

Applied Mathematics 30

Teacher Notes: Minimizing Costs



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Applied Mathematics 30

Minimizing Costs—Teacher Notes

Introduction

This project, which relates to a business plan to minimize costs, allows students to use their knowledge from the Statistics and Probability unit; the Finance and Spreadsheet unit; the Cyclic, Recursive, and Fractal Patterns unit; the Vectors unit; and the Design 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 late August. Sample solutions can be found on the Alberta Education extranet at <https://phoenix.edc.gov.ab.ca>. The general scoring guide for the project is the same as the one issued in September 2000.

One of the written-response questions worth 10% on the Applied Mathematics 30 January 2010 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 have gained experience with the related mathematical skills.

Specific Notes

Teachers may wish to

- discuss with students a suitable cost per metre for part A, question 5
- provide students with a spreadsheet template for part A, question 5. The sample solution shows part of the first 28 trials and uses the SQRT spreadsheet function. Teachers may wish to discuss with students the syntax for this spreadsheet function
- discuss with students the difference between the spreadsheet function ROUND and the decimal places setting for numbers in the format cells menu. The sample solution makes use of the ROUND function, which means that only the rounded value is used in future cell calculations. If the number of decimal places in the format cells menu is set to one, then the unrounded value is actually used in future cell calculations. Be aware, however, that the ROUND function is beyond the scope of Applied Mathematics 30 and would not be an expected outcome for diploma examination purposes
- indicate to students which rows of data to use when performing their regression analysis in part B, question 1

Program of Studies

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

Statistics and Probability

Specific Outcome 2.2: Use z -scores to solve problems related to the normal distribution. [PS, R, T, V]

Finance and Spreadsheet

Specific Outcome 3.1: Design a financial spreadsheet template to allow users to input their own variables. [C, 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]

Vectors

Specific Outcomes 5.1: Use appropriate terminology to describe:

- vector quantities
- scalar quantities.

[C, CN]

5.4: Model and solve problems in 2-D and simple 3-D, using vector diagrams and technology.
[CN, 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 cost for objects, shapes or processes when a design is given.
[C, E, PS]

6.3: Use appropriate variables to design an object, shape, layout or process within a specified budget.
[C, PS, R, V]

Mathematical Processes

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

Communication	Provide a recommendation for budgeting purposes. Prepare a report.
Connections	Relate mathematics to real-world situations and connect different units within Applied Mathematics 30.
Estimation and Mental Mathematics	Check the reasonableness of costs, volumes, lengths, and spreadsheet formulas.
Problem Solving	Decide on an appropriate strategy to minimize production costs and build a spreadsheet that can be used to display costs.
Reasoning	Determine a logical manner in which to solve cost-effective and cost-recovery problems.
Technology	Use a spreadsheet and/or a graphing calculator to solve and display solutions to problems.
Visualization	Use the diagrams provided to visualize a cost-effective path.

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.

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.