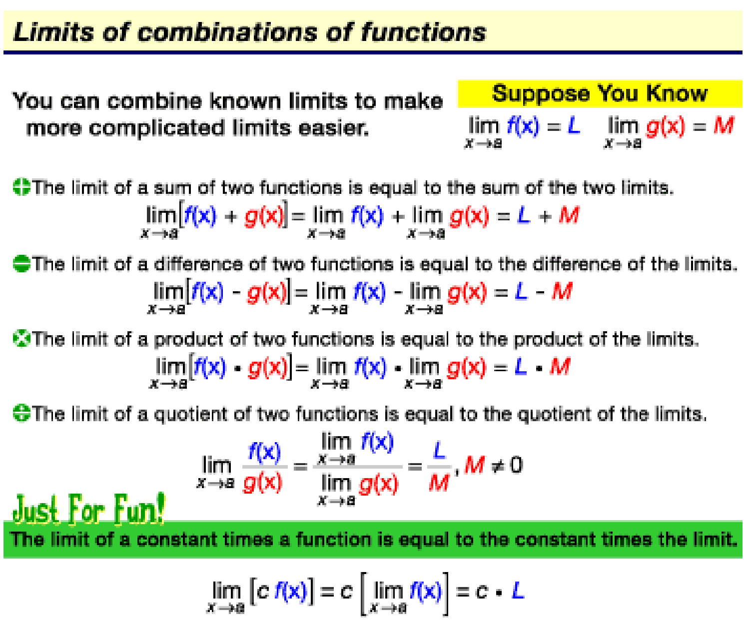
Unit: Limits **Module:** The Concept of the Limit

The Limit Laws

key concepts:

- Since limits are just numbers, a lot of the properties of real numbers also apply to limits.
- The limit of a sum: $\lim\limits_{x \to a} [f(x) + g(x)] = \lim\limits_{x \to a} f(x) + \lim\limits_{x \to a} g(x)$
- The limit of a difference: $\lim\limits_{x \to a} [f(x) - g(x)] = \lim\limits_{x \to a} f(x) - \lim\limits_{x \to a} g(x)$
- The limit of a product: $\lim\limits_{x \to a} [f(x)g(x)] = \lim\limits_{x \to a} f(x) \cdot \lim\limits_{x \to a} g(x)$
- The limit of a quotient: For $\lim\limits_{x \to a} g(x) \neq 0$, $\lim\limits_{x \to a} \left[\dfrac{f(x)}{g(x)}\right] = \dfrac{\lim\limits_{x \to a} f(x)}{\lim\limits_{x \to a} g(x)}$
- The scalar multiple rule for limits: $\lim\limits_{x \to a} [c \cdot f(x)] = c \cdot \lim\limits_{x \to a} f(x)$
- The power rule for limits: $\lim\limits_{x \to a} [f(x)]^n = \left[\lim\limits_{x \to a} f(x)\right]^n$



Taking the limit of a function is an operation, but the resulting limit is just a number. So it makes sense that limits follow a lot of the same properties that numbers do.

The limit of a sum of two functions is equal to the sum of the limits.

The limit of a difference of two functions is equal to the difference of the limits.

The limit of a product of two functions is equal to the product of the limits.

The limit of a quotient of two functions is equal to the quotient of the limits, provided that the denominator does not equal zero.

The limit of a function times a constant is equal to the constant times the limit.

In addition, the limit of a function raised to a power is equal to the limit raised to that power.