

A *power mean* is a type of [mean](#).

Given positive real numbers  $a_1, a_2, \dots, a_n$ , the  $p$ th power mean is obtained by taking the [arithmetic mean](#) of the  $p$ th powers of  $a_1, \dots, a_n$ , and then taking the  $p$ th root of this:

$$\left( \frac{a_1^p + a_2^p + \dots + a_n^p}{n} \right)^{\frac{1}{p}}$$

There are some familiar special cases:

- $p = 1$  is the [arithmetic mean](#)
- $p = -1$  is the [harmonic mean](#)
- $p = 2$  is the [root mean square](#)

(The arithmetic mean and root mean square also work even if some of the numbers are zero or negative.)

Different power means for the same  $a_1, \dots, a_n$  satisfy the inequality:

if  $p > q$ , then the  $p$ th power mean  $\geq$  the  $q$ th power mean

with equality if and only if all of the  $a_i$  are equal to each other.