

Applied Mathematics 30

Teacher Notes: Operating a Ski Resort



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Applied Mathematics 30

Teacher Notes—Operating a Ski Resort

Introduction

The following project relating to the operations of a ski resort allows students to use their knowledge from the Matrices and Pathways unit, the Finance and Spreadsheet unit, the Statistics and Probability 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, you may choose to use 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 <https://phoenix.edc.gov.ab.ca>.

One of the written-response questions worth 10% on the Applied Mathematics 30 January 2007 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

- explain to students that the information and calculations in part B are estimates and may vary as a result of snow conditions, temperatures, etc.
- refer students to Utility 28 in *Applied Mathematics 12* for part C, question 2
- provide students with a spreadsheet template for part D, question 2
- discuss with students the difference between the spreadsheet functions INT and ROUNDUP. The INT function rounds down to the nearest integer. The sample solution makes use of the ROUNDUP worksheet function, but for rounding up to the nearest integer, the INTEGER(INT) worksheet function plus 1 (i.e., $\text{INT}((B1/2)/85)+1$) could also be used. Be aware, however, that this is beyond the scope of Applied Mathematics 30 and would not be an expected outcome for diploma examination purposes
- use the current prime rate instead of the suggested 6% in part D, question 3

Program of Studies

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

Matrices and Pathways

- Specific Outcomes**
- 1.3: Perform, using technology only for larger matrices, the matrix operations of addition, subtraction, matrix multiplication and multiplication by a scalar. [C, E, R, T, V]
 - 1.4: Model and solve consumer and network problems, performing matrix operations and using algebraic solutions strategies as needed. [CN, PS, T, V]

Finance and Spreadsheets

- Specific Outcomes**
- 3.1: Design a financial spreadsheet template to allow users to input their own variables. [C, PS, T]
 - 3.3: Analyze the costs and benefits of buying a decreasing asset, such as a vehicle or a computer. [C, CN, PS, T]

Statistics and Probability

- Specific Outcomes**
- 2.1: Find the population standard deviation of a data set, using technology. [CN, E, T, V]
 - 2.2: Use z-scores to solve problems related to the normal distribution. [PS, R, T, V]
 - 2.3: Use the normal approximation to the binomial distribution to solve problems involving confidence intervals for large-sample binomial experiments. [CN, E, PS, T]

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]
 - 6.4: Use mathematical models to estimate the solutions to complex measurement problems. [E, 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 calculations.
Problem Solving	Decide on an appropriate method to solve problems related to normal distributions.
Reasoning	Determine a logical manner in which to solve transition, revenue projection, and future development problems.
Technology	Use a spreadsheet and/or a graphing calculator to solve and display solutions to problems. Create a histogram.
Visualization	Use the diagrams provided to visualize the shape of the super pipe and the proposed gondola.

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.