Algebra | Inequalities

Important Formulas

- The topic Inequalities is one of the few sections in the quantitative part which can throw up tricky questions. The questions are often asked in conjunction with other sections like ratio and proportion, progressions etc.
- The theory involved in Inequalities is limited and therefore, students should be comfortable with learning the basics, which involves operations such as addition, multiplication and changing of signs of the inequalities.
- The scope for making an error is high in this section

as a minor mistake in calculation (like forgetting the sign) can lead to a completely different answer.

- The modulus of x, $|x|$ equals the maximum of x and $-x$ is $-|x| \leq x \leq |x|$
- For any two real numbers 'a' and 'b',

  ➔ $a > b \Rightarrow -a < -b$

  ➔ $|a| + |b| \geq |a + b|$

  ➔ $|a| - |b| \leq |a - b|$

  ➔ $|a \cdot b| = |a|\,|b|$

  ➔ $|a| > |b| \Rightarrow a > b$ (if both are +ve)

  $\Rightarrow a < b$ (if both are -ve)

- For any three real numbers X, Y and Z;

  if $X > Y$ then $X+Z > Y+Z$

- If $X > Y$ and

  1. Z is positive, then $XZ > YZ$

2. Z is negative, then XZ < YZ

3. If X and Y are of the same sign, $\frac{1}{X} < \frac{1}{Y}$

4. If X and Y are of different signs, $\frac{1}{X} > \frac{1}{Y}$

- For any positive real number, $x + \frac{1}{x} \geq 2$
- For any real number x >1,

$$2 < \left[1 + \frac{1}{x}\right]^x < 2.8$$

As x increases, the function tends to an irrational number called 'e' which is approx. equal to 2.718

- If |x| ≤ k then the value of x lies between −k and k, or −k ≤ x ≤ k
- If |x| ≥ k then x ≥ k or x ≤ -k
- If $ax^2 + bx + c < 0$ then (x-m)(x-n) < 0, and if n > m, then m < x < n
- If $ax^2 + bx + c > 0$ then (x-m)(x-n) > 0 and if m < n, then x < m and x > n
- If $ax^2 + bx + c > 0$ but m = n, then the value of x exists for all values, except x is equal to m,

i.e., x < m and x > m but x ≠ m