AP® BIOLOGY EQUATIONS AND FORMULAS

Statistical Analysis and Probability

Standard Deviation

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

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

Standard Error of the

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

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

	Degrees of Freedom							

Laws of Probability

If A and B are mutually exclusive, then:

If A and B are independent, then:

×

Weinberg Equations

= frequency of allele

= frequency of allele

$\bar{x}$

= sample standard deviation (i.e., the sample estimate of the standard deviation of the

= observed results

= expected results

Σ

Degrees of freedom are equal to the distinct possible outcomes minus one.

Metric Prefixes

= value that occurs most frequently in a data set

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 (sample minimum) from the greatest (sample maximum)

Rate and Growth

$\frac{dY}{dt}$

= amount of change

= change in time

Population Growth

$\frac{dN}{dt} = B - D$

Exponential Growth

$\frac{dN}{dt} = r_{max}N$

= population size

= carrying capacity

imum per capita

Logistic Growth

$\frac{dN}{dt} = r_{max}N\left(\frac{K-N}{K}\right)$

Diversity Index

Diversity Index $= 1 - \Sigma\left(\frac{n}{N}\right)^2$

n = total number of organisms of a particular species

N = total number of organisms of all species

Water Potential Ψ

$\Psi = \Psi_P + \Psi_S$

Ψ_P = pressure potential

Ψ_S = solute potential

The water potential will be equal to the potential of a solution in an open container because the pressure potential of the solution in an open container is zero.

The Solute Potential of a Solution

$\Psi_S = -iCRT$

= ionization constant (because sucrose does not

C = molar concentration

R = pressure constant
R = 0.0831 liter bars/mole K)

T = temperature in Kelvin (ºC + 273)

Surface Area and Volume

Surface Area of a Sphere

$SA = 4\pi r^2$

Volume of a Sphere

$V \quad \frac{4}{3}\pi r^3$

l

Surface Area of a Rectangular Solid

$SA = 2lh + 2lw + 2wh$

Volume of a Rectangular Solid

$V \quad lwh$

Surface Area of a

$SA = 2\pi rh + 2\pi r^2$

$V \quad \pi r^2 h$

Area of a Cube

$SA = 6s^2$

Volume of a Cube

$V \quad s^3$

V