

Appendix B: AP Biology Equations and Formulas

Statistical Analysis and Probability

Standard Error

$$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$$

Mean

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

Standard Deviation

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

Chi-Square

$$\chi^2 = \sum \frac{(o - e)^2}{e}$$

Chi-Square Table

	Degrees of Freedom							
p	1	2	3	4	5	6	7	8
0.05	3.84	5.99	7.82	9.49	11.07	12.59	14.07	15.51
0.01	6.64	9.32	11.34	13.28	15.09	16.81	18.48	20.09

Laws of Probability

If A and B are mutually exclusive, then $P(A \text{ or } B) = P(A) + P(B)$

If A and B are independent, then $P(A \text{ and } B) = P(A) \times P(B)$

Hardy-Weinberg Equations

$$p^2 + 2pq + q^2 = 1$$

p = frequency of the dominant allele in a population

$$p + q = 1$$

q = frequency of the recessive allele in a population

s = sample standard deviation (i.e., the sample based estimate of the standard deviation of the population)

\bar{x} = mean

n = size of the sample

o = observed individuals with observed genotype

e = expected individuals with observed genotype

Degrees of freedom equals the number of distinct possible outcomes minus one.

Metric Prefixes

<u>Factor</u>	<u>Prefix</u>	<u>Symbol</u>
10^9	giga	G
10^6	mega	M
10^3	kilo	k
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p

Mode = value that occurs most frequently in a data set

Median = middle value that separates the greater and lesser halves of a data set

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Mode = value that occurs most frequently in a <u>data set</u> Median = middle value that separates the greater and lesser halves of a data set Mean = sum of all data points divided by number of data points Range = value obtained by subtracting the smallest observation (<u>sample minimum</u>) from the greatest (<u>sample maximum</u>)																																													

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