



Name:

Date:

Student Exploration: Rabbit Population by Season

Directions: Follow the instructions and respond to the questions and prompts in the orange boxes.

Vocabulary: carrying capacity, density-dependent limiting factor, density-independent limiting factor, limiting factor, population, population density

Gizmo Warm-up

A **population** is a group of individuals of the same species that live in the same area. The size of a population is determined by many factors. In the *Rabbit Population by Season* Gizmo, you will see how different factors influence how a rabbit population grows and changes.



1. Select the **BAR CHART** tab. What is the size of the initial rabbit population?

40

2. Select the **TABLE** tab. Click **Play** (▶), and allow the simulation to run for one year.

- A. In which season did the rabbit population increase the most?

spring

- B. In which season did the rabbit population increase the least?

winter

Activity A:

Carrying capacity

Get the Gizmo ready

- Click **Reset** (↺).



Question: What determines how large a population can grow?

1. **Think about it:** A **limiting factor** is any factor that controls the growth of a population. What do you think are some of the limiting factors for the rabbit population?

winter, food, predators, space, ect

2. **Run Gizmo:** Select the **DESCRIPTION** tab. Set the **Simulation speed to Fast**. Select the **GRAPH** tab. Click **Play**, and allow the simulation to run for at least 10 years. (Note: You can use the zoom controls on the right to see the whole graph.)

- A. Describe how the rabbit population changed over the course of 10 years.

increased and stayed around 350

- B. What pattern did you see repeated every year?

increase in spring decrease in winter

Population Dynamics Gizmo Worksheet

Utkir A. Rozikov

A decorative graphic element consisting of a light blue horizontal bar with a rounded right end, and a red-to-white gradient semi-circle overlapping the right side of the bar.

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Resources in Education, 1998 *Population Dynamics* Maurice E. Solomon, 1976 *Population Dynamics* Bertram G. Jr. Murray, 2013-07-22 *Population Dynamics Alternative Models* provides a theoretical framework of population dynamics. This book contains seven chapters that discuss the controversies surrounding discussions on the explicit view of the subject. Chapters 1 and 2 present a general introduction to the terminology, the mathematical background, and the philosophical approach that lie behind the theoretical development. Chapter 3 contains a series of models accounting for variations in population growth rates, sizes, and fluctuations, while Chapter 4 examines a model accounting for the evolution of life history patterns. A more detailed examination of the effects of predation on prey populations, especially with respect to determining a prey population's maximum sustainable yield, is explored in Chapter 5. Chapter 6 highlights the interspecific competition theory in terms of the population dynamics models presented in a previous chapter. Chapter 7 summarizes the developments in the population dynamics research studies. This work will be of great value to ecologists, biologists, and population dynamics researchers.

Population dynamics; proceedings Symposium on Population Dynamics, Mathematics Research Center, 1972, *Population Dynamics in Variable Environments* Shripad Tuljapurkar, 1985 *Population Dynamics and the Tribolium Model: Genetics and Demography* Robert F. Costantino, Robert A. Desharnais, 2011-09-17 The study of populations is becoming increasingly focused on dynamics. We believe there are two reasons for this trend. The first is the impact of nonlinear dynamics with its exciting ideas and colorful language: bifurcations, domains of attraction, chaos, fractals, strange attractors. Complexity, which is so very much a part of biology now, seems to be also a part of mathematics. A second trend is the accessibility of the new concepts. The barriers to communication between theorist and experimentalist seem impenetrable. The active participation of the experimentalist means that the theory will obtain substance. Our role is the application of the theory of dynamics to the analysis of biological populations. We began our work early in 1979 by writing an ordinary differential equation for the rate of change in adult numbers, which was based on an equilibrium model proposed a decade earlier. During the next few months, we filled our notebooks with straightforward deductions from the model and its associated biological implications. Slowly, some of the biological observations were explained, and papers followed on a variety of topics: genetic and demographic stability, stationary probability distributions for population size, population growth as a birth-death process, natural selection and density-dependent population growth, genetic disequilibrium, and the stationary stochastic dynamics of adult numbers.

Population Dynamics and the Tribolium Model Robert F. Costantino, Robert A. Desharnais, 1991-08-01 **Population Dynamics: Algebraic and Probabilistic Approach** Utkir A. Rozikov, 2020 The book contains a very popular topic since the number of young scientists interested in dynamical systems is increasing as there are a multitude of applications in biology, mathematics, medicine, and physics. It is the first ever book published in English on this topic. The book contains results of many recent papers related to population dynamics. [Population Dynamics](#)

Self-Instructional Materials Project,1973 Population Dynamics Johannes Phillippus Degenaar,Diederik Arnoldus Scholtz,Andries Marthinus Louis Thomas,South African Association for Teachers of Biology,1988 Population Dynamics Program University of Illinois at Urbana-Champaign. Population Dynamics Group,1975 Population Biology Simon A. Levin,1984 Contains lecture notes that were presented at the AMS Short Course on Population Biology held August 6 7 1983 in Albany New York in conjunction with the summer meeting of the American Mathematical Society This title acquaints the reader with the mathematical ideas that pervade various levels of thinking in population biology Population Dynamics Mathematics Research Center. Symposium, Univ. of Wisconsin, 1972,Population,1972 Population dynamics ,1978
Week 2 NatSci 106, **Patterns of Life Series: Population dynamics** ,1965 **Population Dynamics: a Computerized Simulation for Systematic Policy Analysis** Kenneth Floyd Smith,Massachusetts Institute of Technology. Department of Political Science,1970 **Analytical population dynamics** T. Royama,1996 **Population Dynamics** Thomas N. Greville,1972 **Theory of Populations** Alexandr N Tetearing,2016-11-29 The book is devoted to the theory of development of the biological systems The fundamental equation of life of a biological population based on the general physical principles allows us to get all the basic equations of population dynamics describing the development of the populations under various environmental conditions The equations describe the population transition that occurred in our human population in the late 20 th century This transition may indicate the fact that the human population consists of two super races the old slow race and new fast growing human race that appeared on Earth relatively recently The separate chapter presents the base classification of predator prey systems The classification consists of ninety six different equation systems The book is addressed to a broad auditorium of biologists ecologists and demographers as well as readers interested in the development of the biological populations Translated from Russian

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