

Scalar quantity:



It is a quantity determined completely by a real number which is the magnitude of this quantity.

For example: Length - mass - time - temperature - volume - distance.

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Vector quantity:

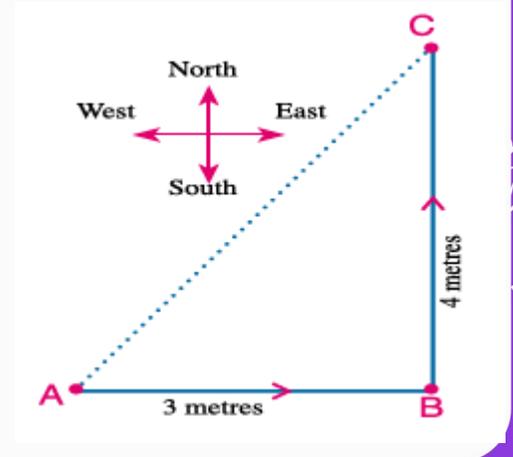
It is a quantity determined completely by a real number which is quantity, and the direction.

For example: Force - displacement — velocity- acceleration.

The difference between the scalar quantity and the vector quantity, we show - for example - the difference between distance as a scalar quantity and displacement as a vector quantity.

If a body moved from point A a distance 3 meters east, then changed its direction and moved 4 meters north and stopped at point C .

Distance is a scalar quantity which is the result of $AB+BC$ or $CB+BA$.
Distance: It is the length of the actual path covered during movement from a position to another, and it is a scalar quantity because it is determined completely by its magnitude only without direction.



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Displacement: it is the smallest distance between the starting point and the ending point.

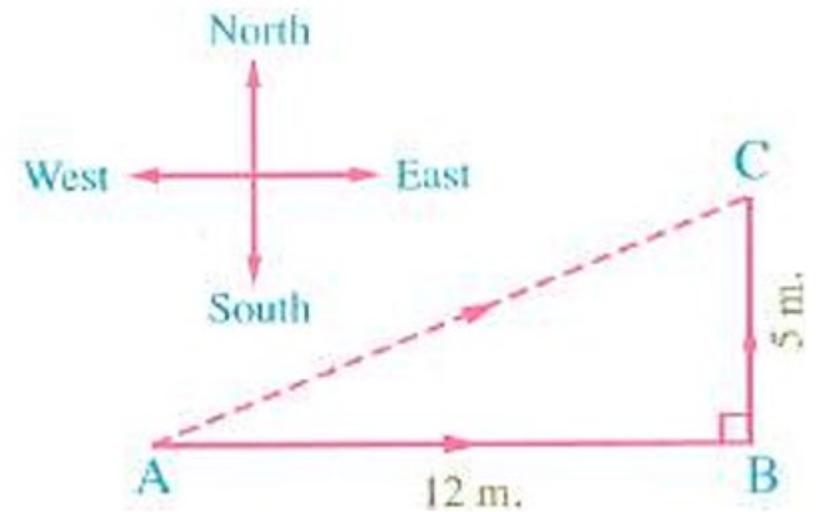
i.e It is the distance covered in a certain direction, and it is a vector quantity because it is determined completely by its magnitude and its direction.

In the opposite figure:

If a body moved from the point A a distance 12 m. east, then changed its direction and moved 5 m. north and stopped at the point C then: the distance covered by the body during the movement = $AB + BC = 12 + 5 = 17$ m .

and the displacement resulted during the movement is the length of \vec{AC} in the direction from A to C Type equation here.

The displacement = $\sqrt{(12)^2 + (5^2)} = 13$ m . 13m in the direction \vec{AC}





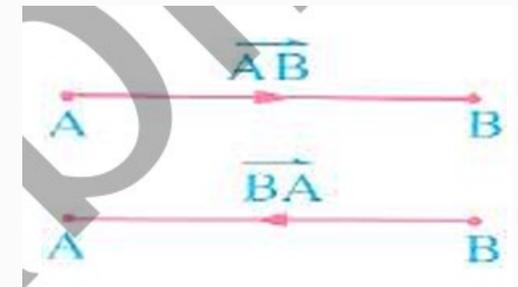
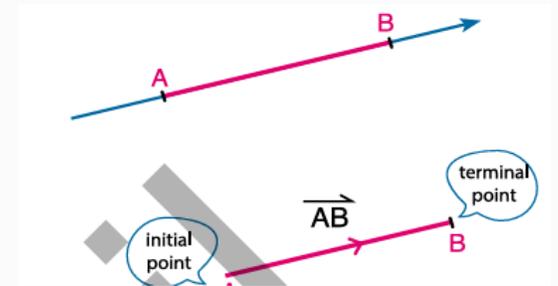
The directed line segment:

It is a line segment which has a starting point, an ending point and a direction.

Notic that: \overrightarrow{AB}

and the displacement resulted during the movement is the length of \overrightarrow{AC} in the direction from A to C

The displacement $= \sqrt{(12)^2 + (5^2)} = 13\text{m} . 13\text{m}$ in the direction $\overrightarrow{AC} \neq \overrightarrow{BA}$



The norm of the directed line segment: "norm of $\|\vec{AB}\|$

It is the length of AB and is denoted by the symbol $\|\vec{AB}\|$

notice that: $\|\vec{AB}\| = \|\vec{BA}\| = AB$

Equivalent directed line segments:

Two directed line segments are equivalent if:

1. they have the same length "norm",
2. They have the same direction.





points to remember

Definition 1: The directed line segment is a line segment which has an initial point, an terminal point and a direction.

Definition 2: The norm of the directed line segment: norm of \vec{AB} is the length \vec{AB} and is denoted by the symbol $\|\vec{AB}\|$

Notic that : $\|\vec{AB}\| = \|\vec{BA}\| = AB$



Definition 3: Equivalent directed line segments : directed line segments are said to be equivalent if they have the same norm and same direction.

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Direction



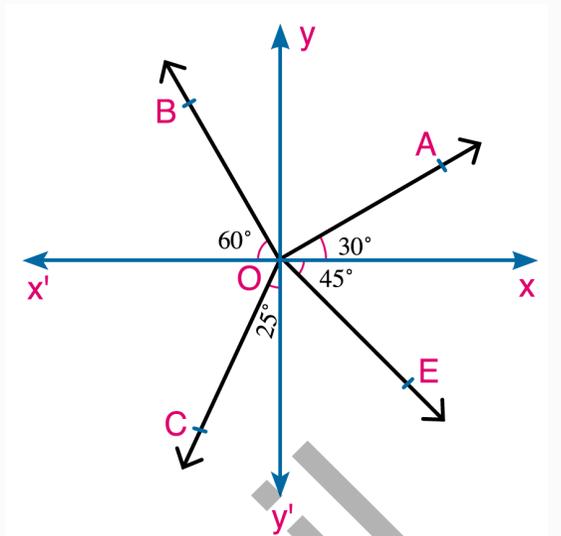
1. Each ray in the plane determines a direction. In the figure opposite:

\vec{OX} determines the east direction, \vec{OY} determines the west direction

\vec{OY} determines the north direction and $\vec{OY'}$ determines the south direction

What are the directions determined by:

\vec{OA} , \vec{OB} , \vec{OC} and \vec{OD} ?



2. IF $\vec{AB} // \vec{CD}$, $E \in \vec{AB}$, then:

\vec{EA} and \vec{BE} have the same direction and are carried on one straight line.'

\vec{EA} and \vec{DC} have the same direction and are carried on two parallel straight lines.

\vec{EA} and \vec{EB} have opposite directions and are carried on one straight line.

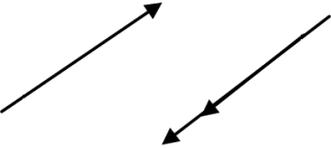
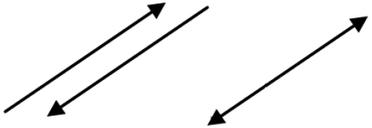
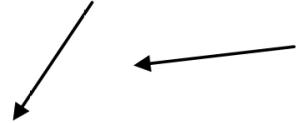
\vec{EA} and \vec{CD} have opposite directions and are carried on two parallel straight lines.





Generally :

1. The two rays which have the same or opposite directions are carried on one straight line or two parallel straight lines and vice versa.
2. The two rays in direction are not carried on one straight line or two parallel straight lines:'

Same direction	opposite direction	different direction
		
Parallel or carried	Parallel or carried	Not carried , not parallel

Example (1)

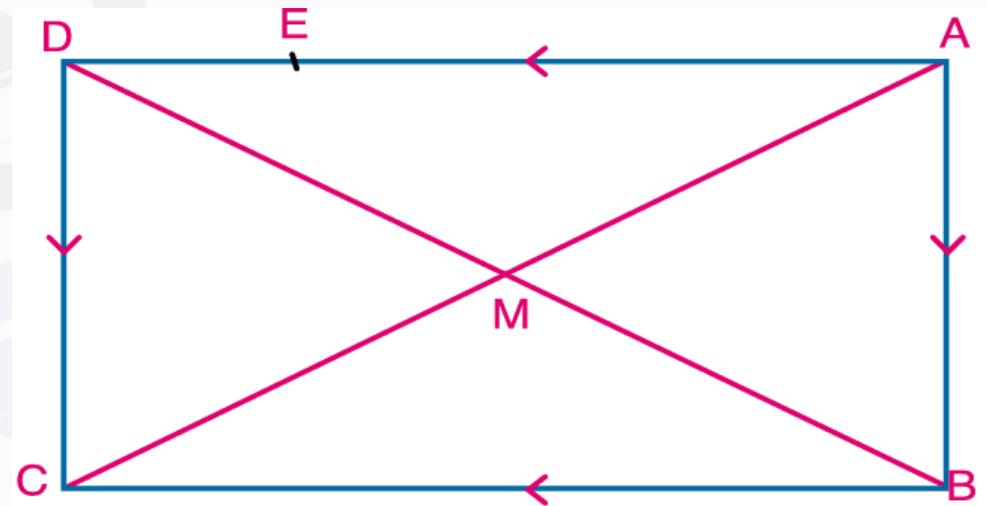


In the figure opposite: ABCD is a rectangle
Its diagonals are intersection at M. $E \in AD$

Then:

$$\vec{AB} // \vec{CD}, AB = CD, \vec{BC} // \vec{AD}, BC = AD$$

And $MA = MB = MD$



Solution: (1)



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Example (2)



In the opposite figure:

ABCD is parallelogram its diagonals intersecting at M , and E is the midpoint of \overrightarrow{AD}

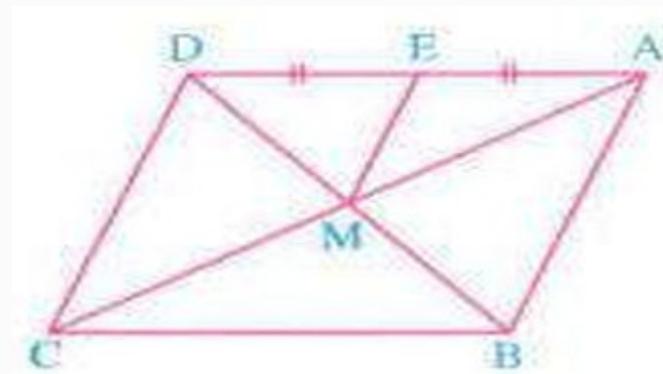
first : Determine the directed line segments (If existed) which are

equivalent 1. \overrightarrow{AB} 2. \overrightarrow{DA} 3. \overrightarrow{MB} 4. \overrightarrow{AM} 5. \overrightarrow{AE} 6. \overrightarrow{ME}

Second : Show why the following directed line segments are not

equivalent : 1. \overrightarrow{DM} and \overrightarrow{DB} 2. \overrightarrow{AD} and \overrightarrow{CB} 3. \overrightarrow{AM} and \overrightarrow{CM}

Solution: (2)

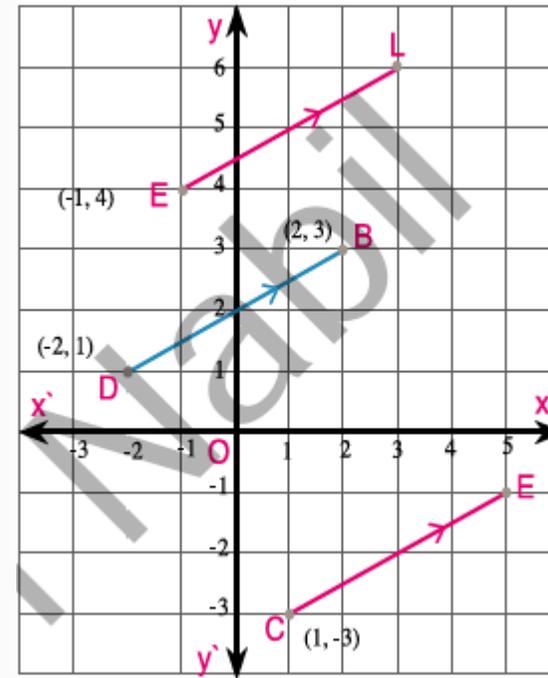


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Example (3)



In an orthogonal coordinate plane, determine the points $A(-2,1)$, $B(2,3)$, $C(1,-3)$, $D(-1,4)$, then draw \vec{CE} and \vec{DL} each of equivalent to \vec{AB} . Find the coordinates of E and L .





Notic that :

Translation preserves parallelism of straight lines and lengths of line segments.

Consider point C is the image of point A by the translation $(1-(-2), -3-1) = (3, -4)$

\rightarrow \rightarrow \rightarrow \rightarrow
 \therefore to draw CE is equivalent to AB, we find that CE is the image of AB by the translation $(3, -4)$ and the coordinates of E = $(2+3, 3+(-4)) = (5, -1)$

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Example (4)



On the lattice, if A (3,-2) , B (6,2) , C (1,3) and D (4,7)

1) FIND: $\|\vec{AB}\|$ and $\|\vec{CD}\|$

2) Prove that : \vec{AB} is equivalent to \vec{CD}

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Example (5)



- In an orthogonal coordinate plane, determine the points $A(-2,1)$, $B(1,3)$, $C(2,2)$ and $D(1,-1)$ then draw \vec{CE} and \vec{DL} each of them is equivalent to \vec{AB}

Find the coordinates of each of : E and L

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ذاكر كل المواد على

المُحتوكة
منصة المحتوى التعليمية



سواء بتذاكر لوحديك أو بتراجع قبل الامتحان ...
هتلاقي كل اللي محتاجه عندنا، في مكان واحد

