**Averages**

A central value around which a group of values show a tendency to concentrate is called an “Average”. It is measured in many ways. (See example 1)

1. **Mode :** Mode is the number that occurs most frequently in a given set of numbers.

**Ex.**  As in set (2,4,4,5,78,4,6,4,7,4,6,2,6) mode is “4” as is occurs maximum (5) times.

1. **Median:** Median is the middle value of a group of numbers arranged in ascending or descending order. If the number of values (n) is odd, then median is th term.
2. **Arithmetic Mean:**  The most commonly used average is arithmetic mean (AM). The arithmetic mean of n numbers is sum of all n term divided by no. of terms (n). It is denoted by .

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If the values x1,x2,……xn are asigned weights w1, w2,………,wn respectively, then

Weighted arithmetic mean/ Arithmetic Mean = (See Example 2)

1. **Geometric Mean:** Geometric mean (GM) of n numbers x1,x2,……xn is nth root of their products

**i.**e. GM = (See Example 3)

5. **Harmonic Mean:**  Harmonic mean of n numbers x1,x2,……xn is calculated as

The HM of a and b is

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| Example 1 | What is the average of x, 2x, and 6? |
| Solution | By the definition of an average, we get:    Hence the answer is x +2 |

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| Example 2 | Grades are often computed using a weighted average. Suppose that homework counts 10%, quizzes 20%, and tests 70%.  If Pat has a homework grade of 92, a quiz grade of 68, and a test grade of 81, then  Pat's overall grade = (0.10)(92) + (0.20)(68) + (0.70)(81) = 79.5 |

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| Example 3 | What is the geometric mean of 2, 8 and 4? |
| Solution | Multiply those numbers together. Then take the third root (cube root) because there are 3 numbers.  Geometric Mean (2X8X4)1/3 |