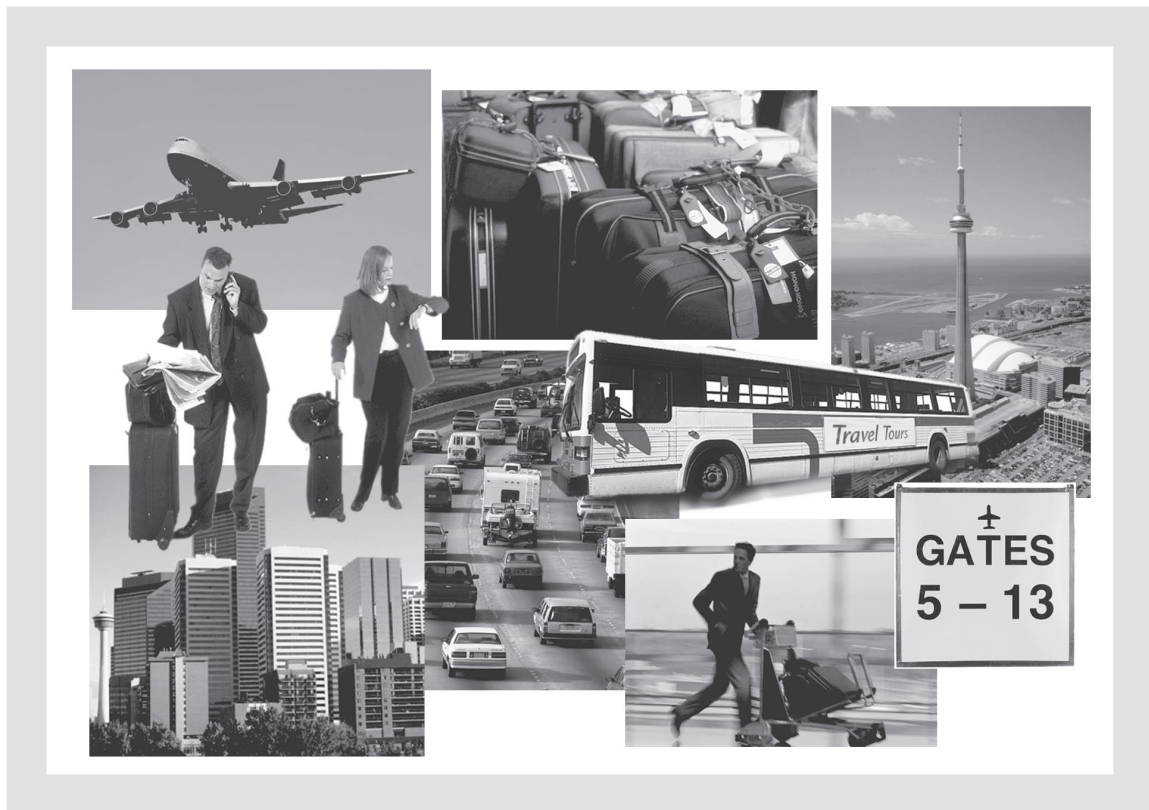


Applied Mathematics 30

Teacher Notes: Conference Travel



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Applied Mathematics 30

Conference Travel—Teacher Notes

Introduction

This project, which relates to the overbooking of scheduled travel routes in the transportation industry, allows students to use their knowledge from the Cyclic, Recursive, and Fractal Patterns unit; the Design unit; the Finance and Spreadsheets unit; the Matrices and Pathways unit; and the Statistics and Probability unit. The project 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 2008. 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 2009 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 want to

- remind students of appropriate rounding practices when finding the 95% confidence interval in Part A, question 1, bullet 3
- refer students to Utility 28 in *Applied Mathematics 12* for instructions on using the TI-83 calculator to answer Part A, question 2, bullet 1
- discuss the similarities of finding $P(134 \leq x \leq 147)$ and $P(x \geq 134)$ in Part A, question 2, bullet 2. The corresponding z -score for 147 in this context is above 3.49 (the highest score on the z -score table) and therefore would be considered to have an area of 1. This situation will only be noticed by students who use the z -score tables to calculate probabilities. Determining a z -score above 3.49 would not be tested on a diploma exam. Students may also use calculator functions such as normalcdf and binomcdf to answer this question
- inform students that the matrix dimensions in Part A, question 3 are larger than what they would be tested on in a diploma examination situation
- supply students with Utility 17 in *Applied Mathematics 11* for instructions on using the TI-83 calculator to help with Part B, question 2, bullet 1. Students may also construct the histogram using paper and pencil
- tell students that histograms with discrete manipulated variables have these variables set in the middle of each column

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 solution strategies as needed. [CN, PS, T, V]

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]

Finance and Spreadsheets

- 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 Outcomes**
- 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 cost 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	Describe a network as a matrix and interpret the results of matrix operations correctly.
Connections	Relate mathematics to real-world situations and connect different units within Applied Mathematics 30.
Estimation and Mental Mathematics	Check the reasonableness of probabilities, costs, and spreadsheet formulas.
Problem Solving	Decide on an appropriate strategy to calculate increases in fares to maintain revenue and to build a spreadsheet to calculate profit.
Reasoning	Choose an appropriate regression model for the given data in a specified context.
Technology	Use a spreadsheet and/or a graphing calculator to solve and display solutions to problems.
Visualization	Use the diagrams provided to aid in redesigning the seating in a bus.

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.