Al Mahdi High Schools *Mathematics* *10^{th}-Grade*

Name: . . . ." Vectors Coordinates & Algebraic measure " *S.S- 3*

➢ Focusing event:

✓ Consider the points $A(x_A)\&B(x_B)$. Write $\overrightarrow{AB}$ in terms of abscissas of $A\&B$.

…………………………………………………………………………………………

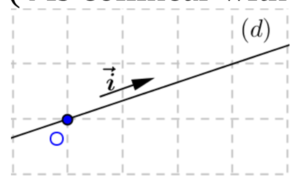
✓ How did you write it in this form? ……………………………………………………

➢ What is an axis?

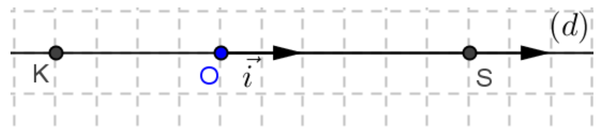
Let O be any point on a straight line (d) with a directing vector $\vec{i}$ ($\vec{i}$ is collinear with (d)).

Then we call the pair $(O,\vec{i})$ the reference of (d).

Thus, we define an ***axis*** by any straight line with a reference.



Ex1: Consider on the axis of reference $(O,\vec{i})$ the points $R(x_R), N(x_N)\&S(x_S)$.



1) Find abscissa of the points $S\&K$ …………………
2) a) Trace the vectors: $\overrightarrow{OR}=2\vec{i}$, & $\overrightarrow{ON}=-\vec{i}$.

   b) Deduce the abscissas of points $R\&N$ ………………………………
3) Express: $\overrightarrow{OS}$ & $\overrightarrow{OK}$ in terms of $\vec{i}$. ……………………….. ………………………..
4) Consider the vectors: $\overrightarrow{RN}$ & $\overrightarrow{RS}$
   i. Complete the following: If $\overrightarrow{RN}=\overrightarrow{ON}-\overrightarrow{OR}$ then, $\overrightarrow{RS}=$ …………………
   ii. Deduce a writing of $\overrightarrow{RN}$, & $\overrightarrow{RS}$ as a function of $\vec{i}$.

   ……………………….. ………………………..

   iii. Deduce the abscissas of $\overrightarrow{RN}$ & $\overrightarrow{RS}$………………………………………

➢ Algebraic measure:

The algebraic measure of a vector $\overrightarrow{AB}$ (or a segment $[AB]$) denoted by $\overline{AB}$ relative to a reference $(O,\vec{i})$ is the abscissa of $\overrightarrow{AB}$.

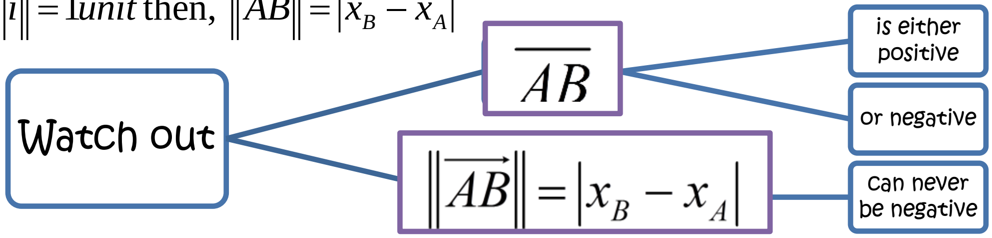
In other words,

$$\overline{AB}=\overline{OB}-\overline{OA}=x_B-x_A$$

❖ Thus, if $\overrightarrow{RN}=k\cdot\vec{i}$, $\forall k\in\mathbb{R}$ then k is the algebraic measure of $\overrightarrow{RN}$

➢ Distance between two points:

If $A(x_A)\&B(x_B)$ are any two points on the axis of reference $(O,\vec{i})$ such that $\|\vec{i}\|=1unit$ then, $\|\overrightarrow{AB}\|=|x_B-x_A|$



Remark

- To define the abscissa of a point we need a reference $(O,\vec{i})$
- To dfine an algebraic measure it is enough to have a unit vector

The set of any two non-collinear vectors $\{\vec{i},\vec{j}\}$ is called a basis of the plane