Physics - Elements of vectors Cheat Sheet

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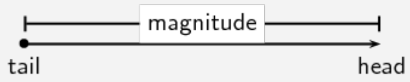
Scalar

Physical quantities having only magnitude but not associated with any direction are called scalar quantities.

scalars are added and subtracted by algebraic method.

Ex : Mass, speed work, power, energy, pressure etc.

Graphical representation of a Vector



A vector can be represented graphically by a directed line segment. The length of the line segment is magnitude of the vector and the arrow head represents the direction of vector.

Triangle law of vectors

The famous triangle law can be used for the addition of vectors and this method is also called the head-to-tail method.

As per this law, two vectors can be added together by placing them together in such a way that the first vector's head joins the tail of the second vector.

Thus, by joining the first vector's tail to the head of the second vector, we can obtain the resultant vector sum.

Scalar Product/Dot Product of Vectors

The resultant of scalar product/dot product of two vectors is always a scalar quantity.

Consider two vectors a and b.The scalar product is calculated as the product of magnitudes of a, b, and cosine of the angle between these vectors.

Scalar product = $|a||b| \cos \alpha$

Here, $|a|$ = magnitude of vector a, $|b|$ = magnitude of vector b, α = angle between the vectors

Vector

Physical quantities having both magnitude and direction are called as vector quantities.

Ex : Displacement, Velocity, acceleration, force, momentum etc.

Types of vectors

Null Vector	It is a vector whose magnitude is zero and direction is not specified
Equal Vector	Two vectors are said to be equal if they have same magnitude and direction irrespective of their initial points
Negative Vector	A vector with same magnitude but opposite in direction is called negative vector
Unit Vector	A vector whose magnitude is unity is termed as unit vector
Parallel Vector	If two vectors are in same direction then they are said to be parallel or like vectors.
Position vectors	The vector which is used to specify the position of a point 'p' with respect to some fixed point 'o' represented by OP is known as position vector of 'p' with respect to 'o'.

Parallelogram Law of Addition of Vectors

Another law that can be used for the addition of vectors is the parallelogram law of the addition of vectors.

Let's take two vectors p and q, as shown below. They form the two adjacent sides of a parallelogram in their magnitude and direction.

The sum p + q is represented in magnitude and direction by the diagonal of the parallelogram through their common point.

Cross Product

If the product of two vectors is another vector then such a product is called vector product or cross product.

If θ is the angle between the given two vectors A and B, then the formula for the cross product of vectors is given by:

$A \times B = |A|\ |B| \sin \theta$