Inequality

Relationship between more than 2 elements which is stated by some particular symbol is inequality.

Questions with a statement consisting of group of elements can be separated by inequality symbols like >, < and =.

Signs	Meaning
>	Greater than
<	Less than
≥	Greater than or Equal to
≤	Less than or Equal to
=	Equal to
≠	In equal to

Let's assume there are two variables X and Y. How many conditions can be made between X and Y by using the Inequality symbols.

X > Y means the value of X is greater than Y.

X < Y means the value of X is less than Y.

X ≥ Y means the value of X is greater than or equal to Y.

X ≤ Y means the value of X is less than or equal to Y.

X = Y means the value of X is equal to the value of Y.

X ≠ Y means X is either greater than or less than Y.

Rule – 1

The combination between two Inequalities for common terms

Condition	Relation or Conclusion
A > B, B > C	Relation – A > B > C Conclusion A > C or C < A

A < B, B < C	Relation – A < B < C Conclusion – A < C or C > A
A ≥ B, B ≥ C	Relation – A ≥ B ≥ C Conclusion – A ≥ C or C ≤ A

Rule – 2

The combination between the two elements is not possible if they are not common terms.

Condition	Relation or Conclusion
A > B, C > B	**Relation -** Cannot define specific relation between A and C. **Conclusion** – Both A and C are greater than B.
B > A, D < B	**Relation** – Cannot define specific relation between A and D. **Conclusion** – Both A and D are less than B.
A ≥ B, B ≤ C	**Relation** – Cannot define specific relation between A and C. **Conclusion** – Both A and C are greater than or equal to B.

Rule – 3

The third important rule is, if the common term is greater than or "greater than or equal to" one and less than or 'less than or equal to' the other, the combination between two inequality can be established.

Condition 1 – A ≥ B, C < B.

Here in the given elements, we can easily establish the combination.

Here B is the common term which is related to the other two terms.

So, the possible relations are –

A ≥ B > C or C < B ≤ A

Conclusion – A > C or C < A.

Condition 2 – A ≥ B, B < C

Here C is the common term, but we cannot make combination between the other elements of the given relation.

Condition 3 – A ≥ B, C ≥ A

Here A is the common term than the other two elements. A is greater than and equal to B and less than and equal to C. So, the establishment of elements is possible with these three elements.

The possible relations between these three elements are –

C ≥ A ≥ B or B ≤ A ≤ C

Conclusion – C > A or B < C

Condition 4 – A ≥ B, A ≥ C

From this condition, we cannot establish the combination in between given elements as the common term A is greater than both the remaining elements.

Rule – 4

The common elements in which no relationship is established, cannot be combined

This condition occurs in Complementary Pair (Either & or) cases.

Let's understand it with a perfect example –

The statement is – A ≥ B, B ≤ C

Conclusion-

1. A ≥ C

2. A < C

The relationship cannot be established in between A and C as per the given statement.

You can only say that either A is greater than or equal to C or you can say A is less than C.

So, you can only choose either condition in both the conclusion.

Example

The symbols $, @, #, ^, and * are used in the following question are illustrated below.

P $ Q means 'P is not smaller than Q'.

P * Q means 'P is not greater than Q'.

P # Q means 'P is neither greater than nor equal to Q'.

P ^ Q means 'P is neither greater than nor smaller than Q'.

P @ Q means 'P is neither smaller than nor equal to Q'.

In each of the below-given statements, assume that the statements are true. Find which of the conclusion is/are definitely true.

Question –

Statement H @ T, T # F, F ^ E, E * V

Conclusions –

I.   V $ F

II.   E @ T

III.   H @ V

IV.   T # V

(A) Only I, II and III are true

(B) Only I, II and IV are true

(C) Only I, III and IV are true

(D) Only II, III and IV are true

(E) All I, II, III and IV are true

Solution –

Based on the direction as given in instructions, we can substitute the symbols like –

H > T, T < F, F = E, E ≤ V

The relation that we can make in all these elements is –

H > T < F = E ≤ V

As per the coded inequalities rules and the available options, we can see that option I, II and IV are correct.

So, here the conclusion is (B) Only I, II and IV are true.