# Tips, Formulae and shortcuts for Inequalities

By

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# Cracku Tip 1 – Inequalities

- 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 very limited and students should be comfortable with the basics involving 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.

# Cracku Tip 2 – Inequalities

- The modulus of x, |x| equals the maximum of x and –x

  $$-|x| \leq x \leq |x|$$

- For any two real numbers 'a' and 'b',

  $$|a| + |b| \geq |a + b|$$

  $$|a| - |b| \leq |a - b|$$

  $$|a \cdot b| = |a|\,|b|$$

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# Cracku Tip 3 – Inequalities

- 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, 1/X < 1/Y
  4. If X and Y are of different signs, 1/X > 1/Y

# Cracku Tip 4 – Inequalities

- 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 approximately equal to 2.718

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# Cracku Tip 5 – Inequalities

- If $|x| \leq k$ then the value of x lies between $-k$ and k, or $-k \leq x \leq k$
- If $|x| \geq k$ then $x \geq k$ or $x \leq -k$

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# Cracku Tip 6 – Inequalities

- 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 $x \neq m$

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