

# Vectors Formula

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## Vectors Formula

Here are some of the main formulas associated with vectors:

Vector addition:  $\mathbf{v} + \mathbf{w} = (v_1 + w_1)\mathbf{i} + (v_2 + w_2)\mathbf{j} + (v_3 + w_3)\mathbf{k}$  Scalar multiplication:  $k\mathbf{v} = k(v_1)\mathbf{i} + k(v_2)\mathbf{j} + k(v_3)\mathbf{k}$  Dot product:  $\mathbf{v} \cdot \mathbf{w} = (v_1w_1) + (v_2w_2) + (v_3w_3)$  Cross product:  $\mathbf{v} \times \mathbf{w} = (v_2w_3 - v_3w_2)\mathbf{i} + (v_3w_1 - v_1w_3)\mathbf{j} + (v_1w_2 - v_2w_1)\mathbf{k}$  where  $\mathbf{v}$  and  $\mathbf{w}$  are vectors, and  $v_1$ ,  $v_2$ , and  $v_3$ ,

and  $w_1$ ,  $w_2$ , and  $w_3$  are the components of the vectors in the x, y, and z directions, respectively. These formulas provide a way to manipulate vectors using mathematical operations, and are an important part of vector algebra and vector calculus.