

A Level MATHS FORMULA SHEET

Statistics (S1)

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Representation of Data

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

\bar{x} = mean

n = number of data

$x_1 + x_2 + x_3 + \dots + x_n$ = total number of data values in the data set

$$\rightarrow \frac{\sum xf}{\sum f}$$

$\sum xf$ = sum of frequencies multiplied by the sum of data

$\sum f$ = sum of frequencies

$$\rightarrow \overline{(x - a)} = \frac{\sum(x-a)}{n} \quad (\text{for assumed mean})$$

$$\rightarrow \frac{n+1}{4} \quad (\text{for lower quartile})$$

$$\rightarrow \frac{3(n+1)}{4} \quad (\text{for upper quartile})$$

$$\rightarrow \frac{n+1}{2} \quad (\text{for mean})$$

where

n = total number of data values in the data set

$$\rightarrow \sigma = \sqrt{\frac{\sum(x-\bar{x})^2}{n}} = \sqrt{\frac{\sum x^2}{n} - \bar{x}^2}$$

σ = standard deviation

n = total number of data values in the data set

$$\rightarrow \sigma^2 = \frac{\sum(x-\bar{x})^2 f}{\sum f} = \frac{\sum x^2}{\sum f} - \left(\frac{\sum xf}{\sum f}\right)^2$$

σ^2 = variance

Probability

Probability "of success" = number of ways to get "success" / total number of outcomes

$$\rightarrow P(A \text{ and } B) = P(A) \times P(B)$$

(for mutually exclusive events)

$$\rightarrow P(A \text{ or } B) = P(A \cup B) = P(A) + P(B)$$

(for independent events)

$$\rightarrow P(B/A) = \frac{P(A \text{ and } B)}{P(A)}$$

(for conditional probability)

where

$P(A)$ = Probability of first event

$P(B)$ = Probability of second event

Permutations Combinations

$$\rightarrow nCr = \frac{n!}{r!(n-r)!}$$

$$\rightarrow nPr = \frac{n!}{(n-r)!}$$

Binomial and Geometric Distribution

$$\rightarrow P(X = x) = nC_x \times p^x \times q^{(n-x)}$$

$$\rightarrow E(x) = \mu = np$$

$$\rightarrow \sigma^2 = npq$$

Where

p = probability of success

q = probability of failure = $(1 - p)$

n = number of trials

Normal Distribution

$$\rightarrow Z = \frac{x - \mu}{\sigma}$$

where

Z = Standardized Probability

μ = mean

σ = standard deviation