



Math for the people, by the people.

bivector

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A *bivector* is a two-dimensional analog to a one-dimensional vector. Whereas a vector is often utilized to represent a one-dimensional directed quantity (often visualized geometrically as a directed line-segment), a bivector is used to represent a two-dimensional directed quantity (often visualized as an oriented plane-segment).

Since a bivector is a two-dimensional entity, it can be built up from two linearly independent vectors, \mathbf{a} and \mathbf{b} by means of the exterior product.

$$\mathbf{B} = \mathbf{a} \wedge \mathbf{b}$$

The vectors \mathbf{a} and \mathbf{b} span the subspace represented by the bivector \mathbf{B} . Typically the orientation of the bivector is established by placing the two vectors tail-to-tail and sweeping from the first vector to the second. In this way, an oppositely oriented bivector may be obtained by reversing the order of the vectors in the exterior product.

$$\mathbf{a} \wedge \mathbf{b} = -\mathbf{b} \wedge \mathbf{a}$$