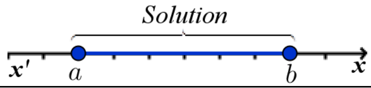
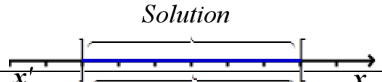
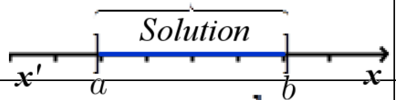
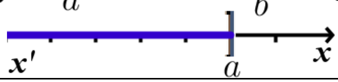
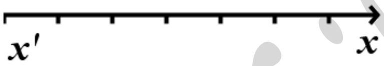
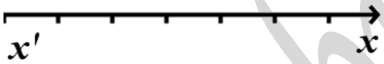
## A- Intervals:

If $a \& b$ are any two real numbers such that, $a < b$ then every set of numbers $x$ may have the following different representations:

| Representations of a set of real numbers $x$ | | | | Illustration of $x$ |
|---|---|---|---|---|
| Inequality form | Number line form | Interval form: Notation | Interval form: Name | |
| $a \le x \le b$ |  | $[a;b]$ | Closed interval | $x$ can take any value between $a \& b$ including $a \& b$ |
| $a < x < b$ |  | $]a;b[$ | Open interval | $x$ can take …………………… |
| $a \le x < b$ |  | ………… | Semi open interval at $b$ | $x$ can take any value between $a \& b$ except $b$ |
| $a < x \le b$ |  | $]a;b]$ | Semi open interval at $a$ | $x$ can take …………………… |
| $x \le a$ |  | $]-\infty;a]$ | ………. | $x$ can take any value less than or equal to $a$ |
| $x < a$ |  | ………… | ………. | $x$ can take …………………… |
| $x \ge b$ |  | $[b;+\infty[$ | ………. | $x$ can take any value greater than or equal to $b$ |
| $x > b$ |  | $]b;+\infty[$ | ………. | $x$ can take …………………… |

## B- Center and amplitude of an interval:

If $I$ is an interval of closed bounds $a$ and $b$ where $a < b$,

- We call the center of $I$ the number: $c = \dfrac{b+a}{2}$
- We call the length or amplitude of $I$, the positive number: $(b-a)$.
- The half - length of $I$ or the radius of $I$ is the positive number: $r = \dfrac{b-a}{2}$.
- Every interval of the form $[c-r, c+r]$, is called a centered interval.

✓ *Note that:*

**a)** $\Re = ]-\infty;+\infty[$ is a centered interval. Its center is any real number.

**b)** The interval $]-\infty;a[\cup]a;+\infty[$ admits $a$ as its center.

**c)** The interval $]-\infty;a[\cup]a;b[\cup]b;+\infty[$ admits a center: $\dfrac{a+b}{2}$