

Analysis of Curriculum Changes for Foundations of Mathematics and Pre- Calculus 10

(WNCP Curriculum for *Mathematics 10*)

IMPLEMENTATION TIMELINE

GRADE	IMPLEMENTATION YEAR					
	2007-08	2008-09	2009-10	2010-11	2011-12	2011-12
8		OPTIONAL	FULL			
9			OPTIONAL	FULL		
10				FULL		
11					FULL	
12						FULL

Source: http://www.bced.gov.bc.ca/irp/imp_sched.htm

Summary of Changes

WNCP Pure 10 (1996) vs. Foundations of Mathematics & Pre-Calculus 10 (2008)

1996 43 outcomes. Of these, **30** have been deleted or significantly changed.

2008 18 outcomes. Of these, **12** are either significantly changed or are new.

Out of 61 outcomes in total for 1996 and 2008, there have been changes in **42**. This is a **69%** change.

Deleted Topics

- Recursive and non-recursive data tables
- Spreadsheets
- Communicate instructions used to solve problems
- Operations on irrational numbers of monomial and binomial form
- Arithmetic sequences and series (including as applications of linear functions) **Moved to Pre-Calculus 11**
- Direct variation as an application of linear functions
- Geometric growth/number patterns **Moved to Pre-Calculus 11**
- Dividing a polynomial by a binomial **Moved to Pre-Calculus 12**
- Rational expressions (equivalent forms, non-permissible values, and operations) and equations **Moved to Pre-Calculus 11**
- Plot nonlinear data **Moved to Apprenticeship and Workplace 12**
- Use of technology to draw the graph of a function (no longer required, but is permitted)
- Sine and cosine for angles from 90° to 180° **Moved to Pre-Calculus 11**
- Sine and cosine laws **Moved to Pre-Calculus 11**
- Distance between points and midpoints of line segments
- Statistics & Probability (Data Analysis): Sampling techniques & inferences and generalizations about populations based on sample data **Moved to Grade 9**
- Statistics & Probability (Chance & Uncertainty): Expected values

New Topics

- Imperial units
- Conversions between SI and imperial units
- Surface area of right cones, right cylinders, right prisms, and right pyramids **Moved from Grade 9**
- Factors of numbers by determining prime factors, GCF, LCM, square root, cube root **Moved from Grade 9**
- Increased emphasis on linear equations, functions, and associated graphs
- Systems of linear equations in two variables (graphically and algebraically) **Moved from Pre-Calculus 11**

A Comparison of WNCP Outcomes for 1996 and 2008: Foundations of Mathematics & Pre-Calculus 10

WNCP (1996)	WNCP (2008)
Strand: Number (Number Concepts & Number Operations)	Strand: Algebra and Number
<p>General Outcomes:</p> <p>Analyze the numerical data in a table for trends, patterns and interrelationships.</p> <p>Explain and illustrate the structure and the interrelationship of the sets of numbers within the real number system.</p> <p>Use basic arithmetic operations on real numbers to solve problems.</p> <p>Describe and apply arithmetic operations on tables to solve problems, using technology as required.</p> <p>Use exact values, arithmetic operations and algebraic operations on real numbers to solve problems.</p>	<p>General Outcome:</p> <p>Develop algebraic reasoning and number sense.</p>
<ol style="list-style-type: none"> 1. Use words and algebraic expression to describe the data and the interrelationships in a table with rows that are not related recursively (not calculated from previous data). [C, CN] 2. Use words and algebraic expressions to describe the data and the interrelationships in a table with rows that are related recursively (calculated from previous data). [C, CN] 3. Classify numbers as natural, whole, integer, rational or irrational, and show that these number sets are nested within the real number system. [C, R, V] <i>(not an outcome, but incorporated into AN2 - AI 2.8)</i> 4. Use approximate representations of irrational numbers. [R, T] 	<ol style="list-style-type: none"> 1. Demonstrate an understanding of factors of whole numbers by determining the: <ul style="list-style-type: none"> • prime factors • greatest common factor • least common multiple • square root • cube root. [CN, ME, R] 2. Demonstrate an understanding of irrational numbers by: <ul style="list-style-type: none"> • representing, identifying and simplifying irrational numbers • ordering irrational numbers. [CN, ME, R, V] 3. Demonstrate an understanding of powers with integral and rational exponents. [C, CN, PS, R]

WNCP (1996)	WNCP (2008)
<p>5. Communicate a set of instructions used to solve an arithmetic problem. [C]</p> <p>6. Perform arithmetic operations on irrational numbers, using appropriate decimal approximations. [E, T]</p> <p>7. Create and modify tables from both recursive and nonrecursive situations. [PS, T, V]</p> <p>8. Use and modify a spreadsheet template to model recursive situations. [PS, T, V]</p> <p>9. Explain and apply the exponent laws for powers of numbers and for variables with rational exponents. [C, E]</p> <p>10. Perform operations on irrational numbers of monomial and binomial form, using exact values. [E]</p>	<p>4. Demonstrate an understanding of the multiplication of polynomial expressions (limited to monomials, binomials and trinomials), concretely, pictorially and symbolically. [CN, R, V]</p> <p>5. Demonstrate an understanding of common factors and trinomial factoring, concretely, pictorially and symbolically. [C, CN, R, V]</p>

WNCP (1996)	WNCP (2008)
Strand: Patterns & Relations (Patterns)	Deleted from Grade 10
General Outcome: Generate and analyze number patterns.	
1. Generate number patterns exhibiting arithmetic growth. [E, R]	
2. Use expressions to represent general terms and sums for arithmetic growth, and apply these expressions to solve problems. [CN, PS, R, T]	
3. Relate arithmetic sequences to linear functions defined over the natural numbers. [CN]	
4. Generate number patterns exhibiting geometric growth. [E, R]	

WNCP (1996)	WNCP (2008)
Strand: Patterns & Relations (Variables & Equations)	See Algebra and Number #4 and #5
General Outcome: Generalize operations on polynomials to include rational expressions.	
5. Factor polynomial expressions of the form $ax^2 + bx + c$, and $a^2x^2 - b^2y^2$. [E] 6. Find the product of polynomials. [E, R] 7. Divide a polynomial by a binomial, and express the result in the forms: <ul style="list-style-type: none"> • $\frac{P}{D} = Q + \frac{R}{D}$ • $P = DQ + R$ • $P(x) = D(x)Q(x) + R$ [E, R] 8. Determine equivalent forms of simple rational expressions with polynomial numerators, and denominators that are monomials, binomials or trinomials that can be factored. [PS, R] 9. Determine the nonpermissible values for the variable in rational expressions. [C, CN] 10. Perform the operations of addition, subtraction, multiplication and division on rational expressions. [E, R] 11. Find and verify the solutions of rational equations. [CN, PS]	

WNCP (1996)	WNCP (2008)
Strand: Patterns & Relations (Relations & Functions)	Strand: Relations and Functions
<p>General Outcomes:</p> <p>Examine the nature of relations with an emphasis on functions.</p> <p>Represent data, using linear function models.</p>	<p>General Outcome:</p> <p>Develop algebraic and graphical reasoning through the study of relations.</p>
<p>12. Plot linear and nonlinear data, using appropriate scales. [C, V]</p> <p>13. Represent data, using function models. [CN, PS, V]</p> <p>14. Use a graphing tool to draw the graph of a function from its equation. [C, T, V]</p> <p>15. Describe a function in terms of:</p> <ul style="list-style-type: none"> • ordered pairs • a rule, in word or equation form • a graph. <p>[C, CN, V]</p> <p>16. Use function notation to evaluate and represent functions. [C, PS]</p> <p>17. Determine the domain and range of a relation from its graph. [PS, V]</p> <p>18. Determine the following characteristics of the graph of a linear function, given its equation:</p> <ul style="list-style-type: none"> • intercepts • slope • domain • range. <p>[PS, V]</p> <p>19. Use direct variation and arithmetic sequences as applications of linear functions. [CN, PS, V]</p>	<p>1. Interpret and explain the relationships among data, graphs and situations. [C, CN, R, T, V]</p> <p>2. Demonstrate an understanding of relations and functions. [C, R, V]</p> <p>3. Demonstrate an understanding of slope with respect to:</p> <ul style="list-style-type: none"> • rise and run • line segments and lines • rate of change • parallel lines • perpendicular lines. <p>[PS, R, V]</p> <p>4. Describe and represent linear relations, using:</p> <ul style="list-style-type: none"> • words • ordered pairs • tables of values • graphs • equations. <p>[C, CN, R, V]</p> <p>5. Determine the characteristics of the graphs of linear relations, including the:</p> <ul style="list-style-type: none"> • intercepts • slope • domain • range. <p>[CN, PS, R, V]</p> <p>6. Relate linear relations expressed in:</p> <ul style="list-style-type: none"> • slope–intercept form ($y = mx + b$) • general form ($Ax + By + C = 0$) • slope–point form ($y - y_1 = m(x - x_1)$) to their graphs. [CN, R, T, V]

WNCP (1996)	WNCP (2008)
	<p>7. Determine the equation of a linear relation, given:</p> <ul style="list-style-type: none"> • a graph • a point and the slope • two points • a point and the equation of a parallel or perpendicular line <p>to solve problems. [CN, PS, R, V]</p> <p>8. Represent a linear function, using function notation. [CN, ME, V]</p> <p>9. Solve problems that involve systems of linear equations in two variables, graphically and algebraically. [CN, PS, R, T, V]</p>

WNCP (1996)	WNCP (2008)
Strand: Shape & Space (Measurement)	Strand: Number
<p>General Outcomes:</p> <p>Demonstrate an understanding of scale factors, and their interrelationship with the dimensions of similar shapes and objects.</p> <p>Solve problems involving triangles, including those found in 3-D and 2-D applications.</p>	<p>General Outcome:</p> <p>Develop spatial sense and proportional reasoning.</p>
<ol style="list-style-type: none"> 1. Calculate the volume and surface area of a sphere, using formulas that are provided. [CN, PS, V] 2. Determine the relationships among linear scale factors, areas, the surface areas and the volumes of similar figures and objects. [CN, PS, R, V] 3. Solve problems involving two right triangles. [CN, PS, V] 4. Extend the concepts of sine and cosine for angles from 0° to 180°. [R, T, V] 5. Apply the sine and cosine laws, excluding the ambiguous case, to solve problems. [CN, PS, V] 	<ol style="list-style-type: none"> 1. Solve problems that involve linear measurement, using: <ul style="list-style-type: none"> • SI and imperial units of measure • estimation strategies • measurement strategies. [ME, PS, V] 2. Apply proportional reasoning to problems that involve conversions between SI and imperial units of measure. [C, ME, PS] 3. Solve problems, using SI and imperial units, that involve the surface area and volume of 3-D objects, including: <ul style="list-style-type: none"> • right cones • right cylinders • right prisms • right pyramids • spheres. [CN, PS, R, V] 4. Develop and apply the primary trigonometric ratios (sine, cosine, tangent) to solve problems that involve right triangles. [C, CN, PS, R, T, V]

WNCP (1996)	WNCP (2008)
Strand: Shape & Space (3-D Objects and 2-D Shapes)	See Relations and Functions #3
General Outcome: Solve coordinate geometry problems involving lines and line segments.	
<ol style="list-style-type: none"> 6. Solve problems involving distances between points in the coordinate plane. [PS, V] 7. Solve problems involving midpoints of line segments. [PS] 8. Solve problems involving rise, run and slope of line segments. [PS, V] 9. Determine the equation of a line, given information that uniquely determines the line. [PS, V] 10. Solve problems using slopes of: <ul style="list-style-type: none"> • parallel lines • perpendicular lines. [CN, PS, V] 	

WNCP (1996)	WNCP (2008)
Strand: Statistics & Probability (Data Analysis)	Deleted from Grade 10
General Outcome: Implement and analyze sampling procedures, and draw appropriate inferences from the data collected.	
<ol style="list-style-type: none"> <li>1. Choose, justify and apply sampling techniques that will result in an appropriate, unbiased sample from a given population. [C, PS, R] <li>2. Defend or oppose inferences and generalizations about populations, based on data from samples. [C, PS, R] 	
Strand: Statistics & Probability (Chance & Uncertainty)	
General Outcomes: Make and analyze decisions, using expected gains and losses, based on the probabilities of simple events.	
<ol style="list-style-type: none"> <li>3. Connect probabilities to calculated expected gains or losses. [CN, PS, R, V] <li>4. Solve decision-making problems involving expected values, and communicate the solutions. [C, PS, R] 	