BEFORE YOU READ

Sixteen identity families in four groups

The trigonometric identities on this page fall into four groups by where they come from: the definitions, symmetry, angle arithmetic, and algebraic rewriting.

- L0 **Trigonometric identities** 16 families
  - L1 **Foundational**
    - L2 **Definition-based** triangle sides
    - L2 **Reciprocal** multiplicative-inverse pairs
    - L2 **Pythagorean** $\sin^2\theta + \cos^2\theta = 1$
    - L2 **Triangle geometry** any triangle
  - L1 **Symmetry**
    - L2 **Even-odd** $f(-\theta)$
    - L2 **Co-function** $f(\pi/2 - \theta)$
    - L2 **Periodicity** $f(\theta + \text{period}) = f(\theta)$
    - L2 **Shift** $f(\theta + \pi), f(\theta + \pi/2)$
  - L1 **Angle arithmetic**
    - L2 **Sum** $f(a + b)$
    - L2 **Difference** $f(a - b)$
    - L2 **Double** $f(2\theta)$
    - L2 **Triple** $f(3\theta)$
    - L2 **Half** $f(\theta/2)$
  - L1 **Algebraic transform**
    - L2 **Power-reducing** $f^2(\theta)$ via $f(2\theta)$
    - L2 **Product-to-sum**
    - L2 **Sum-to-product**

TAKEAWAY

Know the source, rebuild the rest

Most identities can be derived from a few foundational ones; the groups show which family each one comes from.