Mathematical ESS

Calculations…

Fetch calculators unless you have them already.

Simple Percentages

- You use the value divided by the total then multiply that answer by 100%

- E.g. 20 / 35 = 0.57143 x 100 = 57.143%
- Often more than 1 decimal place is not required so you should round to 1 decimal place.

Simple Average (Mean)

Add all the data together and divide by the number of entries.

E.g. Class test results...we add all of your scores together

20 + 25 + 80 + 60 + 70 + 55 +95 + 70 = **475**

$$\frac{\mathbf{475}}{\mathbf{8}} = 59.375 \text{ is the average score}$$

Percentage Increase/Decrease

1. Starting Value – Finishing Value = change
2. Change/ Starting Value = fraction of change
3. Fraction of change x 100 = % increase or decrease

Pyramids of Productivity, Biomass or Numbers

- Creating Scaled pyramids should be reliatively easy to complete.
- The pyriamids should have 4 levels (4 trophic levels).
- Each of the different pyramids shows us something different.
- P.o. Numbers should have a wide base and narrow top although can be inverted.
- P.o. Biomass and Productivity should become narrower as it increases.

Practice

10000	**Trophic Level 1**
500	**Trophic Level 2**
180	**Trophic Level 3**
10	**Trophic Level 4**

Lake Species Ecosystem

Tree Species Ecosystem

1	**Trophic Level 1**
80	**Trophic Level 2**
20	**Trophic Level 3**
5	**Trophic Level 4**

3000	**Trophic Level 1**
300	**Trophic Level 2**
30	**Trophic Level 3**
3	**Trophic Level 4**

Transfer of Energy

Licoln Index

Estimation of population size

$$N = \frac{n1 \times n2}{m}$$

N = Total population of species in sample site.

n1 = number of animals captured on Day 1.

n2 = number of animals captured on Day 2.

m = number of **re**captured animals on Day 2.

1. 21 pheasant were caught, marked, and released. 23 were caught a second time, 5 of which had a marking. Estimate the population size.
2. 15 elephants were caught, marked, and released. 8 were caught a second time, 7 of which had a marking. Estimate the population size.
3. 162 Japanese Beetles were caught, marked, and released. 148 were caught a second time, 59 of which had a marking. Estimate the population size.
4. 8 tigers were caught, marked, and released. 4 were caught a second time, 4 of which had a marking. Estimate the population size.

How would we "capture" each of these species in order to count them?

Simpson's Diversity Index

Simpson's Diversity measures the richness of species.

$$D = \frac{N(N-1)}{\Sigma\, n(n-1)}$$

D = Diversity Index

N = Total number of organisms of all species.

n = number of individual species divided into species

Σ = sum of

Σ

Species	Number (n)	n(n-1)
Sea holly	2	
Sand couch	8	
Sea bindweed	1	
Sporobolus pungens	1	
Echinophora spinosa	3	
Total		
	N =	**n(n-1) = 64**