	Less than or equalto	A ≤ B --A is less than or equal to B
≥	Greater than or equal to	A ≥ B --A is less than or equal to B
=	Equal to	A = B -- A is equal to B

Mathematical Inequality (Negative)

Symbol	Meaning	Example
| >	Not Greater than	≤
| <	Less than	≥
| ≤	Not less than or equal to	<
| ≥	Not greater than or equal to	>
=	Not equal to	< or >

Tips to solve inequality

1. A > B ≥ C --- A > C

2. A ≥ B > C --- A > C

3. A > B = C --- A > C

4. A = B > C --- A > C

5. A < B ≤ C = D --- A < D and B ≤ D

6. A < B ≤ C > D = E --- A < C and C > E

In this case, the relations between AD, AE, BD and BE cannot be established. For e.g. A < C and C > D so we get A < C > D. That means C is greater than both A and D. But we don't know which is greater – A or D; or if they are both equal. Thus the rela- tion between A and D cannot be established.

7. A > B ≤ C ! ≥ D ≤ E --- A > B ≤ C < D ≤ E --- B < E, C < E, B < D.

But the relations between AC, AD, and AE cannot be established.

9. STATEMENT AND COURSES OF ACTION

The questions from topic 'Statement & Course of action' are asked to test the ability of aspirant to **judge a problem correctly** as well as to determine the **root cause of the problem and then to prescribe a suitable course of action.**

What is the Course of Action?

A course of action is a step or **administrative decision** to be taken up for improvement or follow-up for further action in regard to the **problem, policy** etc. on the basis of the information given in the statement.

Broadly, we can classify these questions in the following two types:

1. Problem and Solution based: When the given situation talks of a problem, then the suggested 'course of action' should talk about the solution keeping in mind the following points-

- It solves/reduces or minimizes the problem.
- The solution or course of action is practically Possible.

Note:

1. A suggested course of action may indeed solve a problem but in **practical life, it may not be advisable or possible**. If it is so, then the course of action is rejected.

2. When the statement is an established fact. ie, It is acknowledged universally as a fact.

For e.g. –

Statement: A large number of people in ward X of the city are diagnosed to be suffering from a fatal malaria type.

Courses of Action: I. The city municipal authority should take immediate steps to carry out extensive fumigation in ward X.

1. The people in the area should be advised to take steps to avoid mosquito bites.

(1). Only I follows

(2). Only II follows

(3). Either I or II follows

(4). Neither I nor II follows

(5). Both I and II follow

The answer is (5) – Clearly, prevention from mosquitoes and elimination of mosquitoes are two ways to prevent malaria. The action will reduce the problem. So, both the courses of action follow.

2. Fact and Improvement based: When the presented situations talk about a simple fact **(not a problem, just a situation)** then the suggested courses of action should suggest ways of improvement.

The format of the Problem: These types of questions contain two or more statements and these statements are followed by a number of Courses of Action. You are required to find which Course of Action will logically follow from the given statement.

For e.g.-

Statement: Exporters in the capital are alleging that commercial banks are violating a Reserve Bank of India directive to operate a post-shipment export credit denominated in foreign currency at international rates from January this year.

Courses of Action: I. The officers concerned in the commercial banks are to be suspended.

II. The RBI should be asked to stop giving such directives to commercial banks.

(1) Only I follows

(2) Only II follows

(3) Either I or II follows

(4) Neither I nor II follows

(5) Both I and II follow

Answers (4) – The statement mentions that the commercial banks violate a directive issued by the RBI. The remedy is only to make the banks implement the Act. So, none of the courses follows.

Steps to Solve Statement and Course of Action Questions

Following are the approaches to solve the questions of this topic :

1. Don't make your individual perception.

2. Act according to the rules of any organization.

3. Go for impartial and not personal thinking.

4. Existing practices are not effective Course of Action.

5. Whenever a problem arises, it is always a sensible course of action to find out the cause.

Important Points to proceed step by step to reach final courses of action:

1. Extreme or strict action is not a valid course of action.

2. The actions should be a positive step towards the solution of the problem, rather harsh and undemocratic.

3. Analyses course of action whether it will solve the problem or lessen it. For proper analysis check with