



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
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Using Mathematics to Explain the Spread of Diseases

Guide for Curriculum Unit 09.05.08
by Hermine E. Smikle

This curriculum unit aims to provide students with background knowledge for the study of mathematical content that can be applied to the biological sciences, and attempts to connect relevant topics from the high-school mathematics content to the concepts in microbiology that affect real-life situations.

The curriculum unit is written in three sections. The first section states the rationale and the objectives of the unit. The second section provides the background information necessary for the study of the mathematical content. The topics include viruses, growth of bacteria, emerging diseases, cholera, malaria, and immunity. The third section shows the connection of the biological concepts and mathematics. The mathematical concepts include: exponential growth and decay, rate of change, and Poisson distribution. The replication of bacteria can be explained by the doubling time, and the growth of bacteria can be explained by the exponential function. The logistic model is used to solve problems based on the spread of diseases. The Poisson distribution will be used to find the probability of the number of bacteria grown in a test situation. Of great importance is the connection of the unit to the state and school district's curriculum. According to the NCTM mathematics standards, mathematics instruction should encourage students to use mathematical models to analyze change in both real and abstract contexts, and to make connections to real-life experiences.

(Developed for AP Calculus, grades 11-12; recommended Mathematics, grade 11-12)

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