Grade 11 Pre-Calculus Mathematics (1999)	Grade 11 Pre-Calculus Mathematics (2009)
Use interval notation (A-1)	
Plot and describe data of quadratic form using appropriate scales (A-2)	
Determine the following characteristics of a graph of a quadratic function: • Vertex • Domain and range • Axis of symmetry • Intercepts (A-3)	11P.R.3. Analyze quadratic functions of the form $y = a(x-p)^2 + q$ and determine the: • vertex • domain and range • direction of opening • axis of symmetry • *x*- and *y*-intercepts. [C, CN, R, T, V] 11P.R.4. Analyze quadratic functions of the form $y = ax^2 + bx + c$ to identify characteristics of the corresponding graph, including: • vertex • domain and range • direction of opening • axis of symmetry • *x*- and *y*-intercepts [C, CN, PS, R, T, V]
Connect algebraic and graphical transformations of quadratic functions, using completing the square as required (A-4)	11P.R.4. Analyze quadratic functions of the form $y = ax^2 + bx + c$ to identify characteristics of the corresponding graph, including: • vertex • domain and range • direction of opening • axis of symmetry • *x*- and *y*-intercepts [C, CN, PS, R, T, V]
Model real-world situations, using quadratic functions (A-5)	11P.R.4. Analyze quadratic functions of the form $y = ax^2 + bx + c$ to identify characteristics of the corresponding graph, including: • vertex • domain and range • direction of opening • axis of symmetry • *x*- and *y*-intercepts [C, CN, PS, R, T, V]
Sketch the graph of $y = \sin\theta$ and $y = \cos\theta$ (B-1a)	

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Grade 11 Pre-Calculus Mathematics (1999)	Grade 11 Pre-Calculus Mathematics (2009)
Extend the definitions of trigonometric functions to include all quadrants (B-1b)	11P.T.1. Demonstrate an understanding of angles in standard position [0° to 360°]. [C, R, V] 11P.T.2. Solve problems, using the three primary trigonometric ratios (sine, cosine and tangent) for angles from 0° to 360° in standard position. [C, ME, PS, R, T, V]
Solve trigonometric equations $0° \leq \theta \leq 360°$ (B-1c)	11P.T.2. Solve problems, using the three primary trigonometric ratios (sine, cosine and tangent) for angles from 0° to 360° in standard position. [C, ME, PS, R, T, V]
Solve problems involving ambiguous case triangles (B-2)	11P.T.3. Solve problems, using the cosine law and sine law, including the ambiguous case. [C, CN, PS, R, T]
Solve quadratic equations, and relate the solutions to the zeros of a corresponding quadratic function using: • Graphing • The quadratic formula • Factoring (C-1a)	11P.R.5. Solve problems that involve quadratic equations. [C, CN, PS, R, T, V]
Solve non-linear equations • By factoring • Graphically • Graphically with a graphing calculator's built in function [zeros, intersect, equation solver] (C-1b)	
Determine the character of the real and non-real roots of a quadratic equation, using • The discriminant in the quadratic formula • Graphing (C-2)	11P.R.3. Analyze quadratic functions of the form $y = a(x - p)^2 + q$ and determine the: • vertex • domain and range • direction of opening • axis of symmetry • *x*- and *y*-intercepts. [C, CN, R, T, V] 11P.R.5. Solve problems that involve quadratic equations. [C, CN, PS, R, T, V]
Solve non-linear equations using a graphing tool (C-3)	

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Formulate and apply strategies to solve absolute value equations, radical equations, and rational equations (C-4)	11P.A.3. Solve problems that involve radical equations (limited to square roots). [C, CN, PS, R, T] 11P.A.6. Solve problems that involve rational equations (limited to numerators and denominators that are monomials, binomials or trinomials). [C, CN, PS, R] 11P.R.2. Graph and analyze absolute value functions (limited to linear and quadratic functions) to solve problems. [C, PS, R, T, V]
Develop the coordinate equation of a circle (D-1)	
Solve problems involving the distances between points and lines (D-2)	
Verify and prove assertions in plane geometry using coordinate geometry (D-3)	
Solve systems of linear equations in two variables: • Graphically • Algebraically (elimination and substitution) (D-4)	
Solve systems of linear equations, in three variables: • Algebraically • With technology (D-5)	
Determine the solution to a system of nonlinear equations, using technology as appropriate (D-6)	11P.R.6. Solve, algebraically and graphically, problems that involve systems of linear-quadratic and quadratic-quadratic equations in two variables. [C, CN, PS, R, T, V]
Graph linear inequalities in two variables (D-7)	11P.R.7. Solve problems that involve linear and quadratic inequalities in two variables. [C, PS, T, V]
Formulate and apply strategies to solve quadratic, absolute value, radical, and rational inequalities (D-8)	11P.R.7. Solve problems that involve linear and quadratic inequalities in two variables. [C, PS, T, V] 11P.R.8. Solve problems that involve quadratic inequalities in one variable. [CN, PS, V]

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Grade 11 Pre-Calculus Mathematics (1999)	Grade 11 Pre-Calculus Mathematics (2009)
Use technology and measurement to 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 • Inscribed angles subtended by the same arc are congruent • The angle inscribed in a semicircle is a right angle • Opposite angles of a cyclic quadrilateral are 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 180°(*n*-2) • The measure of an arc is one half the measure of the inscribed angle subtended by the arc (E-1)	
Verify the following general properties by providing reasons for each step in the solution • The perpendicular bisector of a chord contains the centre of the circle • The measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc (for the case when the centre of the circle is in the interior of the inscribed angle) • Inscribed angles subtended by the same arc are congruent • The angle inscribed in a semicircle is a right angle • Opposite angles of a cyclic quadrilateral are 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 (2*n*-4) right angles (E-2)	
Solve consumer problems, including: • Wages earned in various situations • Property taxation • Exchange rates • Unit prices (F-1)	
Reconcile financial statements including • Chequebooks with bank statements • cash register tallies with daily receipts (F-2)	
Solve budget problems, using graphs and tables to communicate solutions (F-3)	
Plot and describe data of exponential form, using appropriate scales (F-4)	

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Grade 11 Pre-Calculus Mathematics (1999)	Grade 11 Pre-Calculus Mathematics (2009)
Solve investment and credit problems involving simple and compound interest (F-5)	
Differentiate between inductive and deductive reasoning (G-1)	
Explain and apply connecting words, such as “and” , “or”, and “not” to solve problems (G-2)	
Use examples and counterexamples to analyze conjectures (G-3)	
Distinguish between an “if-then” proposition, its converse, and its contrapositive (G-4)	
Prove assertions in a variety of settings, using direct and indirect reasoning (G-5)	
Perform operations on functions and compositions of functions (H-1)	
Determine the inverse of a function (H-2)	
Use the remainder theorem to evaluate polynomial expressions and the factor theorem to determine factors of polynomials (H-3)	
Describe, graph, and analyze polynomials and rational functions, using technology (H-4)	
	11P.A.1. Demonstrate an understanding of the absolute value of real numbers. [ME, R, V]
	11P.A.2. Solve problems that involve operations on radicals and radical expressions with numerical and variable radicands. [CN, ME, PS, R, T]
	11P.A.4. Determine equivalent forms of rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials). [C, ME, R]
	11P.A.5. Perform operations on rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials). [C, CN, ME, R]
	11P.R.1. Factor polynomial expressions of the form: • $ax^2+bx+c,\ a\neq 0$ • $a^2x^2-b^2y^2,\ a\neq 0,\ b\neq 0$ • $a\left(f\left(x\right)\right)^2+b\left(f\left(x\right)\right)+c,\ a\neq 0$ • $a^2\left(f\left(x\right)\right)^2-b^2\left(g\left(y\right)\right)^2,\ a\neq 0,\ b\neq 0$ where a, b and c are rational numbers. [ME, R]

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Grade 11 Pre-Calculus Mathematics (1999)	Grade 11 Pre-Calculus Mathematics (2009)
	11P.R.9. Analyze arithmetic sequences and series to solve problems. [C, CN, PS, R, T]
	11P.R.10. Analyze geometric sequences and series to solve problems. [C, CN, PS, R, T]
	11P.R.11. Graph and analyze reciprocal functions (limited to the reciprocal of linear and quadratic functions). [CN, R, T, V]

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