**Properties of GM**

1. **Property 1**

For any series of positive values, the geometric mean is smaller than the arithmetic mean. However, when all the values of a series are equal, G.M. equals to the arithmetic mean.

**Proof.**Let a be the largest and b the smallest positive values of a series.

Then      (a –b)2 > 0

So, a2 – 2ab + b2 > 0

So, a2 + 2ab+ b2 > 4ab     (adding 4ab to both the sides)

So,          (a + b)2 > (2√ab )2

So,          a + b > 2√ab,

So,  a+b/2 >√ab  , (Dividing each side by 2)

Now a+b/2 = Arithmetic mean and √ab = Geometric Mean

1. **Property 2**

 If any value of a series is zero, the value of geometric mean is infinity and thus inappropriate.

**Proof.**Let there be 3 times viz. 15, 20 and 0. The geometric mean of these items would be

3√(15 x 20 x 0) = 3√0 = infinity, and hence inappropriate.

1. **Property 3**

The products of a series of numbers remain the same even when each number of the series is replaced by its geometric mean.

**Proof.**

Product of the series, 4,5, 20,25 = 10000

Geometric mean of the series = 4√(4 x 5 x 20 x 25) = 10

If each number of the series is replaced by G.M.10, the series becomes 10, 10, 0, 10.

The product of this series 10 × 10 × 10 × 10 = 10000. Proved.