
Connections

The Chapter Problem

This *Chapter Problem* examines a common environmental problem facing many Ontario green spaces and wetlands, the invasion of non-native plants or noxious weeds. Students are given data and facts surrounding the germination and growth of knapweed.

Students can use this data to generate a table of values either manually or by using a spreadsheet. By examining the patterns in the data students can determine the general term of two geometric sequences; the “Total Number of Plants” as well as “Number of Seeds in the Seedbank” in the population at the end of each year. Students in the Functions and Relations course can also generate recursive formulas for these sequences.

Once the students have determined the general terms, they are asked to use the formulas to make predictions. Some of these involve the use of rational exponents, while others involve making population predictions well into the future. Students are also asked “When will” type questions that lead to the solution of an exponential equation.

This problem can be used on an ongoing basis as the chapter develops. Alternatively, the problem could be solved as an assignment after the entire unit has been taught. A blackline master listing all of the questions is provided at the end of the chapter. In addition, the answers/solutions to these questions are also provided.

Challenge 1

This is the famous “Chess Problem,” which illustrates effectively the effects of exponential growth. The questions ask students to calculate things such as the mass of the amount of wheat required to fill a specific number of squares and the time required to fill the chess board in terms of the world wheat production (1996). Students can determine a cash value of the wheat reward by searching for the selling price of 1 t of wheat on the Internet and incorporating this fact into their calculation. This problem utilizes a numerical approach and may be best suited for students in the Functions course.

Challenge 2

This problem is more abstract than Challenge 1 and may be best suited for students in the Functions and Relations course. This problem really deals with the sum of the terms of a geometric sequence. You may wish to use this problem with the students in the Functions course after you have covered section 2.3 dealing with geometric series. However, it is not necessary that student use the formula for finding the sum of a geometric series. If they find the terms of the sequence, the sum can be determined by addition.

Web Challenge

You will find support for this Internet activity at the teachers’ Web site: www.math.nelson.com.

All three Challenges can be used as rich learning tasks or for formative / summative assessment purposes. Refer to the front matter of this *Teacher Resource* for more detailed instructions.