

# APPLICATIONS OF MATHEMATICS 12

## CURRICULUM CONNECTIONS

Shaded text indicates that the Prescribed Learning Outcomes will not be assessed on the Applications of Mathematics 12 Provincial Examination. These PLOs are thought to be best assessed in the classroom.

**NUMBER:** Students demonstrate an understanding of and proficiency with calculations including making decisions concerning which arithmetic operation or operations to use to solve a problem and then solve the problem.

**Matrices:** Describe and apply operations on matrices to solve problems, using technology as required.

*It is expected that students will:*

- A1 model and solve problems, including those solved previously, using technology to perform matrix operations, including
- addition
  - subtraction
  - scalar multiplication

*Clarification: Examination questions may include combinations of the operations above and matrix multiplication.*

- A2 model and solve consumer and network problems using technology to perform matrix multiplication as required

**Finance:** Design or use a spreadsheet to make and justify financial decisions.

*It is expected that students will:*

- A3 design a financial spreadsheet template to allow users to input their own variables

*Clarification: Examination questions may include formulas involving +, -, \*, /, and ^, as well as the built-in functions SUM and AVERAGE.*

- A4 analyse the costs and benefits of renting or buying an increasing asset, such as land or property, under various circumstances

*Clarification: Examination questions will consist of analysing investments and loans.*

- A5 analyse the costs and benefits of leasing or buying a decreasing asset, such as a vehicle or computer, under various circumstances

*Clarification: Leasing questions will be limited to those where monthly payments and lease-end value are given.*

- A6 analyse an investment portfolio applying such concepts as interest rate, rate of return, and total return.

**PATTERNS AND RELATIONS:** Students use patterns to describe the world and to solve problems.

**Sinusoidal Functions:** Generate and analyze sinusoidal patterns.

*It is expected that students will:*

- B1 describe sinusoidal curves using terms, including
  - amplitude
  - period
  - maximum and minimum values
  - vertical and horizontal shift
- B2 graph sinusoidal data using technology, and represent the data with a best fit equation of the form  $y = a \sin(bx + c) + d$
- B3 use best fit sinusoidal equations, and their associated graphs, to make predictions (interpolation, extrapolation)

**SHAPE AND SPACE:** Students describe and compare everyday phenomena, using either direct or indirect measurement and describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

**Measurement:** Analyse objects, shapes and processes to solve cost and design problems.

*It is expected that students will:*

- C1 use dimensions and unit prices to solve problems involving perimeter, area, and volume
- C2 solve problems involving estimation and costing for objects, shapes, or processes when a design is given
- C3 design an object, shape, layout, or process within a specified budget
- C4 use simplified models to estimate the solutions to complex measurement problems

**3-D Objects and 2-D Shapes:** Solve problems involving polygons and vectors, including 2-D and 3-D applications

*It is expected that students will:*

- C5 use appropriate terminology to describe
  - vectors (i.e., direction, magnitude)
  - scalar quantities (i.e., magnitude)
- C6 assign meaning to the multiplication of a vector by a scalar
- C7 determine the magnitude and direction of a resultant vector, using triangle or parallelogram methods  
*Clarification: Examination questions may include the concept of static equilibrium.*
- C8 model and solve problems in 2-D and 3-D (with 3-D vectors restricted to those that are mutually orthogonal), using vector diagrams and technology

**STATISTICS AND PROBABILITY:** Students use experimental and theoretical probability to represent and solve problems involving uncertainty.

***Chance and Uncertainty:*** Solve problems based on the counting of sets, using techniques such as the fundamental counting principle, permutations and combinations. Model the probability of a compound event, and solve problems based on the combining of simpler probabilities.

*It is expected that students will:*

- D1 classify events as independent or dependent
- D2 use the fundamental counting principle to determine the number of different ways to perform multi-step operations

*Clarification: Examination questions may also include pathway problems.*

- D3 construct a sample space for two or three events

*Clarification: Examination questions may include the use of Venn diagrams.*

- D4 solve problems, using the probabilities of mutually exclusive and complementary events

*Clarification: Examination questions may also include binomial probabilities (e.g., binompdf and binomcdf on graphing calculators).*