# Maths Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 31

## Statistics

### Mean, median and mode

MEAN

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$

MEDIAN (GROUPED)

$$M = l + \frac{\frac{N}{2} - C}{f} \times h$$

EMPIRICAL RELATION

$$\text{Mode} \approx 3\,\text{Median} - 2\,\text{Mean}$$

### Mean deviation

$$\text{MD about } a = \frac{\sum f_i |x_i - a|}{\sum f_i}$$

Mean deviation is least about the median.

### Variance and standard deviation

$$\sigma^2 = \frac{\sum f_i (x_i - \bar{x})^2}{N} = \frac{\sum f_i x_i^2}{N} - \bar{x}^2$$

CHANGE OF ORIGIN AND SCALE

$$y = ax + b: \quad \bar{y} = a\bar{x} + b, \qquad \sigma_y = |a|\,\sigma_x$$

FIRST N NATURAL NUMBERS

$$\text{variance} = \frac{n^2 - 1}{12}$$

COMBINED GROUPS

$$\sigma^2 = \frac{n_1(\sigma_1^2 + d_1^2) + n_2(\sigma_2^2 + d_2^2)}{n_1 + n_2}, \qquad d_i = \bar{x}_i - \bar{x}$$

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