

2020/21A.Y First Quarter Physics Lesson Note One for Grade 9

UNIT ONE

Vectors

- ✓ Anything that can be measured either directly or indirectly is called physical quantity.
Example:- mass, time speed, distance etc.
- ✓ Physical quantity can be categorized in to two.
i.e – Basic or fundamental quantities
- Derived physical quantities
- ❖ **Basic physical quantities** are quantities that can be measured directly by using measuring devices.
There are seven basic physical quantities. These include mass, length, time, temperature, electric current, amount of substance and luminous intensity.
- ❖ **Derived physical quantities** are quantities that come from basic ones either by multiplying or dividing them.
Example:- Speed, velocity, area, density, acceleration etc.

Scalar and Vectors

- ✓ Physical quantities can also be classified into two; namely **scalar** and **vectors** based on whether they need direction to be described or not.
- ❖ **Scalars** are quantities that need **only magnitude or size to be described**. All the seven basic quantities are scalars.
- ✓ Derived quantities such as speed, pressure, work, volume, charge, voltage etc are also scalars.
- ❖ **Quantities that need direction other than magnitude to be described** are called **vectors**.
Example:- displacement, velocity, acceleration, force, etc.
Therefore **Vector = magnitude + direction**
Velocity = Speed + Direction
- ✓ 10m describes distance but 10m due North describes displacement. 10m/s describes speed but 10m/s due North describes velocity.

Representation of vectors

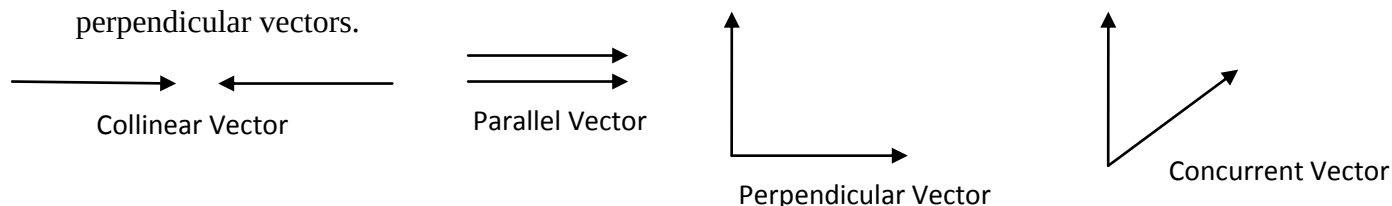
- ✓ Vector can be represented by using either of the following ways.
 1. **Bold face purple symbols** as in **F**, **α**, **P** to represent force, acceleration and momentum.
- ✓ Vector operation is represented by bold face sign of '+', '-', and '='.
 2. **Putting an arrow above the symbol** as in $\vec{F}$, $\vec{a}$ and $\vec{P}$
 3. **Graphical or geometrical representation** of vectors.
- ✓ Vector is represented by a direct line segment` having magnitude and direction. When we represent vectors by this method, the length of the arrow indicates magnitude of the vector and the way it is pointing represents its direction.

- ✓ The initial point of the arrow is named as tail and that of the terminal point head of the vector.



Kinds of vectors

- ✓ There are different kinds of vectors. These include concurrent, collinear, parallel, coplanar and perpendicular vectors.



- Collinear Vectors**: are vectors which act either along the same line or along parallel lines. These vectors may act either the same direction or in opposite direction.
- Parallel Vectors**: are systems of vectors in which the components are parallel. Anti-parallel vectors are also called as opposite vectors.
 - ✓ Two vectors “A” and ‘B’ are said to be parallel if and only if there is a constant number ‘C’ such that $B = CA$. if ‘C’ is positive they are parallel and negative anti-parallel.
- Perpendicular Vector**: are vectors that make an angle of 90° between them.
- Concurrent Vectors**: are systems of vectors in which the lines of action of the components pass through a common single point.

Addition of vectors

- ✓ Vectors addition is a little bit complex compared with scalar addition. The reason is that the direction of vectors must be considered.
- ✓ When we add two vectors the maximum resultant vector is the sum of the two vectors and the minimum value is the difference of them. When we add two or more vectors together, the overall vector is called resultant.
- ✓ There are two method of adding vectors.
 - ❖ Graphical (geometrical) method
 - ❖ Analytical method