Rules of Inequalities

In order to solve inequalities, we have to simplify them. In simplifying inequalities, we have to observe four rules.

1. If we add or subtract the same number to both sides of an inequality, the inequality

sign is maintained, i.e. $a > b \rightarrow a + c > b + c$ and $a - c > b - c.$

Example: If $x > 2$ then $x + 1 > 3.$

2. If we multiply or divide both sides by a positive number the inequality sign is unchanged i.e. $a > b$ and $c > 0$ then

$ac > bc$ and $\dfrac{a}{c} > \dfrac{b}{c}.$

Example: If $x > 2$ then $2x > 4.$

3. If we multiply or divide both sides by a negative number, the inequality sign is reversed i.e. $a > b$ and $c < 0$ then

$ac < bc$ and $\dfrac{a}{c} < \dfrac{b}{c}.$

Example: If $x > 2$ then $-3x < -6.$

4. If both sides of an inequality are positive we can square both sides, maintaining the inequality sign, i.e.

$a > b > 0 \rightarrow a^2 > b^2.$

Example: $3 > 2 > 0$ so $9 > 4.$

Example in the use of the rules. Solve $4 - 2x < 15.$

Use rule 1 to subtract 4 from both sides, obtaining $-2x < 11.$

Use rule 3 to divide by -2, obtaining $x > \dfrac{11}{-2} = -5.5.$