INEQUALITY

- In this section, comparison between any two elements is given using the inequality symbols i.e. <, > or =.

Important symbols and their meaning:

Sr. No.	Symbol	Meaning
1.	A > B	A is Greater than B.
2.	A < B	A is Smaller than B
3.	A = B	A is Equal to B.
4.	A ≥ B	A > B or A = B
5.	A ≤ B	A < B or A = B
6.	A ≠ B	A < B or A > B
7.	A $\nleq$ B	A > B
8.	A β B	A < B
9.	A $\prec$ B	A > B or A = B
10.	A k B	A < B or A = B

Basic Inequality

In this section, an expression consist of comparison between different elements will be given and a definite relation between any 2 elements will be asked.

Directions: In the question, assuming the given statements to be true, find which of the conclusion (s) among given two conclusions is /are definitely true and then give your answer accordingly.

Q. Statement:
H < A < T = G > U ≥ V ≥ B

Conclusions:

I. T > B

II. G > H

1) Only conclusion I follow.
2) Either conclusion I or II follow.
3) Only conclusion II follow.
4) None Follows.
5) Both conclusion I and II follow.

A. Given statement: H < A < T = G > U ≥ V ≥ B

T > B ⟶ True (as T = G > U ≥ V ≥ B)
G > H ⟶ True (as H < A < T = G)

Thus, Both conclusion I and II follow.

Description: In these questions, relationship between different elements is. shown in the statements. The statements are followed by conclusions. Study the conclusions based on the given statements and select the appropriate answer.

Q. Statement:
F > Y ≥ X < Z, C ≤ X < W

Conclusions:
I. Z > C
II. F > W

1) Only conclusion I follow.

2) **Either conclusion I or II follow.**
3) **Only conclusion II follow.**
4) **None Follows.**
5) **Both conclusion I and II follow.**

A. Given statement: F > Y ≥ X < Z, C ≤ X < W
On combining we will get: F > Y ≥ X ≥ C and F > Y ≥ X < W

Conclusions:

I. Z > C – True (F > Y ≥ X ≥ C)

II. F > W – False (F > Y ≥ X < W, Relationship between F and W cannot be determine)

Hence only conclusion I follow.

Trick you can use:

- **You can consider the symbols by trick, so you can find the answer quickly.**
  - **> as Father**
  - **≥ as Mother**
  - **= as Servant**
- **And, we all know that Father is the Head of any Family.**
- **Among >, ≥, =, Priority will be given to ">" as this is the Father/head of the family.**

Similarly,

- **Among ≥, >, Priority will be given to ">" as this is the Father/head of the family.**
- **Among >, =, Priority will be given to ">" as this is the Father/head of the family.**
- **Among ≥, =, Priority will be given to "≥" as this is the Mother who is senior to servant.**

<, ≤ the value of these symbols is same as above.

If relation between 2 elements is given as:

1. **>, <**
2. **>, ≤**
3. **≤, >**

Then answer is can't say i.e., false.

Memory Tip

S.No	Statement	Conclusion
1.	P > Q > R	P > R
2.	P > Q ≥ R	
3.	P ≥ Q > R	
4.	P = Q > R	
5.	P > Q = R	
6.	P < Q < R	P < R
7.	P < Q ≤ R	
8.	P ≤ Q < R	
9.	P = Q < R	
10.	P < Q = R	
11.	P ≥ Q ≥ R	P > R or P = R
12.	P = Q ≥ R	
13.	P ≥ Q = R	
14.	P ≤ Q ≤ R	P < R or P = R
15.	P = Q ≤ R	
16.	P ≤ Q = R	
17.	P < Q > R	No conclusion can be inferred
18.	P ≤ Q > R	
19.	P < Q ≥ R	
20.	P > Q < R	
21.	P > Q ≤ R	
22.	P ≥ Q < R	

Either- or Case

When a definite relation between 2 elements cannot be determined but we know that there will be only 2 relation between the elements then we can say, either relation 1 or 2 is definitely true.

Rule #1:

S.No.	Complementary Pair	Conditions
1.	> + =	1) Elements in both conclusions should be same. 2) Both are individually false. 3) Combination of the relation should be true.
2.	< + =	
3.	> + < + =	
4.	≤ + >	1) Elements in all the conclusion should be same. 2) The relation between the element in all the case should be can't say. **Note:** Only three relations are possible between any two elements and when all the relations are given in conclusion & the relation between the elements can't be determined from the given statement. Either - or case will be formed.
5.	> + ≤	

Directions: **In the question, assuming the given statements to be true, find which of the conclusion (s) among given conclusions is /are definitely true and then give your answer accordingly.**

Q. Statement:
B = K ≥ H = T > U ≤ I

Conclusions:
I. H > I
II. H ≤ I

1) Only conclusion I follow.

2) **Either conclusion I or II follow.**
3) **Only conclusion II follow.**
4) **None Follows.**
5) **Both conclusion I and II follow.**

A. Given statement: B = K ≥ H = T > U ≤ I

I. H > I ⟶ False (as H = T > U ≤ I)
II. H ≤ I ⟶ False (as H = T > U ≤ I)

Conclusion I and II is false and it makes complementary form for either or.

Thus, Either conclusion I or II follow.

Q. Statement:
1. O < L > P > M ≤ N ≤ B
2. L = K, M ≥ R

Conclusions:
I. K > M
II. O = M
III. R < B
IV. R = B

1) **Only conclusion II follow.**
2) **Only conclusion I and III follow.**
3) **Only conclusion I and IV follow.**
4) **Either conclusion III or IV follow.**
5) **Only conclusion I and Either conclusion III or IV follow.**

A. Given statements: O < L > P > M ≤ N ≤ B and L = K, M ≥ R

I. K > M ⟶ True (as L = K, so L replaced by K then K > P > M)
II. O = M ⟶ False (as O < L > P > M)
III. R < B ⟶ False (as M ≥ R, then R ≤ M ≤ N ≤ B gives either R < B or R = B)
IV. R = B ⟶ False (as M ≥ R, then R ≤ M ≤ N ≤ B gives either R < B or R = B)

R ≤ M ≤ N ≤ B is given in the statement. therefore, conclusion III and IV makes a complementary pair.

Thus, Only conclusion I and Either conclusion III or IV follow.

Exception

Either-or case can be formed even when elements given in conclusions are not same as illustrated in the below example.

Q. Statement: C = T ≥ V ≥ U

Conclusion:
I. C > U
II. T = U

1) Only conclusion I follow.
2) Either conclusion I or II follow.
3) Only conclusion II follow.
4) None Follows.
5) Both conclusion I and II follow.

A. Given statement: C = T ≥ V ≥ U

I. C > U ⟶ False (C = T ≥ V ≥ U)
II. T = U ⟶ False (T ≥ V ≥ U)

In this case either I or II is true because C = T and when we put this in conclusion I then the conclusion will be T.

Now the conclusions are: T > U and T = U.

We can see that both the conclusion consists of a complementary pair and both are individually false and the combination of both the relation is true.

Hence, Either I or II are true.

Coded Inequality

Codes will be assigned to Inequality symbols and the expression will be given using those codes. You need to decode the symbols and find the relation between the elements.

Directions: In the following questions, the symbols @, #, $, %, * are used with the following meaning illustrated below:

'A @ B' means 'A is not greater than B'
'A # B' means 'A is greater than or equal to B'
'A $ B' means 'A is neither greater than nor less than B'
'A % B' means 'A is less than B'
'A * B' means 'A is neither less than nor equal to B'

In the following question assuming the given statements to be True, find which of the conclusion among given conclusions is/are definitely true and then give your answers accordingly.

Q. Statements: R $ J; J % Y; C @ Y

Conclusions:
I. C % J
II. R * Y
III. R * C

1) **Only conclusion I follow.**
2) **All follows.**
3) **Only conclusion II follow.**
4) **None Follows.**
5) **Only conclusion I and III follow.**

A. According to the statement:

A @ B ⟶ A ≤ B
A # B ⟶ A ≥ B
A $ B ⟶ A = B
A % B ⟶ A < B
A * B ⟶ A > B

Given statements: R = J; J < Y; C ≤ Y

On combining: R = J < Y ≥ C

Conclusions:

I. C % J ⟶ C < J ⟶ False as (R = J < Y ≥ C ⟶ thus relationship between C and J cannot be determined)

II. R * Y ⟶ R > Y ⟶ False as (R = J < Y ≥ C ⟶ R < Y)

III. R * C ⟶ R > C ⟶ False as (R = J < Y ≥ C ⟶ thus relationship between R and C cannot be determined)

Thus, none are true.

Practice Questions

Direction: In the following question assuming the given statements to be true, find which of the given conclusions is /are definitely true and then give your answers accordingly.

1. **Statements: W < X; X ≥ Y; Y = Z; Z ≥ A**

Conclusions:

I. X ≥ A
II. A < Z
III. A > X

1) Only I is true
2) Only I and II is true
3) Only II and III is true
4) Only III is true
5) All are true

Correct Option: 1

Explanation:

Given statements: W < X; X ≥ Y; Y = Z; Z ≥ A

On combining: W < X ≥ Y = Z ≥ A

Conclusions:

I. X ≥ A ⟶ True (X ≥ Y = Z ≥ A)
II. A < Z ⟶ False (Z ≥ A; thus A < Z ⟶ it is possible but not definite)
III. A > X ⟶ False (X ≥ Y = Z ≥ A; this means that X ≥ A)

Therefore, conclusions I is only true.

2. **Statements**: **P ≥ U; Q ≥ S; S ≤ P; R ≥ U**

   Conclusions:

   I. P ≥ R
   II. Q ≤ U
   III. S ≥ R

   1) None is true
   2) Only I is true
   3) Only I and II is true
   4) Only II and III is true
   5) Only III is true

   Correct Option: 1

   Explanation:

   Here, according to the given information: Q ≥ S ≤ P ≥ U ≤ R

   Conclusions:

   I. P ≥ R → False (as P ≥ U ≤ R → clear relation between P and R cannot be determined)
   II. Q ≤ U → False (as Q ≥ S ≤ P ≥ U → clear relation between Q and U cannot be determined)
   III. S ≥ R → False (as S ≤ P ≥ U ≤ R → clear relation between S and R cannot be determined)

   Therefore, none of the conclusions is true.

3. **Statements: A ≤ B = D ≤ E; F < L = K; E ≥ F**

   Conclusion:

   I. F ≥ B
   II. E ≥ A

   1) Only I is true.
   2) Only II is true.
   3) Both I and II are true.
   4) Either I or II is true.
   5) Neither I nor II is true.

   Correct Option: 2

Explanation:

Given statements: A ≤ B = D ≤ E; F < L = K; E ≥ F

On combining: A ≤ B = D ≤ E ≥ F < L = K

Conclusion:

I. F ≥ B ⇒ False (as B = D ≤ E ≥ F hence relationship between F and B can't be determine)
II. E ≥ A ⇒ True (as A ≤ B = D ≤ E)

Hence, only conclusion II is true.

4. **Statements: X = Y > Z ≤ A; A = Q; Q > R ≥ S < W**

Conclusions:

I. W > R
II. A ≥ Y
III. Q ≥ Z
IV. Q ≥ X

1) None is true
2) Only I and II are true
3) Only II is true
4) Only III is true
5) Only II and IV are true

Correct Option: 4

Explanation:

Given statements: X = Y > Z ≤ A; A = Q; Q > R ≥ S < W

On combining: X = Y > Z ≤ A = Q > R ≥ S < W

Conclusions:

I. W > R ⟶ False (as R ≥ S < W ⟶ thus clear relation between W and R cannot be determined)
II. A ≥ Y ⟶ False (as X = Y > Z ≤ A = Q ⟶ thus clear relation between A and Y cannot be determined)
III. Q ≥ Z ⟶ True
IV. Q ≥ X ⟶ False (as X = Y > Z ≤ A = Q > R ≥ S < W ⟶ thus clear relation between Q and X cannot be determined)

Therefore, only conclusions III is true.

5. **Statements: F ≥ B = C; C > D ≤ E; F < A ≤ E**

Conclusions:

I. D < A
II. E > F
III. C > A
IV. E ≥ A

1) Only I and II are true
2) Only II, III and IV are true
3) Only I, II and IV are true
4) Only III and IV are true
5) All are true

Correct Option: 3

Explanation:

Given statements: F ≥ B = C; C > D ≤ E; F < A ≤ E

On combining: E ≥ A > F ≥ B = C > D ≤ E

Conclusions:

I. D < A → True (as A > F ≥ B = C > D → D < A)
II. E > F → True (as E ≥ A > F → E > F)
III. C > A → False (as A > F ≥ B = C → C < A)
IV. E ≥ A → True

Therefore, only conclusion I, II and IV are true.

6. **Statement**: **C < D < E; D > F = G**

Conclusions:

I. C = G
II. F > E
III. G < D

1) Only I and II are true
2) Only I and III are true
3) Only III is true

4) All of them are true
5) None of them are true

Correct Option: 3

Explanation:

Given statements: C < D < E; D > F = G

Conclusions:

I. C = G ⟶ False (as C < D and D > F = G ⟶ C < D > F = G ⟶ clear relation between C and G cannot be determined)
II. F > E ⟶ False (as D < E and D > F ⟶ E > D > F ⟶ E > F)
III. G < D ⟶ True (as D > F = G ⟶ D > G)

Hence only conclusion III follows.

7. Statements: M > A ≥ B = Q ≤ P < J ≤ Y; Z ≥ A > X

Conclusions:

I. B < Y
II. X ≥ J
III. Z = Q
IV. Z > Q

1) None is true.
2) Only II and III are true.
3) Only I is true.
4) Only I and either conclusion III or IV are true.
5) Either III or IV is true.

Correct Option: 4

Explanation:

Given statements: M > A ≥ B = Q ≤ P < J ≤ Y; Z ≥ A > X

On combining: X < A ≥ B = Q ≤ P < J ≤ Y; Z ≥ A ≥ B = Q ≤ P < J ≤ Y; M > A > X; M > A ≤ Z.

Conclusions:

I. B < Y ⟶ True (as B = Q ≤ P < J ≤ Y ⟶ B < Y)

II. X ≥ J ⟶ False (as X < A ≥ B = Q ≤ P < J ⟶ relationship between X and J can't be determined)
III. Z = Q ⟶ False (as Z ≥ A ≥ B = Q ⟶ Z ≥ Q)
IV. Z > Q ⟶ False (as Z ≥ A ≥ B = Q ⟶ Z ≥ Q)
Conclusion III and IV forms complementary pair.

Therefore, only conclusion I and either conclusion III or IV are true.

Direction: In the following question assuming the given statements to be true, find which of the given conclusions is/are definitely true and then give your answer accordingly.

8. Statements: L = M, N < O, M ≥ N, P = O

Conclusions:
I. L > N
II. P > N
III. L = N

1) Only I follows
2) Both I and II follows
3) Only II and either I and III follows
4) Both I and III follows
5) None of the above

Correct Option: 3

Explanation:

Given Statements: L = M, N < O, M ≥ N, P = O

On combining: L = M ≥ N < O = P

I. L > N ⟶ False (as L = M ≥ N ⟶ L ≥ N)
II. P > N ⟶ True (as N < O = P ⟶ N < P)
III. L = N ⟶ False (as L = M ≥ N ⟶ L ≥ N)

Here conclusion I and III form a complementary pair.

Therefore, conclusion II and either I or III is true.

9. Statements: O ≤ P < Q, A > B ≤ C, X = O > C

Conclusions:
I. A > X
II.C ≤ A
III.Q > B
IV. A ≤ O
V. A < C

1) conclusion III follow.
2) either conclusion I or IV and conclusion III follow.
3) either Conclusion II or V and conclusion III follow.
4) either conclusion I or IV and either conclusion II or V and conclusion III follow.
5) either conclusion I or Iv and conclusion II or V follow.

Correct Option: 4

Explanation:

Combining all given conclusion: A > B ≤ C < O = X ≤ P < Q

Conclusions:

I. A > X ⟶ False (No relationship is found here as A > B ≤ C < X)
II.C ≤ A ⟶ False (No relationship is found here as A > B ≤ C)
III.Q > B ⟶ True (B ≤ C < O = X ≤ P < Q)
IV. A ≤ O ⟶ False (as A > B ≤ C < O has given and also O = X given)
V. A < C ⟶ False (as A > B ≤ C < O given)

Conclusion I and iv are complementary pairs and II and V are complementary pairs.

Hence, the correct answer is the conclusion I or Iv and conclusion II or V and conclusion III follow.

10. Statement: Z = Y ≥ T > D < C = A ≤ H = G ≤ J

Conclusions:
I. Y < C
II. Z ≥ C
III. A ≤ J
IV. J = Y

1) either I or II follow.
2) conclusion III follows.
3) none follow.
4) either III or II follow and conclusion Iv follows.

5) either I or II follow and conclusion III follow.
Correct Option: 5

Explanation:

Given statement: $Z = Y \geq T > D < C = A \leq H = G \leq J$

Conclusion:

I. $Y < C \rightarrow$ False (as no direct relationship is found $Y \geq T > D < C$)
II. $Z \geq C \rightarrow$ False (as no direct relationship is found $Z = Y \geq T > D < C$)
III. $A \leq J \rightarrow$ True (as $A \leq H = G \leq J$ follow)
IV. $J = Y \rightarrow$ False

Here conclusion I and II are complimentary pairs so either or case is followed.

Hence, the correct answer is either I or II follow and conclusion III follows.