Blueprint for *Mathematics 10* Final Exam – Option 1

Measurement **General Outcome:** Develop spatial sense and proportional reasoning.	
Specific Outcome: Solve problems that involve linear measurement, using: • SI and imperial units of measure • estimation strategies • measurement strategies. [ME, PS, V]	
Provide referents for linear measurements, including millimetre, centimetre, metre, kilometre, inch, foot, yard and mile, and explain the choices.	MC #4, Conceptual
Compare SI and imperial units, using referents.	
Estimate a linear measure, using a referent, and explain the process used.	MC #36, Conceptual
Justify the choice of units used for determining a measurement in a problem-solving context.	MC #14, Problem Solving WR #1a), Procedural
Solve problems that involve linear measure, using instruments such as rulers, calipers or tape measures.	NR #31, Procedural
Describe and explain a personal strategy used to determine a linear measurement; e.g., circumference of a bottle, length of a curve, perimeter of the base of an irregular 3-D object.	
Specific Outcome: Apply proportional reasoning to problems that involve conversions between SI and imperial units of measure. [C, ME, PS]	
Explain how proportional reasoning can be used to convert a measurement within or between SI and imperial systems.	MC #7, Conceptual, Procedural MC #8, Procedural MC #17, Conceptual, Procedural
Solve a problem that involves the conversion of units within or between SI and imperial systems.	MC #7, Conceptual, Procedural MC #9, Problem Solving MC #10, Problem Solving
Verify, using unit analysis, a conversion within or between SI and imperial systems, and explain the conversion.	MC #10, Problem Solving MC #11, Procedural MC #16, Procedural
Justify, using mental mathematics, the reasonableness of a solution to a conversion problem.	

Specific Outcome: Solve problems, using SI and imperial units, that involve the surface area and volume of 3-D objects, including: • right cones • right cylinders • right prisms • right pyramids • spheres. [CN, PS, R, V]	
Sketch a diagram to represent a problem that involves surface area or volume.	
Determine the surface area of a right cone, right cylinder, right prism, right pyramid or sphere, using an object or its labelled diagram.	NR #15, Problem Solving, Procedural MC #18, Procedural MC #20, Procedural MC #25, Procedural
Determine the volume of a right cone, right cylinder, right prism, right pyramid or sphere, using an object or its labelled diagram.	NR #19, Procedural MC #23, Procedural MC #33, Problem Solving WR #2a), b), Problem Solving
Determine an unknown dimension of a right cone, right cylinder, right prism, right pyramid or sphere, given the object's surface area or volume and the remaining dimensions.	MC #14, Problem Solving MC #32, Procedural
Solve a problem that involves surface area or volume, given a diagram of a composite 3-D object.	MC #14, Problem Solving NR #15, Problem Solving, Procedural MC #18, Procedural NR #26, Problem Solving WR #2f), Problem Solving
Describe the relationship between the volumes of: • right cones and right cylinders with the same base and height • right pyramids and right prisms with the same base and height.	
Specific Outcome: Develop and apply the primary trigonometric ratios (sine, cosine, tangent) to solve problems that involve right triangles. [C, CN, PS, R, T, V]	
Explain the relationships between similar right triangles and the definitions of the primary trigonometric ratios.	NR #27, Procedural MC #48, Conceptual
Identify the hypotenuse of a right triangle and the opposite and adjacent sides for a given acute angle in the triangle.	
Solve right triangles, with or without technology.	MC #1, Procedural MC #5, Problem Solving MC #21, Procedural WR #1b), Procedural
Solve a problem that involves one or more right triangles by applying the primary trigonometric ratios or the Pythagorean theorem.	NR #2, Problem Solving MC #5, Problem Solving MC #28, Problem Solving MC #35, Problem Solving NR #50, Procedural

Solve a problem that involves indirect and direct measurement, using the trigonometric ratios, the Pythagorean theorem and measurement instruments such as a clinometer or metre stick.	NR #22, Problem Solving MC #39, Conceptual, Problem Solving
Algebra and Number **General Outcome:** Develop algebraic reasoning and number sense.	
Specific Outcome: Demonstrate an understanding of factors of whole numbers by determining the: • prime factors • greatest common factor • least common multiple • square root • cube root. [CN, ME, R]	
Determine the prime factors of a whole number.	
Explain why the numbers 0 and 1 have no prime factors.	
Determine, using a variety of strategies, the greatest common factor or least common multiple of a set of whole numbers, and explain the process.	MC #40, Conceptual
Determine, concretely, whether a given whole number is a perfect square, a perfect cube or neither.	
Determine, using a variety of strategies, the square root of a perfect square, and explain the process.	
Determine, using a variety of strategies, the cube root of a perfect cube, and explain the process.	NR #37, Procedural
Solve problems that involve prime factors, greatest common factors, least common multiples, square roots or cube roots.	MC #38, Procedural
Specific Outcome: Demonstrate an understanding of irrational numbers by: • representing, identifying and simplifying irrational numbers • ordering irrational numbers. [CN, ME, R, V]	
Sort a set of numbers into rational and irrational numbers.	MC #45, Conceptual
Determine an approximate value of a given irrational number.	
Approximate the locations of irrational numbers on a number line, using a variety of strategies, and explain the reasoning.	
Order a set of irrational numbers on a number line.	
Express a radical as a mixed radical in simplest form (limited to numerical radicands).	NR #41, Conceptual MC #42, Conceptual, Procedural MC #43, Procedural NR #44, Procedural
Express a mixed radical as an entire radical (limited to numerical radicands).	
Explain, using examples, the meaning of the index of a radical.	

Represent, using a graphic organizer, the relationship among the subsets of the real numbers (natural, whole, integer, rational, irrational).	
Specific Outcome: Demonstrate an understanding of powers with integral and rational exponents. [C, CN, PS, R]	
Explain, using patterns, why $a^{-n} = \frac{1}{a^n}$, $a \neq 0$.	
Explain, using patterns, why $a^{\frac{1}{n}} = \sqrt[n]{a}$, $n > 0$.	
Apply the exponent laws: • $(a^m)(a^n) = a^{m+n}$ • $(a^m) \div (a^n) = a^{m-n}$, $a \neq 0$ • $(a^m)^n = a^{mn}$ • $(ab)^m = a^m b^m$ • $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$, $b \neq 0$ to expressions with rational and variable bases and integral and rational exponents, and explain the reasoning.	
Express powers with rational exponents as radicals and vice versa.	
Solve a problem that involves exponent laws or radicals.	MC #6, Problem Solving NR #60, Procedural
Identify and correct errors in a simplification of an expression that involves powers.	
Specific Outcome: Demonstrate an understanding of the multiplication of polynomial expressions (limited to monomials, binomials and trinomials), concretely, pictorially and symbolically. [CN, R, V]	
(*It is intended that the emphasis of this outcome be on binomial by binomial multiplication, with extension to polynomial by polynomial to establish a general pattern for multiplication.*) Model the multiplication of two given binomials, concretely or pictorially, and record the process symbolically.	WR #3a), Procedural
Relate the multiplication of two binomial expressions to an area model.	
Explain, using examples, the relationship between the multiplication of binomials and the multiplication of two-digit numbers.	MC #30, Conceptual
Verify a polynomial product by substituting numbers for the variables.	NR #49, Procedural
Multiply two polynomials symbolically, and combine like terms in the product.	WR #3b), Procedural
Generalize and explain a strategy for multiplication of polynomials.	
Identify and explain errors in a solution for a polynomial multiplication.	MC #57, Procedural

Specific Outcome: Demonstrate an understanding of common factors and trinomial factoring, concretely, pictorially and symbolically. [C, CN, R, V]	
Determine the common factors in the terms of a polynomial, and express the polynomial in factored form.	MC #58, Procedural
Model the factoring of a trinomial, concretely or pictorially, and record the process symbolically.	
Factor a polynomial that is a difference of squares, and explain why it is a special case of trinomial factoring where $b = 0$.	MC #57, Procedural
Identify and explain errors in a polynomial factorization.	
Factor a polynomial, and verify by multiplying the factors.	
Explain, using examples, the relationship between multiplication and factoring of polynomials.	
Generalize and explain strategies used to factor a trinomial.	
Express a polynomial as a product of its factors.	MC #24, Procedural
Relations and Functions **General Outcome:** Develop algebraic and graphical reasoning through the study of relations.	
Specific Outcome: Interpret and explain the relationships among data, graphs and situations. [C, CN, R, T, V]	
Graph, with or without technology, a set of data, and determine the restrictions on the domain and range.	
Explain why data points should or should not be connected on the graph for a situation.	
Describe a possible situation for a given graph.	MC #29, Conceptual
Sketch a possible graph for a given situation.	
Determine, and express in a variety of ways, the domain and range of a graph, a set of ordered pairs or a table of values.	NR #46, Procedural
Specific Outcome: Demonstrate an understanding of relations and functions. [C, R, V]	
Explain, using examples, why some relations are not functions but all functions are relations.	
Determine if a set of ordered pairs represents a function.	
Sort a set of graphs as functions or non-functions.	
Generalize and explain rules for determining whether graphs and sets of ordered pairs represent functions.	WR #3d), e), Conceptual

Specific Outcome: Demonstrate an understanding of slope with respect to: • rise and run • line segments and lines • rate of change • parallel lines • perpendicular lines. [PS, R, V]	
Determine the slope of a line segment by measuring or calculating the rise and run.	MC #12, Procedural MC #34, Problem Solving
Classify lines in a given set as having positive or negative slopes.	WR #2e), Conceptual
Explain the meaning of the slope of a horizontal or vertical line.	
Explain why the slope of a line can be determined by using any two points on that line.	
Explain, using examples, slope as a rate of change.	WR #2c), d), Problem Solving
Draw a line, given its slope and a point on the line.	
Determine another point on a line, given the slope and a point on the line.	
Generalize and apply a rule for determining whether two lines are parallel or perpendicular.	
Solve a contextual problem involving slope.	MC #3, Problem Solving
Specific Outcome: Describe and represent linear relations, using: • words • ordered pairs • tables of values • graphs • equations. [C, CN, R, V]	
Identify independent and dependent variables in a given context.	
Determine whether a situation represents a linear relation, and explain why or why not.	
Determine whether a graph represents a linear relation, and explain why or why not.	WR #3c), d), e), Conceptual
Determine whether a table of values or a set of ordered pairs represents a linear relation, and explain why or why not.	
Draw a graph from a set of ordered pairs within a given situation, and determine whether the relationship between the variables is linear.	
Determine whether an equation represents a linear relation, and explain why or why not.	
Match corresponding representations of linear relations.	

Specific Outcome: Determine the characteristics of the graphs of linear relations, including the: • intercepts • slope • domain • range. [CN, PS, R, V]	
Determine the intercepts of the graph of a linear relation, and state the intercepts as values or ordered pairs.	
Determine the slope of the graph of a linear relation.	MC #51, Procedural WR #1c), Procedural
Determine the domain and range of the graph of a linear relation.	MC #13, Conceptual
Sketch a linear relation that has one intercept, two intercepts or an infinite number of intercepts.	
Identify the graph that corresponds to a given slope and y-intercept.	
Identify the slope and y-intercept that correspond to a given graph.	MC #56, Conceptual
Solve a contextual problem that involves intercepts, slope, domain or range of a linear relation.	
Specific Outcome: Relate linear relations expressed in: • 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]	
Express a linear relation in different forms, and compare the graphs.	MC #54, Procedural
Rewrite a linear relation in either slope–intercept or general form.	WR #1d), Conceptual, Procedural
Generalize and explain strategies for graphing a linear relation in slope–intercept, general or slope–point form.	
Graph, with and without technology, a linear relation given in slope–intercept, general or slope–point form, and explain the strategy used to create the graph.	
Identify equivalent linear relations from a set of linear relations.	
Match a set of linear relations to their graphs.	
Specific Outcome: Determine the equation of a linear relation, given: • a graph • a point and the slope • two points • a point and the equation of a parallel or perpendicular line to solve problems. [CN, PS, R, V]	
Determine the slope and y-intercept of a given linear relation from its graph, and write the equation in the form $y = mx + b$.	MC #47, Conceptual

Write the equation of a linear relation, given its slope and the coordinates of a point on the line, and explain the reasoning.	
Write the equation of a linear relation, given the coordinates of two points on the line, and explain the reasoning.	MC #52, Procedural MC #53, Conceptual, Procedural
Write the equation of a linear relation, given the coordinates of a point on the line and the equation of a parallel or perpendicular line, and explain the reasoning.	MC #53, Conceptual, Procedural
Graph linear data generated from a context, and write the equation of the resulting line.	
Solve a problem, using the equation of a linear relation.	
Specific Outcome: Represent a linear function, using function notation. [CN, ME, V]	
Express the equation of a linear function in two variables, using function notation.	
Express an equation given in function notation as a linear function in two variables.	
Determine the related range value, given a domain value for a linear function; e.g., if $f(x) = 3x - 2$, determine $f(-1)$.	NR #59, Conceptual, Procedural
Determine the related domain value, given a range value for a linear function; e.g., if $g(t) = 7 + t$, determine t so that $g(t) = 15$.	
Sketch the graph of a linear function expressed in function notation.	
Specific Outcome: Solve problems that involve systems of linear equations in two variables, graphically and algebraically. [CN, PS, R, T, V]	
Model a situation, using a system of linear equations.	
Relate a system of linear equations to the context of a problem.	
Determine and verify the solution of a system of linear equations graphically, with and without technology.	
Explain the meaning of the point of intersection of a system of linear equations.	
Determine and verify the solution of a system of linear equations algebraically.	
Explain, using examples, why a system of equations may have no solution, one solution or an infinite number of solutions.	
Explain a strategy to solve a system of linear equations.	
Solve a problem that involves a system of linear equations.	MC #55, Procedural