

Applied Mathematics 30

**Teacher Notes:
Apiculture –
The Beekeeping Industry**



September 2007

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Applied Mathematics 30

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Introduction

This project is related to several aspects of beekeeping in California, Arizona, Texas, and Mexico and allows students to use their knowledge from the Finance and Spreadsheets unit; the Design unit; and the Cyclic, Recursive, and Fractal Patterns unit. It is designed to be completed in three to five hours of student time. The use of this project is optional; however, if you choose to use it, you may include it as part of your assessment. A hard copy will be mailed to your school in August 2007. Sample solutions can be found on the Alberta Education extranet at <https://phoenix.edc.gov.ab.ca>.

One of the written-response questions worth 10% on the Applied Mathematics 30 January 2008 Diploma Examination will be related to this project. Students who do not complete the project but who have completed the course will have the knowledge to answer the written-response question; however, students who have completed the project will gain experience with the related mathematical skills.

Specific Notes:

Teachers may wish to

- discuss what values students should input in L_1 on their graphing calculator when they do the regression equation in part B, question 1
- review the meaning of a correlation coefficient, r and R^2 , in class so that students can justify their choice of regression equation in part B, question 1
- indicate how many decimal places are required in student answers to part B, question 1, and part D, questions 1 and 2
- remind students of appropriate rounding rules (for example, in part B, question 2, the number of swarms must be a whole number)
- have students construct their plan for where the beehives should be located in part C on centimetre grid paper
- provide students with a template for the spreadsheet in part D

Program of Studies

The project relates to mathematics learned in the following units of Applied Mathematics 30.

Finance and Spreadsheets

- Specific Outcomes**
- 3.1: Design a financial spreadsheet template to allow users to input their own variables. [C, PS, T]
 - 3.4: Analyze an investment portfolio, applying such concepts as interest rate, rate of return and total return. [C, CN, PS, T]

Cyclic, Recursive, and Fractal Patterns

- Specific Outcome**
- 4.4: Use technology to generate and graph sequences that model real-life phenomena. [PS, T, V]

Design

- Specific Outcomes**
- 6.1: Use dimensions and unit prices to solve problems involving perimeter, area and volume. [E, PS, V]
 - 6.2: Solve problems involving estimation and costing for objects, shapes or processes when a design is given. [C, E, PS]

Mathematical Processes

The seven mathematical processes identified in the Program of Studies are addressed in this project in the following manner.

Communication	Write a report to communicate the effect Africanized honeybees have had on agriculture in the southern United States and Mexico.
Connections	Relate mathematics to real-life situations, and connect different units within Applied Mathematics 30.
Estimation and Mental Mathematics	Check the reasonableness of predictions found using a regression equation.
Problem Solving	Determine a reasonable layout for the location of beehives in a farmer's field. Construct a spreadsheet that allows a comparison between pre- and post-Africanized honeybee profits.
Reasoning	Use a logical method to determine where beehives should be placed in a farmer's field.
Technology	Use a spreadsheet and a graphing calculator to solve and display solutions to problems.
Visualization	Use visualization to help plan the layout of the beehives in a farmer's field.

ICT Program of Studies

C.1—Students will access, use, and communicate information from a variety of technologies.

Specific Outcome 4.2: Select information from appropriate sources, including primary and secondary sources.

C.3—Students will critically assess information accessed through the use of a variety of technologies.

Specific Outcome 4.1: Assess the authority, reliability, and validity of electronically accessed information.

C.6—Students will use technology to investigate and/or solve problems.

Specific Outcomes 4.1: Investigate and solve problems of prediction, calculation, and inference.
4.2: Investigate and solve problems of organization and manipulation of information.
4.3: Manipulate data by using charting and graphing technologies in order to test inferences and probabilities.
4.4: Generate new understandings of problematic situations by using some form of technology to facilitate the process.

F.1—Students will demonstrate an understanding of the nature of technology.

Specific Outcome 4.2: Solve mathematical and scientific problems by selecting appropriate technology to perform calculations and experiments.

F.2—Students will understand the role of technology as it applies to self, work, and society.

Specific Outcome 4.7: Use current, reliable information sources from around the world.

P.2—Students will organize and manipulate data.

Specific Outcome 4.1: Manipulate and present data through the selection of appropriate tools, such as scientific instrumentation, calculators, databases, and/or spreadsheets.