Vector Space Axioms

Mathematics

The full axiom list, in the two groups it naturally falls into.

A set V over a field F. Every one must hold.

Addition

Closed: u + v lies in V

Associative: (u + v) + w = u + (v + w)

Commutative: u + v = v + u

Zero vector: v + 0 = v

Inverse: v + (−v) = 0

Scalar multiplication

Closed: λv lies in V

λ(u + v) = λu + λv

(λ + μ)v = λv + μv

λ(μv) = (λμ)v

1v = v

Functions, polynomials, matrices and sequences all satisfy these. That is why one theory covers every one of them at once.