



J-Curve vs S-Curve

Understanding Population Growth Models in Ecology

Resource availability controls growth



Unlimited Resources

Food and space are abundant. Allows a species to realize its full innate potential to grow in number.

Leads to **Exponential Growth**.



Limited Resources

Finite resources trigger competition between individuals. Only the 'fittest' survive and reproduce.

Leads to **Logistic Growth**.

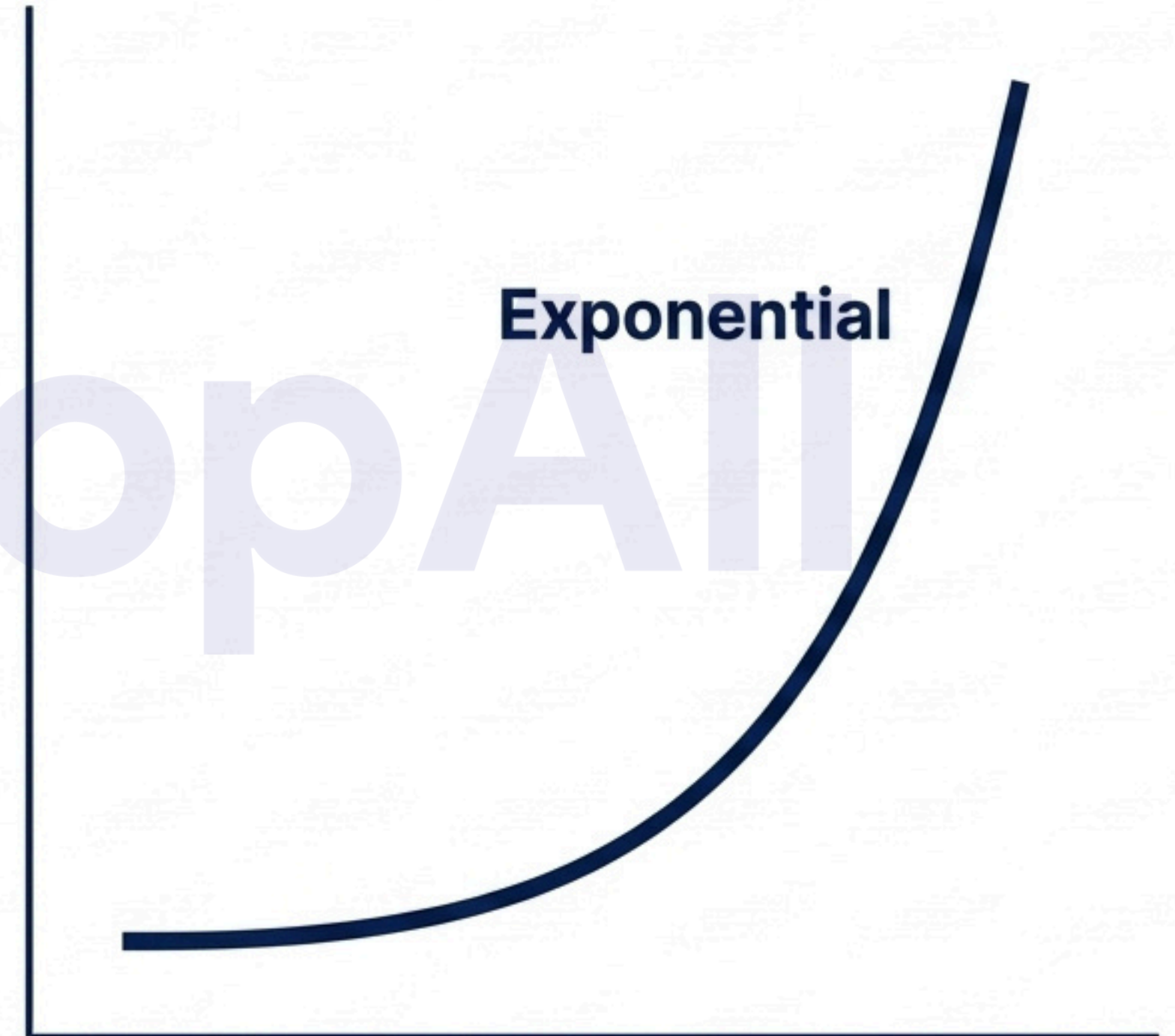
Exponential (Geometric) Growth

$$\frac{dN}{dt} = rN$$

N = Population size

r = Intrinsic rate of natural increase
(births - deaths)

Key Characteristic: Forms a J-shaped curve. Can reach enormous densities in a short time (e.g., a single Paramecium doubling daily).





**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



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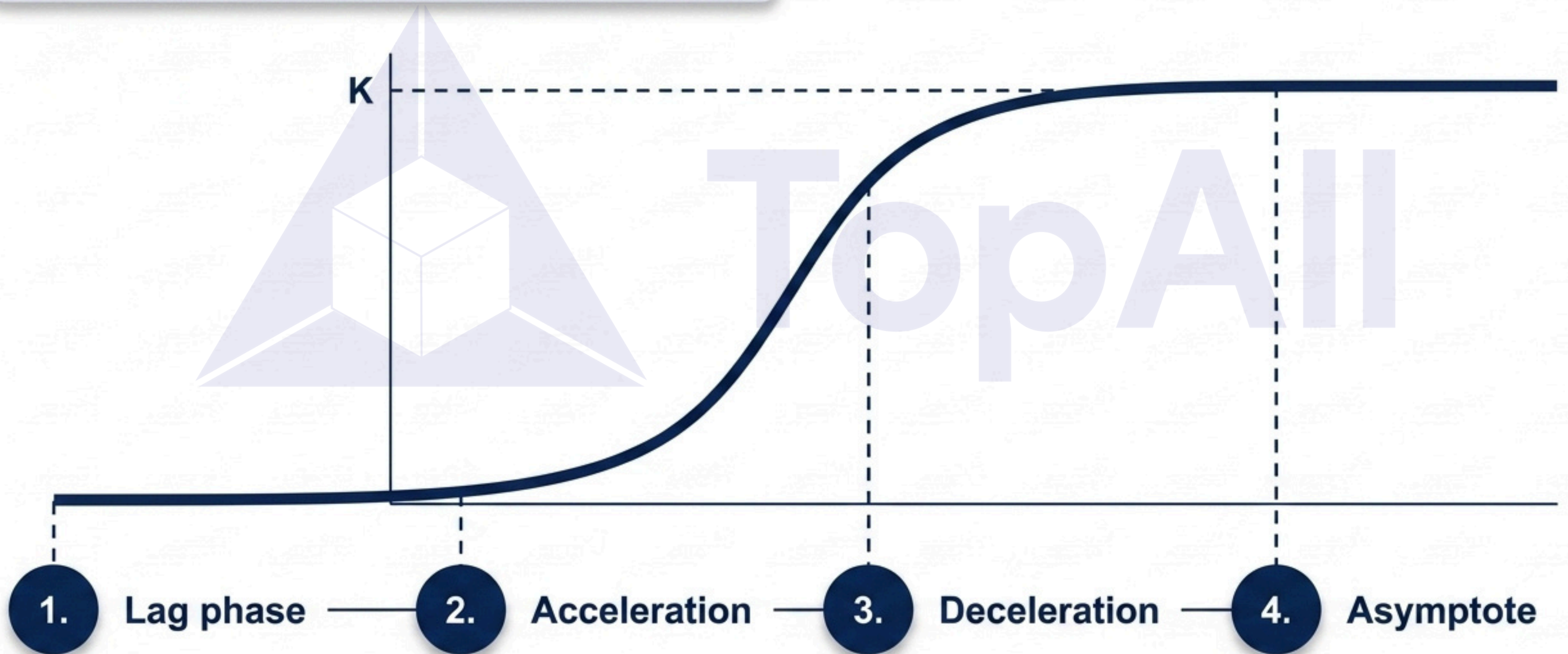


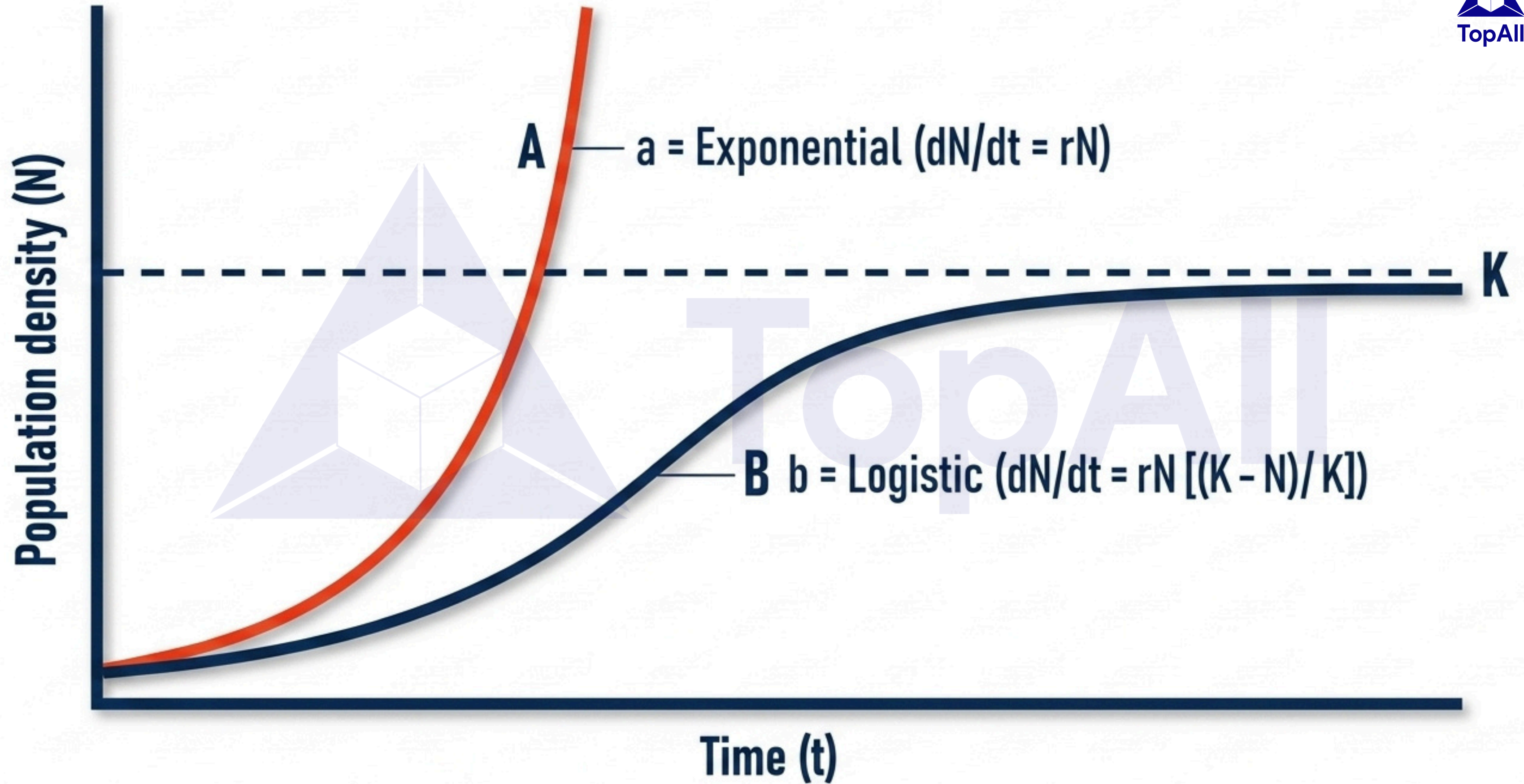
Verhulst-Pearl Logistic Growth

$$\frac{dN}{dt} = rN \left[\frac{K - N}{K} \right]$$

Reality Check:

Since resources for most animal populations are finite, this is considered the most realistic model in nature.





NEET Key Takeaway

K = Carrying Capacity

- The maximum possible number of individuals a habitat can support.
- Beyond this limit, no further growth is possible.
- Resources become a limiting factor, making the Logistic model (S-Curve) the realistic standard for animal populations.



You've Learned the Theory.

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