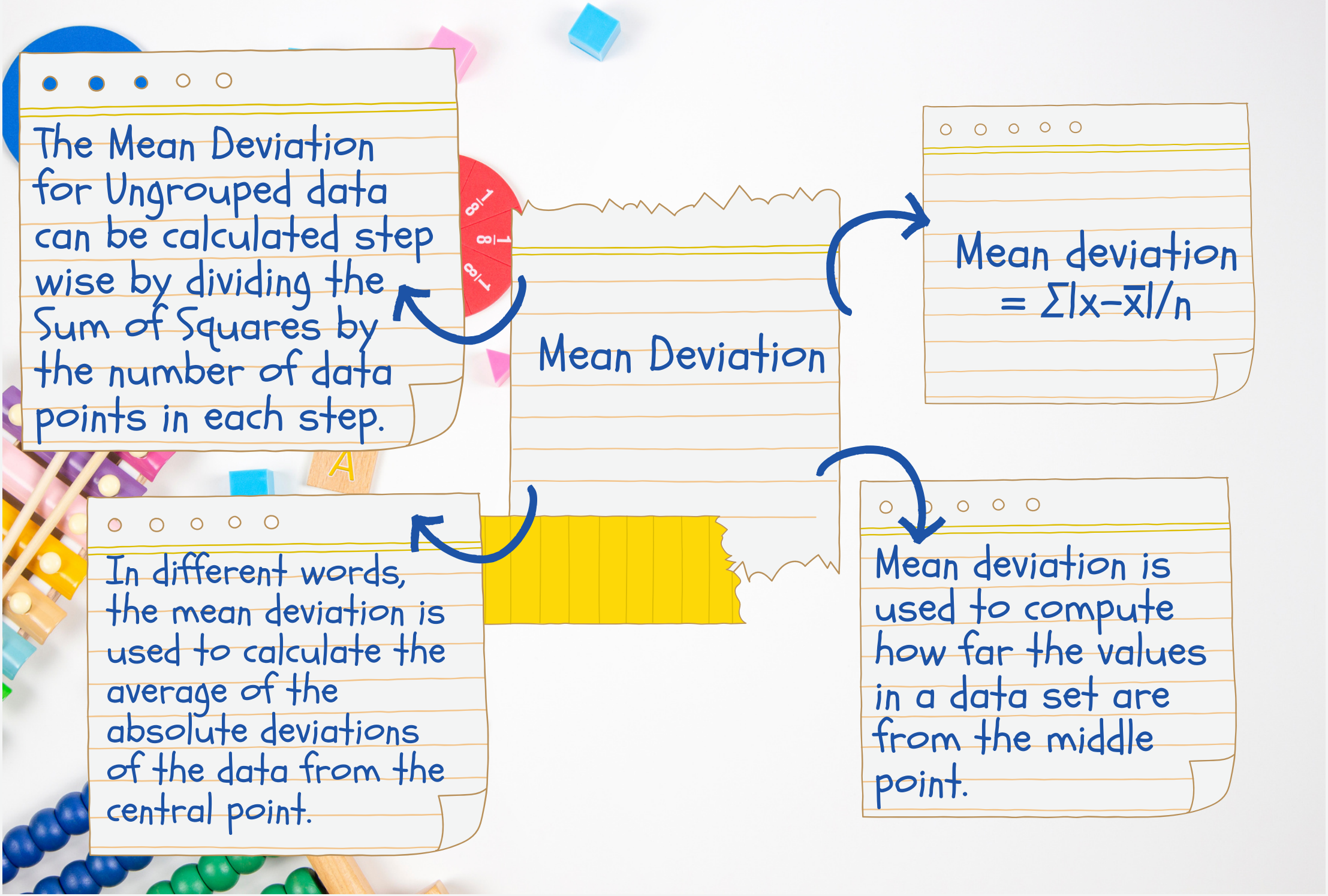

The Mean Deviation for Ungrouped data can be calculated step wise by dividing the Sum of Squares by the number of data points in each step.
Mean Deviation
Mean deviation = Σ|x−x̄|/n
In different words, the mean deviation is used to calculate the average of the absolute deviations of the data from the central point.
Mean deviation is used to compute how far the values in a data set are from the middle point.

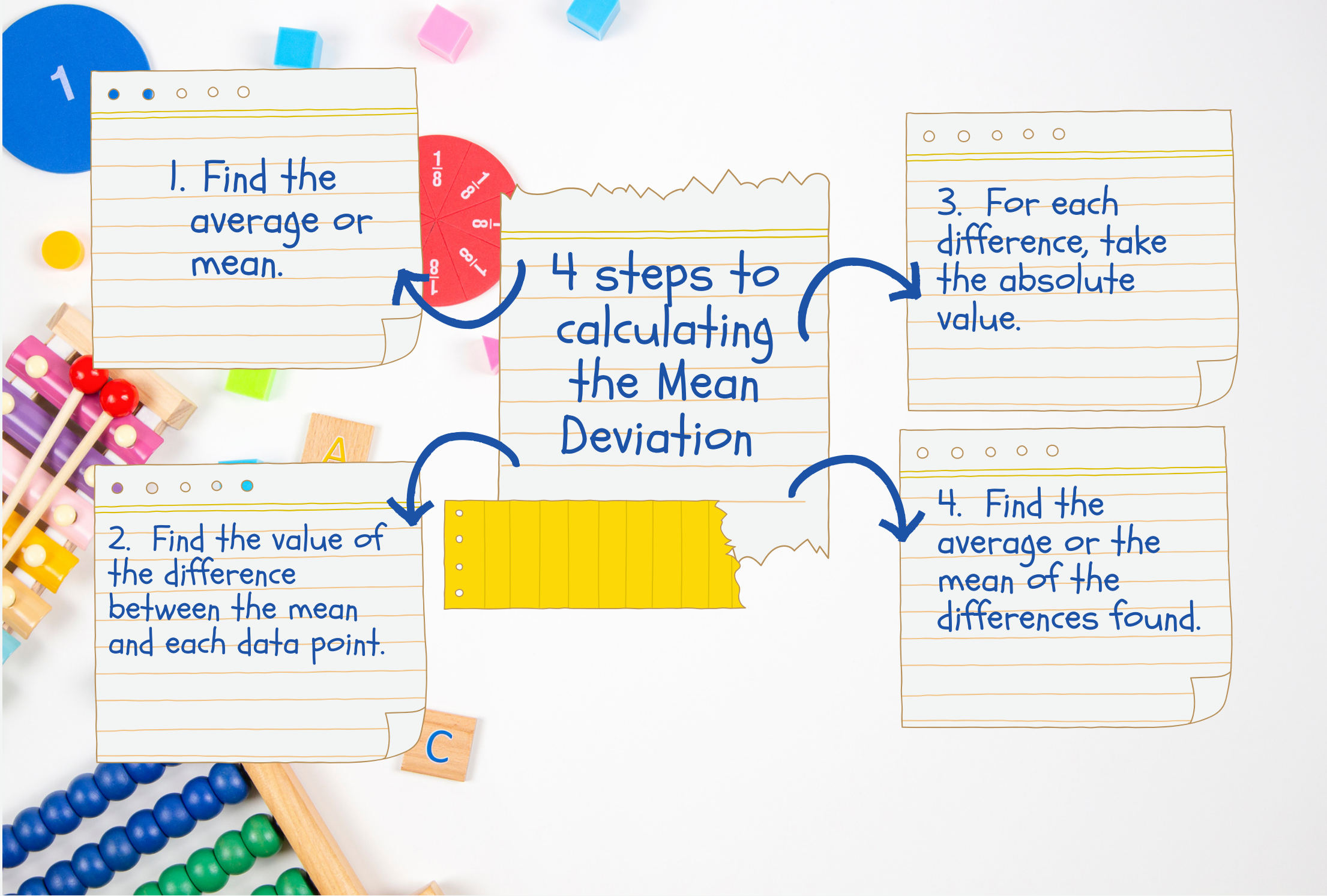
4 steps to calculating the Mean Deviation

1. Find the average or mean.

2. Find the value of the difference between the mean and each data point.

3. For each difference, take the absolute value.

4. Find the average or the mean of the differences found.



Variance

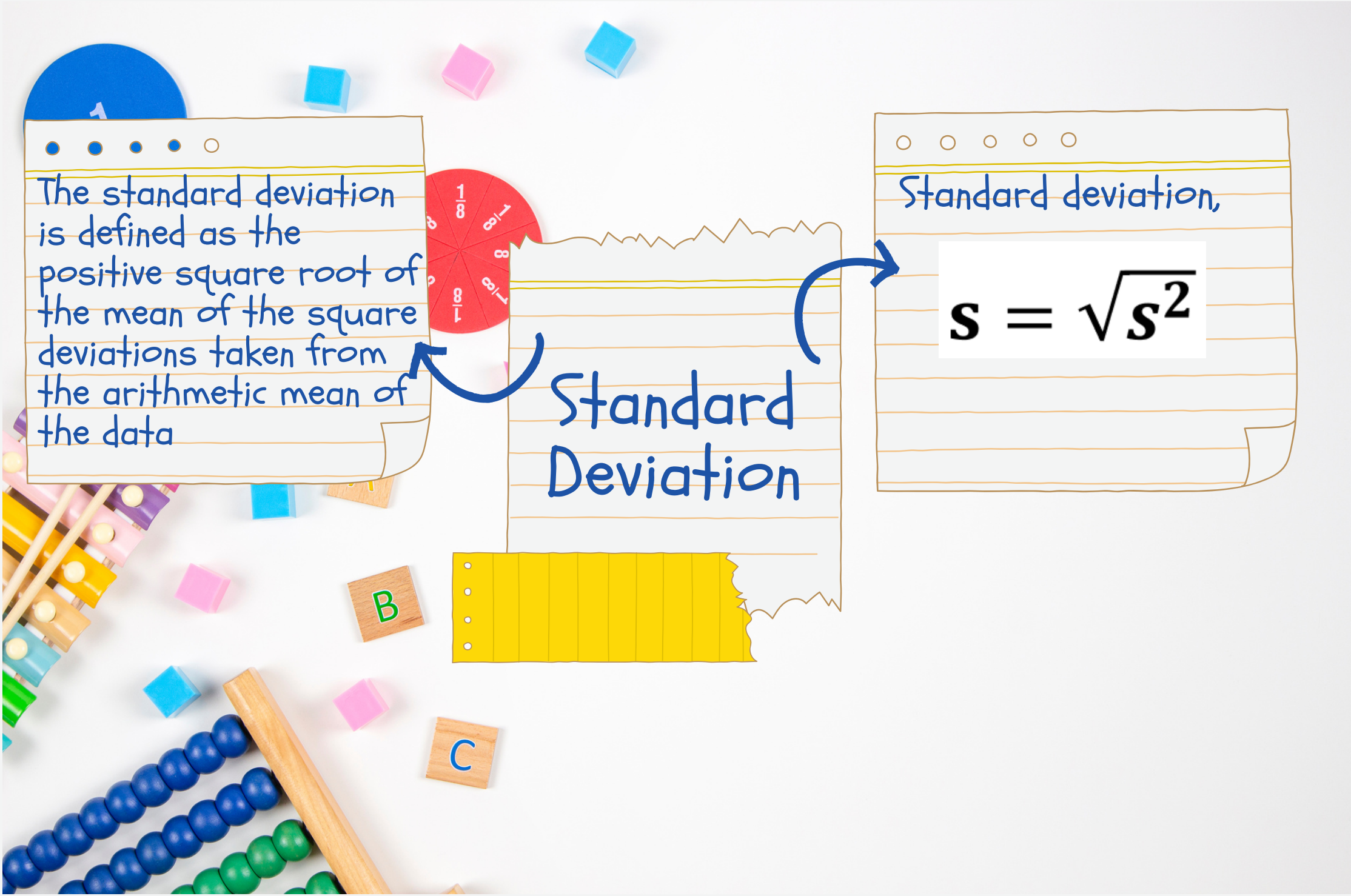
Variance is a measurement of the spread between numbers in a data set.

The variance is a measure of variability. It is calculated by taking the average of squared deviations from the mean.

It measures the degree of dispersion of data around the sample's mean.

Variance,

$$s^2 = \frac{\Sigma|x-\bar{x}|^2}{n}$$


The standard deviation is defined as the positive square root of the mean of the square deviations taken from the arithmetic mean of the data
Standard Deviation
Standard deviation,
$s = \sqrt{s^2}$

Example

x	$\lvert x-\bar{x}\rvert$	$\lvert x-\bar{x}\rvert^2$
1	1 - 3.182 = -2.182 = 2.182	$(2.182)^2 = 4.761$
1	1 - 3.182 = -2.182 = 2.182	$(2.182)^2 = 4.761$
2	2 - 3.182 = -1.182 = 1.182	$(1.182)^2 = 1.397$
2	2 - 3.182 = -1.182 = 1.182	$(1.182)^2 = 1.397$
2	2 - 3.182 = -1.182 = 1.182	$(1.182)^2 = 1.397$
2	2 - 3.182 = -1.182 = 1.182	$(1.182)^2 = 1.397$
3	3 - 3.182 = -0.182 = 0.182	$(0.182)^2 = 0.033$
3	3 - 3.182 = -0.182 = 0.182	$(0.182)^2 = 0.033$
5	5 - 3.182 = 1.818	$(1.818)^2 = 3.305$
6	6 - 3.182 = 2.818	$(2.818)^2 = 7.941$
8	8 - 3.182 = 4.818	$(4.818)^2 = 23.213$
	$\Sigma = 18.91$	$\Sigma = 49.635$

Mean Deviation

$$\frac{\Sigma|x-\bar{x}|}{n} = \frac{18.91}{11} = 1.719$$

Variance

$$s^2 = \frac{\Sigma|x-\bar{x}|^2}{n} = \frac{49.635}{11} = 4.512$$

Standard Deviation

$$s = \sqrt{s^2} = \sqrt{4.512} = 2.124$$