

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Population Growth Calculator**. Read through the **Introduction** slides, which cover population growth basics, exponential growth, carrying capacity, and logistic growth. Click **Get Started** to begin.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: Select the Exponential Growth equation. Set the initial population to a low value and the maximum per capita growth rate to 0.5. Observe the shape of the population curve on the graph. Then switch to the Logistic Growth equation using the same initial population and growth rate. Adjust the carrying capacity slider and observe how the curve changes at different carrying capacity values.

(A) (1 pt) **Describe** the process by which birth rate, death rate, and population size determine population growth.

(B) (1 pt) **Explain** why reproduction without constraints results in exponential growth.

(C) (1 pt) **Predict** what would happen to a population of organisms growing exponentially in a closed ecosystem if a sudden reduction in a key resource cut the environment's carrying capacity in half.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

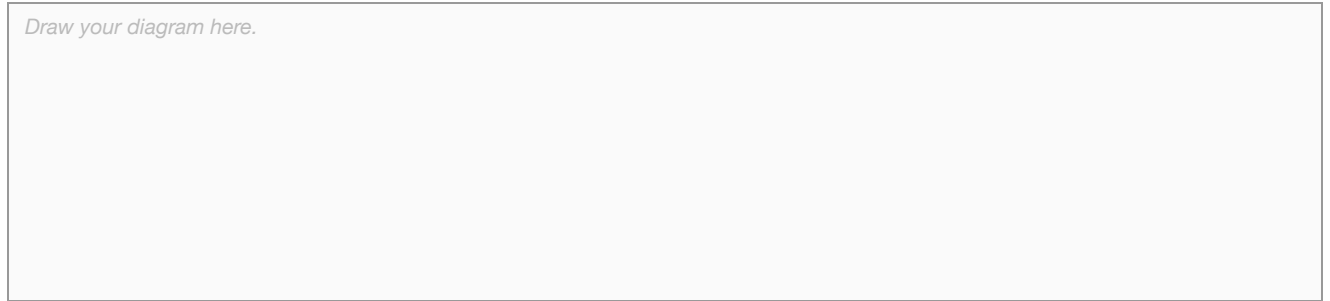
Simulation Task: Select the Logistic Growth equation. Set the carrying capacity to 1000 and the initial population to 10. Use a growth rate of 0.3. Click on the $(K-N)/K$ term in the equation to read its description. Now slowly increase the initial population slider from 10 toward 1000 and observe how the growth rate curve (dN/dt) changes. Note where dN/dt is highest and what happens as N approaches K .

(A) (1 pt) **Describe** the shape of the logistic growth curve as population size approaches the carrying capacity.

(B) (1 pt) **Explain** why the growth rate (dN/dt) of a logistic population falls as population size approaches the carrying capacity.

(C) (1 pt) **Represent** the growth of a population that follows the logistic model by drawing a graph of population size against time that labels the carrying capacity and the point of maximum growth rate.

Draw your diagram here.



(D) (1 pt) **Explain** how changes in the availability of resources within an ecosystem could act as a selective pressure on a population.

8.4.A.2