Session 1.2-Statistical Thinking

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* Previous Session

https://colab.research.google.com/drive/1A2seLtfFf3uDH3O-IEmYX3tAKTWFtHyY

* Prerequisite Knowledge

① A) $2 \times 2 = 4$ or $2^2 = 4$

B) $(-2) \times (-2) = 4$ or $(-2)^2 = 4$

Both gives same result

Now, let x be variable

$x^2 = 4$

$x = 2$

$x = -2$

$x = \pm 2$

② $2 \times 2 \times 2 \times 2 = 16$

$(-2) \times (-2) \times (-2) \times (-2) = 16$

Both gives same result

Let x be any variable

$x^4 = 16$

- $x = 2$
- $x = -2$
- $x = \text{Img}$
- $x = \text{Img}$

} ✗ Out of context

So, we will deal only with positive number {0 is not positive}

* $\sqrt[2]{4} = (4)^{1/2}$

$\sqrt[3]{27} = (27)^{1/3}$

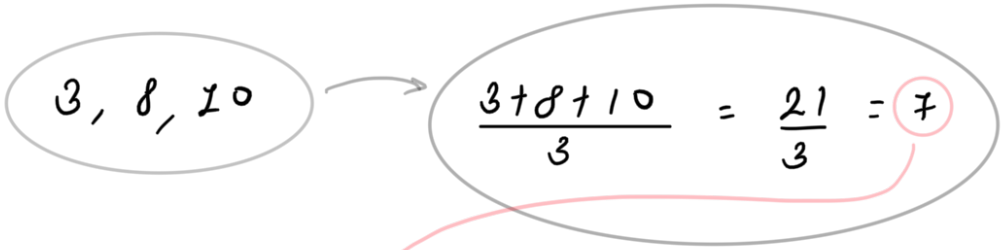
similiarly,

$\sqrt[20]{1000} = (1000)^{1/20}$

General Expression :

$$\sqrt[n]{x} = (x)^{1/n} \quad \text{where } x > 0,\ n \in N$$

* Arithmetic Mean :-



Interpretation

i) Balance point

Alternate way.

$3+8+10 = 21$

$\downarrow \downarrow \downarrow$

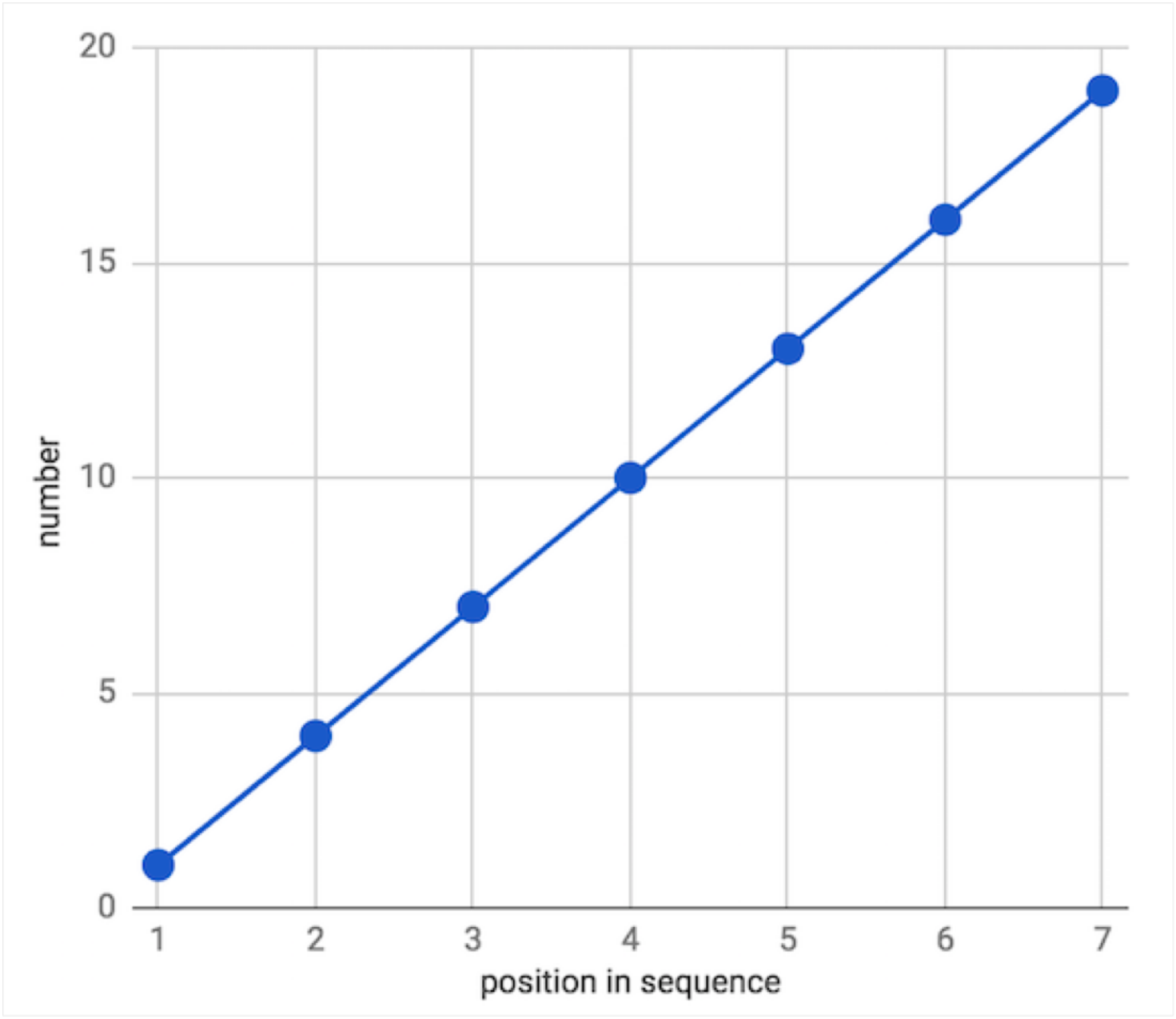
$7+7+7 = 21$

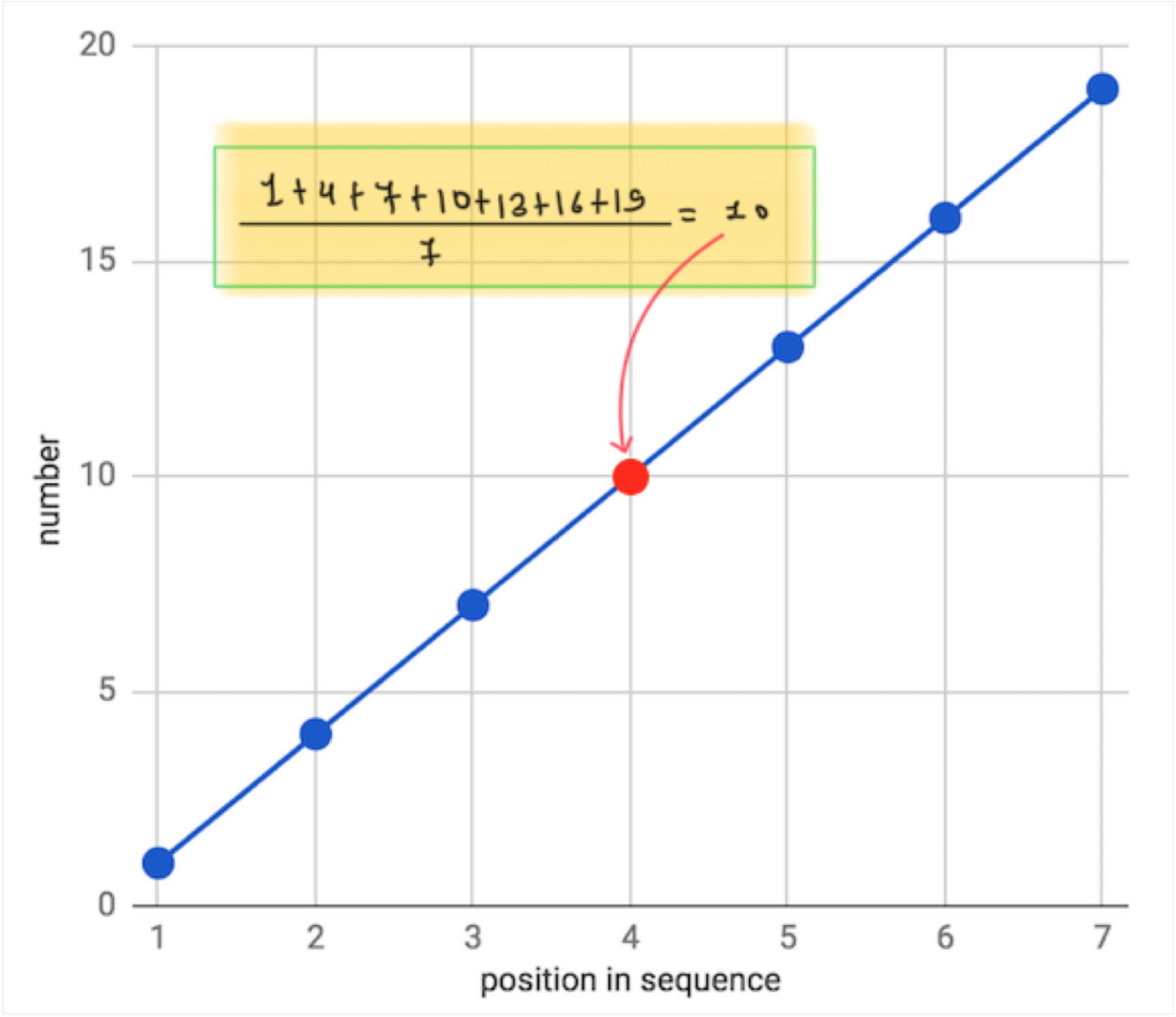
Note :-

The arithmetic mean works well when there is additive relationship between between no:'s.

This relationship is called Linear & the no: tends to fall on straight line.

Eg:- 1, 4, 7, 10, 13, 16, 19


20
15
10
5
0
number
1
2
3
4
5
6
7
position in sequence

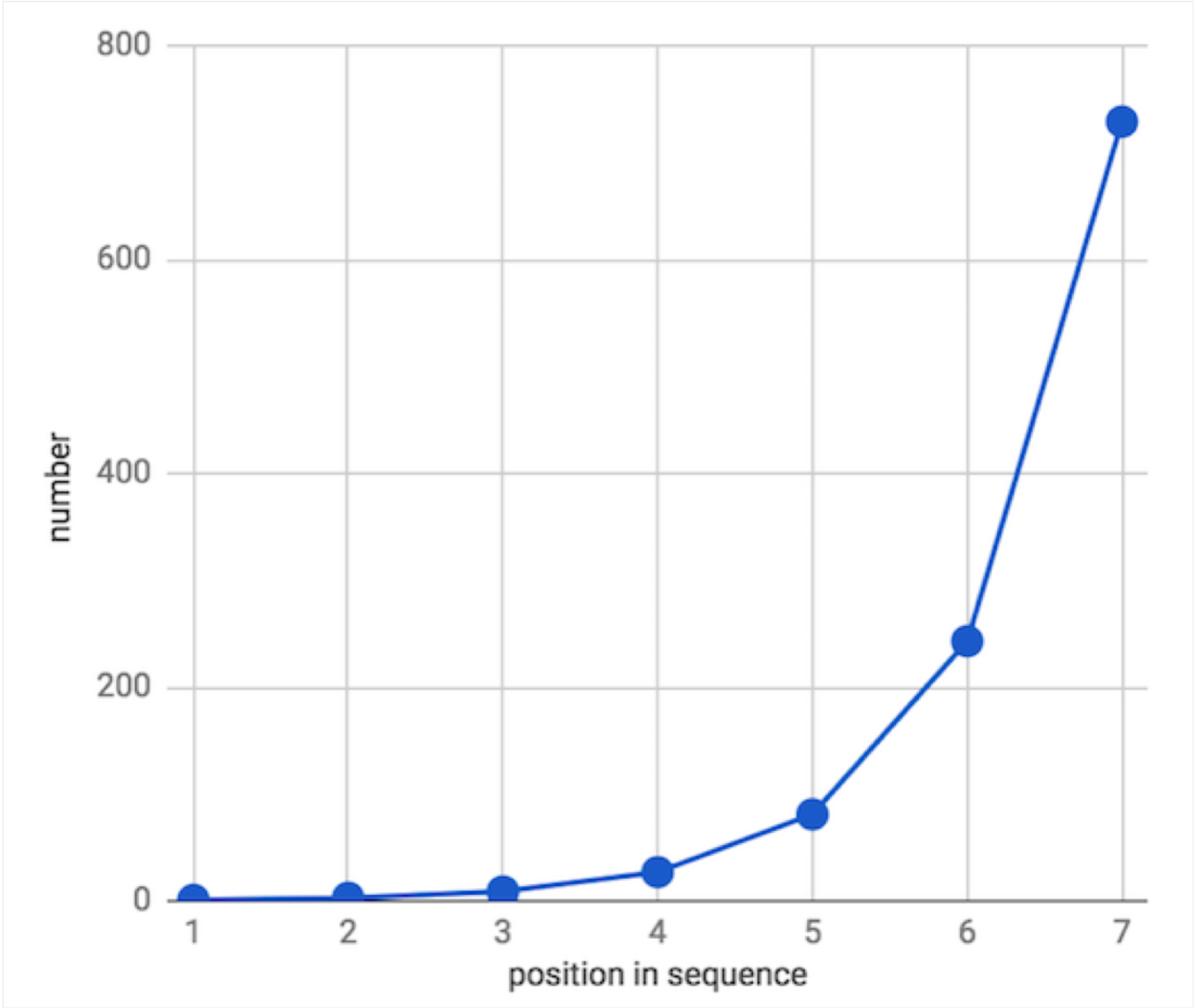


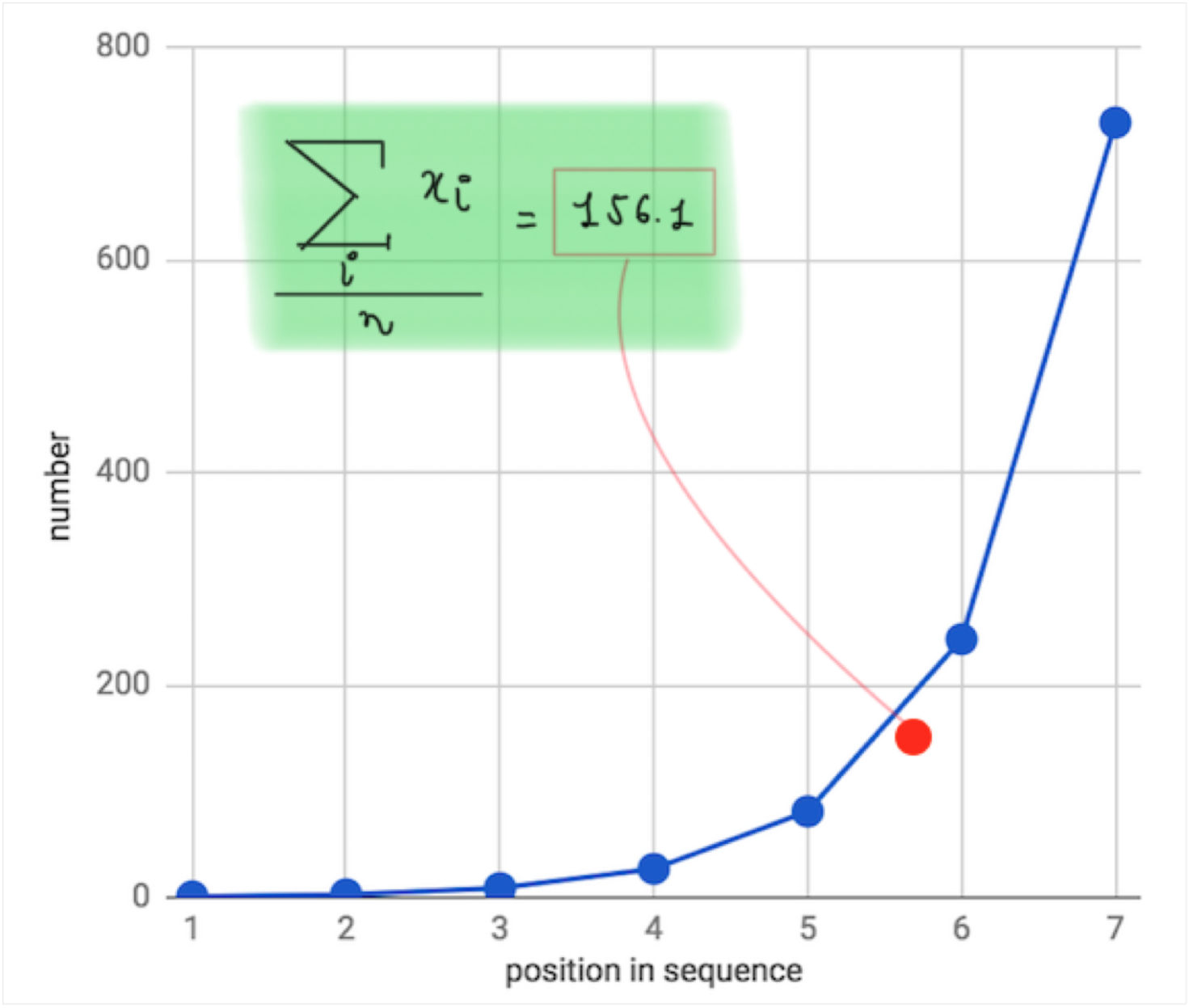
* Other example

1, 3, 9, 27, 81, 243, 729

This dataset has multiplicative or exponential relationship.

!!


800
600
400
200
0
number
1
2
3
4
5
6
7
position in sequence


800
600
400
200
0
number
1
2
3
4
5
6
7
position in sequence
$\frac{\sum_i x_i}{n} = 156.1$


0
100
200
300
400
500
600
700
800

So, here comes the concept of **Geometric Mean**

The relationship is multiplicative, hence rather than adding we multiply the no:'s & then take root.

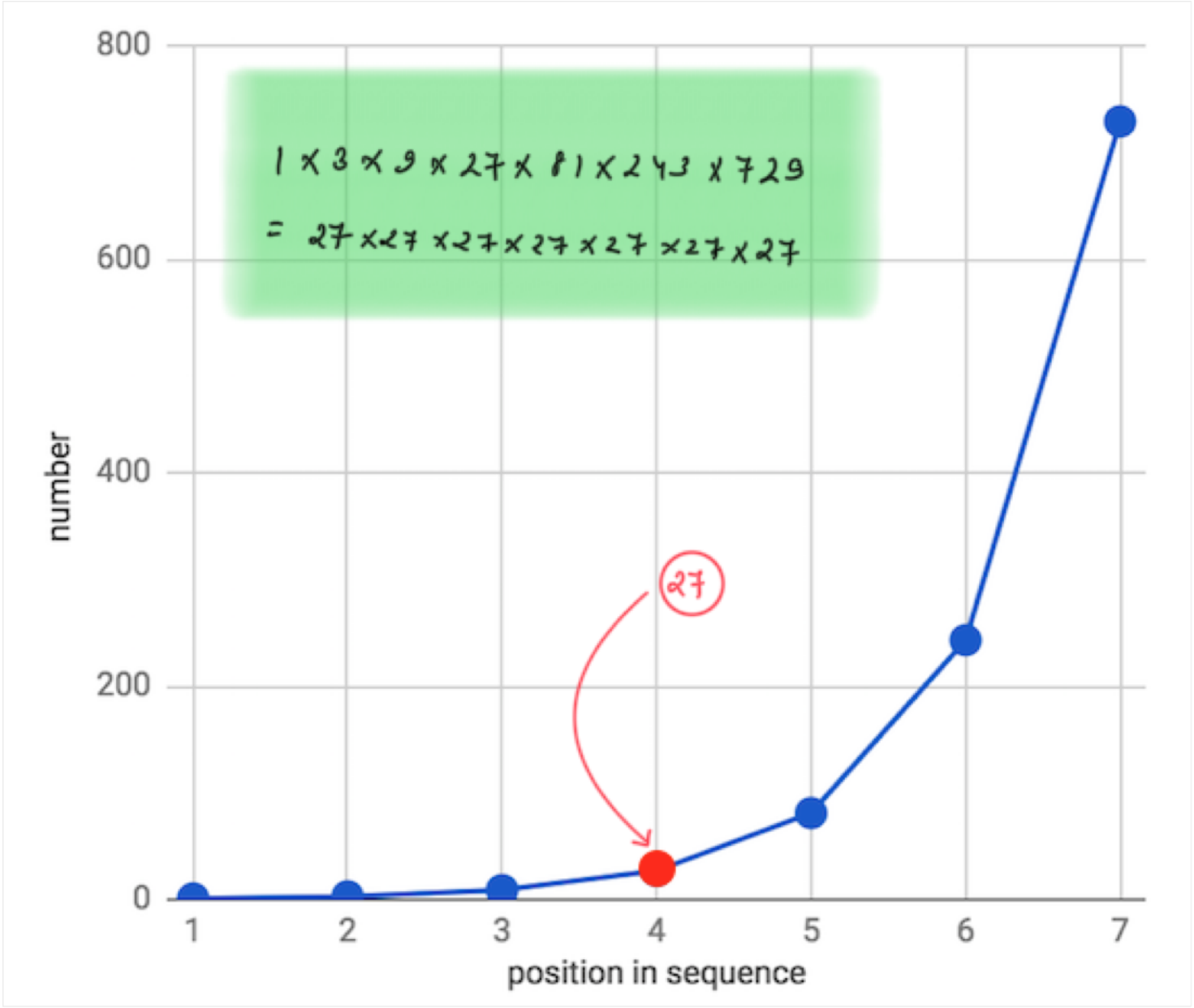
That is like arithmetic mean;

4, 9

$4 \times 9 = 36$

$\downarrow \quad \downarrow$

$6 \times 6 = 36$



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