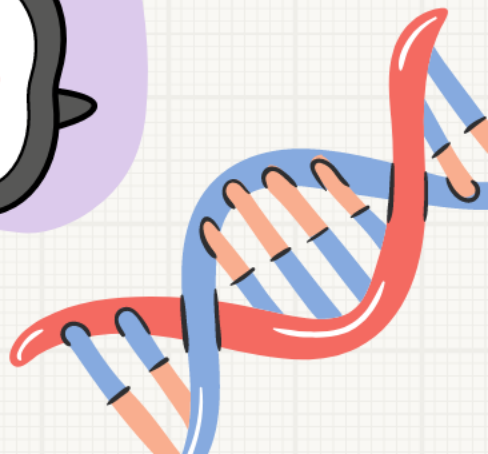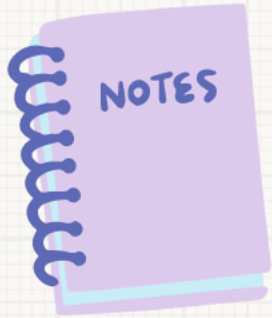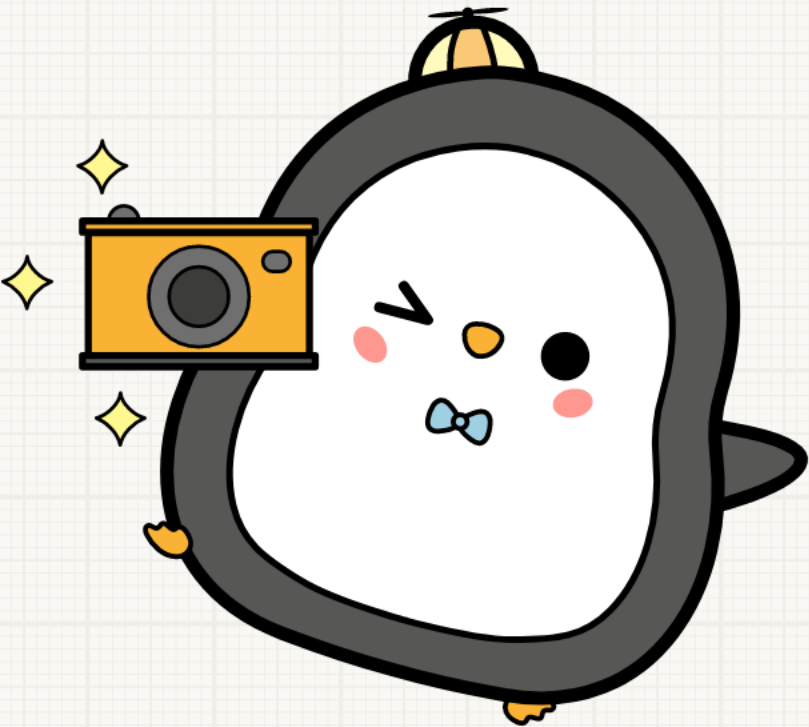# AP Bio
Math Mondays

Simpson's Diversity Index

Simpson's Index

$$1 - \sum \left(\frac{n}{N}\right)^2$$

Math Monday #4

Simpson's Index

In a community of penguins, there are three different types of penguins shown in the table below. Determine the Simpson's diversity index of the community.

Simpson's Index

$$1 - \sum \left(\frac{n}{N}\right)^2$$

n = total organisms of a particular species
N = total number of organisms of all species

Penguin Species	Number of Individuals
Adele	6
Gentoo	8
Little	13

$$1 - \left[\left(\frac{6}{27}\right)^2 + \left(\frac{8}{27}\right)^2 + \left(\frac{13}{27}\right)^2\right]$$

Math Monday #4   Simpson's Index

In a community of penguins, there are three different types of penguins shown in the table below. Determine the Simpson's diversity index of the community.

$$1 - \left[\left(\frac{6}{27}\right)^2 + \left(\frac{8}{27}\right)^2 + \left(\frac{13}{27}\right)^2\right]$$

$$1 - [(0.222)^2 + (0.296)^2 + (0.481)^2]$$

$$1 - [0.369] = 0.631$$

Common Mistake:
Don't forget to subtract from 1 at the end

Example Problem

A student researcher wants to investigate the diversity of the school garden. Determine the Simpson's Index of Diversity from the garden data.

Simpson's Index

$$1 - \sum \left(\frac{n}{N}\right)^2$$

Species	Number of Individuals
Spider	2
Black Ant	6
Bee	1
Horsefly	16

$$1 - \left[\left(\frac{2}{25}\right)^2 + \left(\frac{6}{25}\right)^2 + \left(\frac{1}{25}\right)^2 + \left(\frac{16}{25}\right)^2\right]$$

Example Problem

Simpson's Index

A student researcher wants to investigate the diversity of the school garden. Determine the Simpson's Index of Diversity from the garden data.

$$1 - \left[\left(\frac{2}{25}\right)^2 + \left(\frac{6}{25}\right)^2 + \left(\frac{1}{25}\right)^2 + \left(\frac{16}{25}\right)^2\right]$$

$$1 - [(0.08)^2 + (0.24)^2 + (0.04)^2 + (0.64)^2]$$

$$1 - [0.0064 + 0.0576 + 0.0016 + 0.4096]$$

$$1 - [0.4752] = 0.5248$$