Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
Measurement **General Outcome: Develop spatial sense and proportional reasoning.**	
10I.M.1. 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.	1.1, 1.2
▪ Compare SI and imperial units, using referents.	1.3
▪ Estimate a linear measure, using a referent, and explain the process used.	1.1, 1.2
▪ Justify the choice of units used for determining a measurement in a problem-solving context.	1.1, 1.2
▪ Solve a contextual problem that involves linear measure, using instruments such as rulers, tape measures, trundle wheels, micrometers, or calipers.	1.2
▪ Explain a personal strategy used to determine a linear measurement such as the circumference of a bottle, the length of a curve, or the perimeter of the base of an irregular 3-D object, and explain why it works.	1.2
10I.M.2. Apply proportional reasoning to problems that involve conversions within and between SI and imperial units of measure. [C, ME, PS, T]	
▪ Explain how proportional reasoning can be used to convert a measurement within or between SI and imperial systems.	1.1, 1.3
▪ Solve a contextual problem that involves the conversion of units within or between SI and imperial systems.	1.1, 1.3
▪ Justify, using mental mathematics, the reasonableness of a solution to a conversion problem.	1.3

Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
10I.M.3. 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, T, V]	
▪ Sketch a diagram to represent a problem that involves surface area or volume.	1.4, 1.5, 1.7
▪ Determine the surface area (may be expressed with scientific notation) of a right cone, right cylinder, right prism, right pyramid, or sphere, using an object or its labelled diagram.	1.4, 1.6
▪ Determine the volume (may be expressed with scientific notation) of a right cone, right cylinder, right prism, right pyramid, or sphere, using an object or its labelled diagram.	1.5, 1.6
▪ 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.	1.4, 1.5, 1.6, 1.7
▪ Solve a contextual problem that involves surface area or volume, given a diagram of a composite 3-D object.	1.7
▪ 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	1.5
10I.M.4. 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.	2.1, 2.4
▪ Identify the hypotenuse of a right triangle and the opposite and adjacent sides for a given acute angle in the triangle.	2.1, 2.2, 2.4, 2.5
▪ Solve a problem that involves one or more right triangles by applying the primary trigonometric ratios or the Pythagorean theorem.	2.1, 2.2, 2.4, 2.5, 2.6, 2.7
▪ Solve a problem that involves direct and indirect measurement, using measurement instruments such as a clinometer or metre stick, the trigonometric ratios, or the Pythagorean theorem.	2.3

Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
Algebra and Number **General Outcome: Develop algebraic reasoning and number sense.**	
10I.A.1. Demonstrate an understanding of factors of whole numbers by determining • prime factors • greatest common factor • least common multiple • square root • cube root [CN, ME, R]	
▪ Determine the prime factors of a whole number.	3.1
▪ Explain why the numbers 0 and 1 have no prime factors.	3.1
▪ Determine, using a variety of strategies, the greatest common factor or least common multiple of a set of whole numbers, and explain the process.	3.1
▪ Determine, concretely or pictorially whether a whole number is a perfect square, a perfect cube or neither.	3.2
▪ Determine, using a variety of strategies, the square root of a perfect square, and explain the process.	3.2
▪ Determine, using a variety of strategies, the cube root of a perfect cube, and explain the process.	3.2
▪ Solve a problem that involves prime factors, greatest common factors, least common multiples, square roots or cube roots.	3.1, 3.2
10I.A.2. 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.	4.2
▪ Determine an approximate value of an irrational number.	4.1, 4.2
▪ Approximate the locations of irrational numbers on a horizontal or vertical number line, using a variety of strategies, and explain the reasoning.	4.2
▪ Order a set of irrational numbers on a horizontal or vertical number line.	4.2
▪ Express a radical as a mixed radical in simplest form (limited to numerical radicands).	4.3
▪ Express a mixed radical as an entire radical (limited to numerical radicands).	4.3
▪ Explain, using examples, the meaning of the index of a radical.	4.1
▪ Represent, using a graphic organizer, the relationship among the subsets of the real numbers (natural, whole, integer, rational, irrational).	4.2

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Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
10I.A.3. Demonstrate an understanding of powers with integral and rational exponents. [C, CN, PS, R]	
▪ Explain, using patterns or exponent laws, why $x^{-n} = \frac{1}{x^n}$, $x \neq 0$	4.5
▪ Explain, using patterns, why $x^{\frac{1}{n}} = \sqrt[n]{x}$, $n > 0$	4.4
▪ Apply the exponent laws to expressions with rational or variable bases and integral or rational exponents, and explain the reasoning • $(x^m)(x^n) = x^{m+n}$ • $x^m \div x^n = x^{m-n}, x \neq 0$ • $(x^m)^n = x^{mn}$ • $(xy)^m = x^m y^m$ • $\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}, y \neq 0$	4.6
▪ Express powers with rational exponents as radicals and vice versa.	4.4
▪ Solve a problem that involves exponent laws or radicals.	4.6
▪ Identify and correct errors in the simplification of an expression that involves powers.	4.4, 4.5, 4.6
10I.A.4. Demonstrate an understanding of the multiplication of polynomial expressions (limited to monomials, binomials, and trinomials), concretely, pictorially, and symbolically. [C, 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 binomials, concretely or pictorially, and record the process symbolically.	3.4, 3.5, 3.6
▪ Relate the multiplication of two binomial expressions to an area model.	3.4, 3.5, 3.6
▪ Explain, using examples, the relationship between the multiplication of binomials and the multiplication of two-digit numbers.	3.5
▪ Verify a polynomial product by substituting numbers for the variables.	3.7
▪ Multiply two polynomials symbolically, and combine like terms in the product.	3.7
▪ Generalize and explain a strategy for multiplication of polynomials.	3.7
▪ Identify and explain errors in a solution for a polynomial multiplication.	3.7

Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
10I.A.5. 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.	3.3
▪ Model the factoring of a trinomial, concretely or pictorially, and record the process symbolically.	3.3, 3.4
▪ Factor a polynomial that is a difference of squares, and explain why it is a special case of factoring a trinomial of the form $ax^2 + bx + c = 0$, where $b = 0$ and $c < 0$.	3.8
▪ Identify and explain errors in a polynomial factorization.	3.5, 3.6
▪ Factor a polynomial, and verify by multiplying the factors.	3.5, 3.6
▪ Explain, using examples, the relationship between multiplication and factoring of polynomials.	3.5, 3.6
▪ Generalize and explain strategies used to factor a trinomial.	3.5, 3.6, 3.8
▪ Express a polynomial as a product of its factors.	3.5, 3.6

Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
Relations and Functions **General Outcome: Develop algebraic and graphical reasoning through the study of relations.**	
10I.R.1. Interpret and explain the relationships among data, graphs and contexts. [C, CN, R, T, V]	
▪ Graph, with or without technology, a set of data, and determine the restrictions on the domain and range.	5.4
▪ Explain why data points should or should not be connected on the graph for a context.	5.4, 5.5
▪ Match corresponding representations of data, graphs and contexts.	5.3, 5.5, 5.6
▪ Describe a possible context for a given graph.	5.3
▪ Sketch a possible graph for a context.	5.3
▪ Describe the restrictions on the domain and range for a context.	5.4, 5.5, 5.7
10I.R.2. Demonstrate an understanding of relations and functions. [C, R, V]	
▪ Explain, using examples, why some relations are not functions but all functions are relations.	5.2
▪ Determine if a set of ordered pairs represents a function.	5.2
▪ Sort a set of graphs as functions or non-functions.	5.5
▪ Generalize and explain rules for determining whether graphs and sets of ordered pairs represent functions.	5.2, 5.4, 5.5
▪ Determine, and express in a variety of ways, the domain and range of a relation.	5.1, 5.2, 5.4, 5.5
10I.R.3 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]	
▪ Explain, using examples, slope as a rate of change.	6.1
▪ Determine the slope of a line segment by measuring or calculating the rise and run.	6.1
▪ Classify lines in a given set as having positive or negative slopes.	6.1
▪ Explain the meaning of the slope of a horizontal or vertical line.	6.1
▪ Explain why the slope of a line can be determined by using any two points on that line.	6.1
▪ Draw a line, given its slope and a point on the line.	6.1
▪ Determine another point on a line, given the slope and a point on the line.	6.1
▪ Generalize and apply a rule for determining whether two lines are parallel or perpendicular.	6.2
▪ Solve a contextual problem involving slope.	6.1, 6.2

Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
10I.R.4 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 context.	5.2, 5.5, 5.6
▪ Determine and explain if a graph represents a linear relation.	5.6
▪ Determine and explain if a context represents a linear relation.	5.6
▪ Determine and explain if a table of values or a set of ordered pairs represents a linear relation.	5.6
▪ Draw a graph from a set of ordered pairs within a context, and determine whether the relationship between the variables is linear.	5.6
▪ Determine and explain if an equation represents a linear relation.	5.6
▪ Match corresponding representations of linear relations.	5.6
10I.R.5 Determine the characteristics of the graphs of linear relations, including the • intercepts • slope • domain • range [CN, PS, R, T, V]	
▪ Determine the intercepts of the graph of a linear relation, and state the intercepts as values or ordered pairs.	5.7
▪ Determine the slope of the graph of a linear relation.	6.1
▪ Determine the domain and range of the graph of a linear relation.	5.7
▪ Sketch a linear relation that has one, two, or an infinite number of intercepts.	6.1
▪ Match graphs to their corresponding slopes and y-intercepts.	5.7, 6.4
▪ Solve a contextual problem that involves intercepts, slope, domain or range of a linear relation.	5.7, 6.4

Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
10I.R.6 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. [C, CN, R, T, V]	
▪ Express a linear relation in different forms.	6.5, 6.6
▪ Generalize and explain strategies for graphing a linear relation in slope–intercept, general, or slope–point form.	6.3, 6.4, 6.5, 6.6
▪ Graph, with or without technology, a linear relation given in slope–intercept, general, or slope–point form, and explain the strategy used to create the graph.	6.3, 6.4, 6.5, 6.6
▪ Identify equivalent linear relations from a set of linear relations.	6.6
▪ Match a set of linear relations to their graphs.	6.4, 6.5, 6.6
10I.R.7 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 • a scatterplot [C, CN, PS, R, T, V]	
▪ Determine the slope and y-intercept of a given linear relation from its graph, and write the equation in the form $y = mx + b$.	6.4
▪ Write the equation of a linear relation, given its slope and the coordinates of a point on the line, and explain the process.	6.5
▪ Write the equation of a linear relation, given the coordinates of two points on the line, and explain the process.	6.5
▪ 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 process.	6.5
▪ Graph linear data generated from a context and write the equation of the resulting line.	6.6
▪ Determine the equation of the line of best fit from a scatterplot using technology and discuss the correlation.	See Manitoba Curriculum Companion, Masters 6.16 and 6.17, Lessons 6.9 and 6.10
▪ Solve a contextual problem, using the equation of a linear relation.	6.4, 6.5, 6.6

Correlation of Manitoba Curriculum to Pearson Foundations and Pre-calculus Mathematics 10

FOUNDATIONS and PRE-CALCULUS 10	Grade 10 Lessons
10I.R.8 Represent a linear function, using function notation. [CN, ME, V]	
▪ Express the equation of a linear function in two variables, using function notation.	5.2
▪ Express an equation given in function notation as a linear function in two variables.	5.2
▪ Determine the related range value, given a domain value for a linear function.	5.2, 5.5
▪ Determine the related domain value, given a range value for a linear function.	5.2, 5.5
▪ Sketch the graph of a linear function expressed in function notation.	5.7
10I.R.9 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.	7.1, 7.2, 7.4, 7.5, 7.6
▪ Relate a system of linear equations to the context of a problem.	7.1, 7.4, 7.5
▪ Determine and verify the solution of a system of linear equations graphically, with or without technology.	7.2, 7.3
▪ Explain the meaning of the point of intersection of a system of linear equations.	7.2
▪ Determine and verify the solution of a system of linear equations algebraically.	7.4, 7.5
▪ Explain, using examples, why a system of equations may have no solution, one solution or an infinite number of solutions.	7.6
▪ Describe a strategy to solve a system of linear equations.	7.4, 7.5
▪ Solve a contextual problem that involves a system of linear equations with or without technology.	7.2, 7.3, 7.4, 7.5
10I.R.10 Solve problems that involve the distance between two points and the midpoint of a line segment. [C, CN, PS, T, V]	See Manitoba Curriculum Companion:
▪ Determine the distance between two points on a Cartesian plane using a variety of strategies.	Master 6.14, Lesson 6.7
▪ Determine the midpoint of a line segment, given the endpoints of the segment, using a variety of strategies.	Master 6.15, Lesson 6.8
▪ Determine an endpoint of a line segment, given the other endpoint and the midpoint, using a variety of strategies.	Master 6.15, Lesson 6.8
▪ Solve a contextual problem involving distance between two points or midpoint of a line segment.	Masters 6.14 and 6.15, Lessons 6.7 and 6.8