

CHAPTER SIX

Inequalities In One Variable

Symbols used:

There are four symbols used and these are:

- 1) $<$ 2) \leq
3) $>$ 4) \geq

The meaning of the symbols $<$ and $>$:

Less than $<$ greater than, greater than $>$ less than.

For these two symbols, the sharp or pointed edge always points to the less or the small value, whilst the other side points towards the greater or big value.

Q1. Give the meaning of the following inequalities:

a) $x < 4$.

Soln.

x is less than 4 or 4 is greater than x .

b) $2 < 4$

2 is less than 4 or 4 is greater than 2.

c) $y > x$.

Soln.

y is greater than x or x is less than y .

d) $5 > 2$.

Soln.

5 is greater than 2 or 2 is less than 5. e) $9x > 10$. Soln.

$9x$ is greater than 10 or 10 is less than $9x$.

The meaning of the symbols \leq and \geq :

- 1) Greater than or equal to \geq less than or equal to.
- 2) Less than or equal to \leq greater than or equal to.
- 3) With respect to these two symbols, the sharp edge points towards the less than or equal to value, whilst the other side points towards the greater than or equal to value.

Q2. Give the meaning of the following inequalities:

a) $b \leq 5$

Soln.

b is less than or equal to 5, or 5 is greater than or equal to b.

b) $x \leq 2$

Soln.

x is less than or equal to 2, or 2 is greater than or equal to x.

c) $5 \leq y$

Soln.

5 is less than or equal to y or y is greater than or equal to 5.

d) $4 \geq y$.

Soln.

Y is less than or equal to 4 or 4 is greater than or equal to y.

e) $2x \geq 6$

Soln.

6 is less than or equal to $2x$ or $2x$ is greater than or equal to 6.

Q3. List the members of the following sets:

a) $Z = \{x : x > 2\}$.

Soln.

$x: x > 2 \Rightarrow x$ is greater than 2.

The members are all the numbers greater than 2.

$\Rightarrow z = \{3, 4, 5 \dots \dots \dots\}$

b) $Y = \{x: x \geq 2\}$.

Soln.

Since $x \geq 2 \Rightarrow x$ is greater than or equal to 2, $\Rightarrow y = \{2, 3, 4, 5 \dots\}$.

c) $A = \{n: n > 5\}$.

Soln.

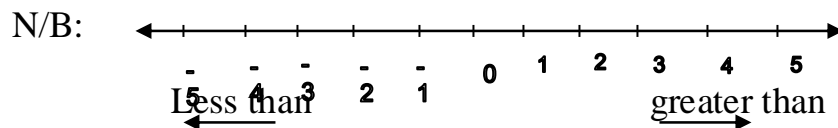
Since $n > 5 \Rightarrow n$ is greater than 5, $\Rightarrow A = \{6, 7, 8, 9 \dots \dots \dots\}$.

d. $N = \{n : n \geq 5\}$.

Soln.

Since $n \geq 5 \Rightarrow n$ is greater than or equal to 5,

$\Rightarrow N = \{5, 6, 7, 8 \dots \dots \dots\}$.



The numbers on the left hand side of the number line, are always less than those on the right hand side. For example

1. -5 is less than -4.
2. -5 is less than -2.
3. -4 is less than -2.
4. -4 is less than -3.
5. -1 is greater than -3.
6. -2 is greater than -5.

Q4. List the members of the following sets:

a) $x = \{x : x \leq 2\}$.

Soln.

Since $x \leq 2 \Rightarrow x$ is less than or equal to 2, $\Rightarrow x = \{2, 1, 0, -1, -2, -3 \dots \dots \}$.

b) $y = \{x : x < 2\}$.

Soln.

$x < 2 \Rightarrow x$ is less than 2, $\Rightarrow y = \{1, 0, -1, -2, -3 \dots \dots \}$.

c) $y = \{n : n \leq -2\}$

Soln.

Since $n \leq -2 \Rightarrow n$ is less than or equal to -2 ,

$\Rightarrow y = \{-2, -3, -4, -5 \dots \dots \}$.

d) $m = \{n : n < -2\}$.

Soln.

Since $n < -2 \Rightarrow n$ is less than -2 , $\Rightarrow m = \{-3, -4, -5 \dots \dots \}$.

e) $Z = \{x : x > -4\}$.

Soln.

Since $x > -4 \Rightarrow x$ is greater than -4 , $\Rightarrow z = \{-3, -2, -1, 0, 1, 2 \dots \dots \}$.

f) $z = \{x : x \geq -4\}$

Soln.

$x \geq -4 \Rightarrow x$ is greater than or equal to -4 . $z = \{-4, -3, -2, -1, 0, 1, 2, \dots \dots \}$.

g) $y = \{x : x \leq -4\}$.

Soln.

$x \leq -4 \Rightarrow x$ is less than or equal to -4 . $Y = \{-4, -5, -6, \dots\}$.

h) $y = \{x : x < -4\}$.

Soln.

$x < -4 \Rightarrow x$ is less than -4 , $\Rightarrow y = \{-5, -6, -7 \dots \dots \dots\}$.