Curriculum Comparison
WNCP Applied 11/12 Mathematics (1996) and

When looking at these two courses as a whole there is a significant amount of change between the outcomes of the 1996 versions of these courses when compared to the 2008 versions.

In 1996 there were 72 general and specific outcomes in these courses. Of these, some outcomes have been deleted outright from this stream; others have been moved to grade 9 or Foundations 10, while others have been moved here from the Pre-Calculus 11 and 12 Mathematics courses.

The 2008 versions of these courses now contain a total of 40 outcomes where:
- 28/40 outcomes or 70% of all outcomes are NEW to this stream
- 12/42 outcomes or 30% of all outcomes REMAIN from the previous courses either within the same course or moved from one course to the other.

A detailed comparison of each of these courses follows.
Curriculum Comparison:
Applied 11 (CCF 1996) and Foundations 11 (CCF 2008)

KEY: Highlighted text in yellow **NO LONGER PART OF FOUNDATIONS 11**
Highlighted text in green **NEW CONTENT IN FOUNDATIONS 11**

1996: 30 outcomes – 23/30 outcomes of this course have been deleted or significantly changed.

2008: 19 outcomes – 16/19 outcomes or 84% of the outcomes of the new course are new or significantly changed.

|------------------------|----------------------------|
| **Strand: Number (Number Operations)**<br>Students will:**<br>- demonstrate an understanding of and proficiency with calculations<br>- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.  

**General Outcome: Solve consumer problems, using arithmetic operations.**
C4–1. Solve consumer problems, including:<br>(N12)<br>- wages earned in various situations<br>- property taxation<br>- exchange rates<br>- unit prices.<br>[CN, E, PS, R, T]<br>C4–2. Reconcile financial statements (N13), including:<br>- cheque books with bank statements<br>- cash register tallies with daily receipts.<br>[CN, PS, T]<br>C4–3. Solve budget problems, using graphs (N14) and tables to communicate solutions.<br>[C, PS, T, V]<br>C4–4. Plot and describe data of exponential (N15) form, using appropriate scales.<br>[C, T, V]<br>C4–5. Solve investment and credit problems (N16) involving simple and compound interest.<br>[CN, PS, T]  

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<table>
<thead>
<tr>
<th>Strand: Patterns and Relations (Variables and Equations)</th>
<th>Relations and Functions</th>
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<tbody>
<tr>
<td><em>Students will:</em></td>
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<tr>
<td>• represent algebraic expressions in multiple ways.</td>
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**General Outcome: Represent and analyze situations that involve expressions, equations and inequalities.**

C5–1. Graph linear inequalities, in two (PR29) variables. [PS, V]

C5–2. Solve systems of linear equations, (PR30) in two variables:
• algebraically (elimination and substitution)
• graphically. [CN, PS, T, V]

C5–3. Solve nonlinear equations, using a (PR31) graphing tool. [CN, T, V]

**General Outcome: Use linear programming to solve optimization problems.**

A5–1. Solve, graphically, systems of linear (PR36) inequalities, in two variables, using technology. [CN, PS, T, V]

A5–2. Design and solve linear and nonlinear (PR37) systems, in two variables, to model problem situations.[C, CN, PS, R, V]

A5–3. Apply linear programming to find (PR38) optimal solutions to decision-making problems. [C, PS, R, T, V]

**General Outcome: Represent and analyze quadratic, polynomial and rational functions, using technology as appropriate.**

C5–4. Determine the following (PR57) characteristics of the graph of a quadratic function:
• vertex
• domain and range
• axis of symmetry
• intercepts. [C, PS, T, V]

**General Outcome: Develop algebraic and graphical reasoning through the study of relations.**

1. Model and solve problems that involve systems of linear inequalities in two variables. [CN, PS, T, V]

2. Demonstrate an understanding of the characteristics of quadratic functions, including:
• vertex
• intercepts
• domain and range
• axis of symmetry. [CN, PS, T, V]

**Strand: Shape and Space (Measurement)  
Students will:**
• describe and compare everyday phenomena, using either direct or indirect measurement.  

**Strand: Measurement**
<table>
<thead>
<tr>
<th>General Outcome: Demonstrate an understanding of scale factors, and their interrelationship with the dimensions of similar shapes and objects. A3–1. Enlarge or reduce a dimensioned (SS3) object, according to a specified scale. [C, CN, PS, V]</th>
<th>General Outcome: Develop spatial sense and proportional reasoning. 1. Solve problems that involve the application of rates. [CN, PS, R] 2. Solve problems that involve scale diagrams, using proportional reasoning. [CN, PS, R, V] 3. Demonstrate an understanding of the relationships among scale factors, areas, surface areas and volumes of similar 2-D shapes and 3-D objects. [C, CN, PS, R, V]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strand: Shape and Space (3-D Objects and 2-D Shapes)</strong>  <strong>Students will:</strong> • describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</td>
<td><strong>Geometry</strong>  (SS26) confirm and apply the following properties to particular cases: • the perpendicular from the centre of a circle to a chord bisects the chord • the measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc • the inscribed angles subtended by the same arc are congruent • the angle inscribed in a semicircle is a right angle • the opposite angles of a cyclic quadrilateral are</td>
</tr>
</tbody>
</table>
supplementary
- a tangent to a circle is perpendicular to the radius at the point of tangency
- the tangent segments to a circle, from any external point, are congruent
- the angle between a tangent and a chord is equal to the inscribed angle on the opposite side of the chord
- the sum of the interior angles of an \( n \)-sided polygon is \((2n - 4)\) right angles.  
  [PS, R, T, V]

**General Outcome:** Develop and apply the geometric properties of circles and polygons to solve problems.
A3–5. Use properties of circles and (SS27) polygons to solve design and layout problems.  
[CN, PS, V]

**General Outcome:** Develop spatial sense.
1. Derive proofs that involve the properties of angles and triangles.  
  [CN, R, V]
2. Solve problems that involve the properties of angles and triangles.  
  [CN, PS, V]
3. Solve problems that involve the cosine law and the sine law, including the ambiguous case.  
  [CN, PS, R]

**Strand: Statistics and Probability (Data Analysis)**
*Students will:*
- collect, display and analyze data to make predictions about a population.

**General Outcome:** Analyze graphs or charts of given situations to derive specific information.  
A4–1. Extract information from given (SP6) graphs of discrete or continuous data, using:
- time series
- glyphs (custom pictorial representations)
- continuous data
- contour lines.  
  [C, CN, E, PS, R, V]
A4–2. Draw and validate inferences.  

**Statistics**

Deleted from Foundations 11
(SP7) including interpolations and extrapolations, from graphical and tabular data. [CN, E, PS, V]

A4–3. Design different ways of presenting (SP8) data and analyzing results, by focusing on the truthful display of data and the clarity of presentation. [C, CN, T, V]

<table>
<thead>
<tr>
<th>General Outcome: Develop statistical reasoning.</th>
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<tbody>
<tr>
<td>1. Demonstrate an understanding of normal distribution, including:</td>
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<tr>
<td>• standard deviation</td>
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<td>• z-scores.</td>
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<tr>
<td>Moved from Mathematics 12</td>
</tr>
<tr>
<td>[CN, PS, T, V]</td>
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<tr>
<td>2. Interpret statistical data, using:</td>
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<tr>
<td>• confidence intervals</td>
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<tr>
<td>• confidence levels</td>
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<tr>
<td>• margin of error.</td>
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<tr>
<td>[C, CN, R]</td>
</tr>
<tr>
<td>Moved from Mathematics 12</td>
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<th>Logical Reasoning</th>
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<tbody>
<tr>
<td>General Outcome: Develop logical reasoning.</td>
</tr>
<tr>
<td>1. Analyze and prove conjectures, using inductive and deductive reasoning, to solve problems.</td>
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<tr>
<td>[C, CN, PS, R]</td>
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<tr>
<td>Moved From Mathematics 11</td>
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<tr>
<td>2. Analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.</td>
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<tr>
<td>[CN, PS, R, V]</td>
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<th>Mathematics Research Project</th>
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<tbody>
<tr>
<td>General Outcome: Develop an appreciation of the role of mathematics in society.</td>
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<tr>
<td>1. Research and give a presentation on a historical event or an area of interest that involves mathematics.</td>
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<tr>
<td>[C, CN, ME, PS, R, T, V]</td>
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Curriculum Comparison:
Applied 12 (CCF 1996) and Foundations 12 (CCF 2008)

KEY: Highlighted text in yellow **NO LONGER PART OF FOUNDATIONS 12**

Highlighted text in green **NEW CONTENT IN FOUNDATIONS 12**

**1996: 42 outcomes** – 28/42 or 67% of this course has been deleted or significantly changed.

**2008: 21 outcomes** – 12/21 or 57% of this course is new or significantly changed.

Out of 63 outcomes in total for 1996 and 2008, there have been changes in 40 of them. This is a 63% change altogether.

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<tbody>
<tr>
<td><strong>Strand: Number (Number Operations)</strong></td>
<td><strong>Financial Mathematics</strong></td>
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<tr>
<td>Students will:</td>
<td></td>
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<tr>
<td>• demonstrate an understanding of and proficiency with calculations</td>
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<tr>
<td>• decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.</td>
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<tr>
<td><strong>Describe and apply operations on matrices to solve problems, using technology as required.</strong></td>
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<tr>
<td>A6–1. Show an understanding of matrices (N17) and perform the operations of addition, scalar multiplication and matrix multiplication.</td>
<td></td>
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<tr>
<td>[C, T]</td>
<td></td>
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<tr>
<td>A6–2. Solve problems, using the operations (N18) of addition, subtraction, scalar multiplication and matrix multiplication on matrices.</td>
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<tr>
<td>[PS, R, T, V]</td>
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<tr>
<td>A6–3. Use matrices and matrix operations (N19) to model and to solve consumer, network and schedule problems.</td>
<td></td>
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<tr>
<td>[C, CN, PS, R, T, V]</td>
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<tr>
<td><strong>Design or use a spreadsheet to make and justify financial decisions.</strong></td>
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<tr>
<td>A8–1. Design or modify a financial (N20) spreadsheet template to allow users</td>
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<td><strong>Deleted from Foundations 12</strong></td>
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<tr>
<td>Develop number sense in financial applications.</td>
<td></td>
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<tr>
<td>1. Solve problems that involve compound interest in financial decision making.</td>
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</tbody>
</table>
to input their own variables.  
[C, PS, T]  
A8–2. Use spreadsheets to analyze renting (N21) or buying an increasing asset (home) under different sets of circumstances.  
[C, PS, T]  
A8–3. Use spreadsheets to analyze leasing (N22) or buying a decreasing asset (vehicle, computer) under different sets of circumstances.  
[C, PS, T]  
A8–4. Use spreadsheet(s) to analyze an (N23) investment or life insurance portfolio, applying such concepts as capital gains, interest rate, inflation rate, risk, total rate of return and after-tax rate of return.  
[C, PS, T]  
A8–5. Analyze car or house insurance needs (N24) and premiums, using such concepts as loss, probability of loss, compulsory coverage, optional coverage, deductible and claims record.  
[CN, E, R, T]  

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<thead>
<tr>
<th>Strand: Patterns and Relations (Patterns)</th>
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<tbody>
<tr>
<td><em>Students will:</em></td>
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<tr>
<td>• use patterns to describe the world and to solve problems.</td>
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**Generate and analyze cyclic, recursive and fractal patterns.**  
A7–1. From cyclic data produce a periodic (PR10) graph.  
[C, PS, V]  
A7–2. Predict results from graphs that (PR11) represent periodic events.  
[E, R, V]  
A7–3. Describe periodic events, including (PR12) sinusoidal curves, using correct terminology  
[C, V]  
A7–4. Collect sinusoidal data; sketch the (PR13) graph of the data; and, using degrees,  

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| 3. Represent data, using sinusoidal functions, to solve problems.  
[C, CN, PS, T, V] |  |
represent the data with an equation of the form:
- \( y = a \sin (kt) + c \)
- **OR**
- \( y = a \cos (kt) + c. \)

A7–5. Develop sinusoidal equations, using (PR14) degrees, to represent periodic behaviour.

A7–6. Use technology to generate and graph (PR15) finite or infinite sequences whose recursive definition may or may not be given.

A7–7. Identify sequences that appear to be:
- divergent
- convergent
- oscillating
- static.

A7–8. Construct a fractal pattern by (PR17) repeatedly applying a procedure to a geometric figure.

A7–9. Use the concept of self-similarity to (PR18) compare and/or predict the perimeters, areas and volumes of fractal patterns.

**Strand: Shape and Space (Measurement)**

*Students will:*
- describe and compare everyday phenomena, using either direct or indirect measurement.

**Analyze objects, shapes and processes to solve cost and design problems.**

A9–1. Use dimensions and unit prices to (SS15) solve problems involving perimeter, area and volume.

A9–2. Solve problems involving estimation.
(SS16) and costing for objects, shapes or processes when a design is given.
[C, E, PS]

A9–3. Design an object, shape, layout or (SS17) process within a specified budget.
[PS, R, V]

A9–4. Use simplified models to estimate the (SS18) solutions to complex measurement problems.
[E, V]

**Solve problems involving polygons and vectors, including both 3-D and 2-D applications.**

A6–4. Use and give 3-D and 2-D examples (SS30) of vector terminology and notation, including:
- vector (direction, magnitude)
- scalar
- unit vector
- collinear vectors
- opposite vectors
- parallel vectors
- resultant vectors.
[C, CN]

A6–5. Assign meaning to the multiplication (SS31) of a vector by a scalar.
[CN]

A6–6. Perform vector additions and (SS32) subtractions, using triangle or parallelogram methods.
[V]

A6–7. Determine the magnitude and (SS33) direction of a resultant vector, using triangle, parallelogram or component methods.
[CN, T, V]

A6–8. Use vector diagrams and (SS34) trigonometry to analyze and solve practical problems in 3-D and 2-D.
[CN, PS, V]

**Deleted from Foundations 12**
**Strand: Statistics and Probability**  
(Chance and Uncertainty)

*Students will:*
- use experimental or theoretical probability to represent and solve problems involving uncertainty.

### Probability

**Use normal and binomial probability distributions to solve problems involving uncertainty.**

- C6–1. Find the population standard deviation of a data set or a probability distribution, using technology.  
  
  [CN, E, T, V]

- C6–2. Use z-scores and z-score tables to solve problems.  
  
  [PS, R, T, V]

- C6–3. Use the normal distribution and the normal approximation to the binomial distribution to solve problems involving confidence intervals for large samples.  
  
  [CN, E, PS]

**Solve problems based on the counting of sets, using techniques such as the fundamental counting principle, permutations and combinations.**

- C6–4. Solve pathway problems, interpreting (SP14) and applying any constraints.  
  
  [PS, R]

- C6–5. Use the fundamental counting principle to determine the number of different ways to perform multistep operations.  
  
  [PS, R]

**Model the probability of a compound event, and solve problems based on the combining of simpler probabilities.**

- C6–6. Construct a sample space for two or three events.  
  
  [PS, R, V]

- C6–7. Classify events as independent or dependent.  
  
  [PS, R, V]
<table>
<thead>
<tr>
<th>[C]</th>
<th>[CN, PS, R, V]</th>
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<tbody>
<tr>
<td>C6–8. Solve problems, using the (SP22) probabilities of mutually exclusive and complementary events.</td>
<td>3. Solve problems that involve the probability of two events.</td>
</tr>
<tr>
<td>[CN, PS, R]</td>
<td>[CN, PS, R]</td>
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### Logical Reasoning

**Develop logical reasoning.**

1. **Analyze puzzles and games that involve numerical and logical reasoning, using problem-solving strategies.**
   - [CN, ME, PS, R]
2. **Solve problems that involve the application of set theory.**
   - [CN, PS, R, V]
3. **Solve problems that involve conditional statements.**
   - [C, CN, PS, R]

### Relations and Functions

**Develop algebraic and graphical reasoning through the study of relations.**

1. **Represent data, using polynomial functions (of degree \( \leq 3 \)), to solve problems.**
   - [C, CN, PS, T, V]
2. **Represent data, using exponential and logarithmic functions, to solve problems.**
   - [C, CN, PS, T, V]

### Mathematics Research Project

**Develop an appreciation of the role of mathematics in society.**

1. **Research and give a presentation on a current event or an area of interest that involves mathematics.**
   - [C, CN, ME, PS, R, T, V]