Curriculum Correlations between McGraw-Hill Ryerson *Foundations of Mathematics 10* and The Ontario Curriculum (MFM 2P)

This course enables students to consolidate their understanding of linear relations and extend their problem-solving and algebraic skills through investigation, the effective use of technology, and hands-on activities. Students will develop and graph equations in analytic geometry; solve and apply linear systems, using real-life examples; and explore and interpret graphs of quadratic relations. Student will investigate similar triangles, the trigonometry of right triangles, and the measurement of three-dimensional figures. Students will consolidate their mathematical skills as they solve problems and communicate their thinking.

Foundations of Mathematics 10: Mathematical Process Expectations Correlation

Mathematical Process Expectations

The mathematical processes are to be integrated into student learning in all areas of this course. Throughout this course, students will:

Mathematical Process Expectations	Chapter/Section	Pages
Problem Solving MPS.01 develop, select, apply, and compare a variety of problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;	**General References** Problem-Solving Strategies All Chapters/Sections **Specific References** **5.2** Solve Linear Systems by Substitution **6.1** Explore Non-Linear Relations **9.1** Volume of Prisms and Pyramids **9.2** Surface Area of Prisms and Pyramids **9.4** Volume of Cones and Spheres	**General References** X to XV Throughout **Specific References** 210 243 370, 371 379 395
Reasoning and Proving MPS. 02 develop and apply reasoning skills (e.g., recognition of relationships, generalization through inductive reasoning, use of counter-examples) to make mathematical conjectures, assess conjectures, and justify conclusions, and plan and construct organized mathematical arguments;	**Specific References** **1.1** Imperial Measure **1.2** Conversions Between Metric and Imperial Systems **5.4** Solve Problems Involving Linear Systems **6.3** Key Features of Quadratic Relations	**Specific References** 10 17, 18 223 263
Reflecting MPS.03 demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by assessing the effectiveness of strategies and processes used, by proposing alternative approaches, by judging the reasonableness of results, by verifying solutions);	**Specific References** **1.2** Conversions Between Metric and Imperial Systems **2.1** The Pythagorean Theorem **2.3** The Sine and Cosine Ratios **2.4** The Tangent Ratio **5.1** Solve Linear Systems by Graphing **5.4** Solve Problems Involving Linear Systems **6.2** Model Quadratic Relations **9.1** Volume of Prisms and Pyramids **9.2** Surface Area of Prisms and Pyramids	**Specific References** 17 50, 51, 52 72 81 202 224 252 370 378

Mathematical Process Expectations	Chapter/Section	Pages
Selecting Tools and Computational Strategies MPS.04 select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;	**General References** All Chapters/Sections (Tools) Technology Appendix **Specific References** **1.3** Similar Triangles **5.4** Solve Problems Involving Linear Systems	**General References** Throughout 444 to 466 **Specific References** 28 224
Connecting MPS.05 make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, current events, art and culture, sports);	**General References** MathConnect Margin Feature **Specific References** **1.4** Solve Problems Using Similar Triangles **4.1** Solve One- and Two-Step Linear Equations **5.2** Solve Linear Systems by Substitution **6.1** Explore Non-Linear Relations **6.2** Model Quadratic Relations **6.4** Rates of Change in Quadratic Relations **9.3** Surface Area and Volume of Cylinders **9.5** Solve Problems Involving Surface Area and Volume	**General References** Throughout **Specific References** 35 160 210 242 252 270 388 403
Representing MPS.06 create a variety of representations of mathematical ideas (e.g., numeric, geometric, algebraic, graphical, pictorial representations; onscreen dynamic representations), connect and compare them, and select and apply the appropriate representation to solve problems;	**Specific References** **1.4** Solve Problems Using Similar Triangles **4.1** Solve One- and Two-Step Linear Equations **4.3** Model With Formulas **5.1** Solve Linear Systems by Graphing **5.3** Solve Linear Systems by Elimination **5.4** Solve Problems Involving Linear Systems **9.1** Volume of Prisms and Pyramids **9.2** Surface Area of Prisms and Pyramids	**Specific References** 36 161 180 202 218 224 370 377
Communicating MPS.07 communicate mathematical thinking orally, visually, and in writing, using mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions.	**General References** Literacy Links Literacy Connect Questions **Specific References** **1.1** Imperial Measure **1.2** Conversions Between Metric and Imperial Systems **1.3** Similar Triangles **2.1** The Pythagorean Theorem	**General References** One in each Chapter opening spread (supported in the Teacher's Resource) One in each section (included in the Practice Questions) **Specific References** 10 18 27 51

Mathematical Process Expectations	Chapter/Section	Pages
Communicating MPS.07 communicate mathematical thinking orally, visually, and in writing, using mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions.	**2.2** Explore Ratio and Proportion in Right Triangles **2.4** The Tangent Ratio **2.5** Solve Problems Using Right Triangles **4.1** Solve One- and Two-Step Linear Equations **4.3** Model With Formulas **5.3** Solve Linear Systems by Elimination **6.3** Key Features of Quadratic Relations **7.1** Multiply Two Binomials **9.1** Volume of Prisms and Pyramids **9.2** Surface Area of Prisms and Pyramids	61 81 87 161 182 218 263 288 370, 371 378

Foundations of Mathematics 10: Correlation to Overall and Specific Expectations by Chapter and Section

Measurement and Trigonometry

Overall Expectations

MTV.01 use their knowledge of ratio and proportion to investigate similar triangles and solve problems related to similarity

MTV.02 solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean theorem

MTV.03 solve problems involving the surface area and volumes of three-dimensional figures, and use the imperial and metric systems of measurement

Specific Expectations

	Chapter/Section	Pages
Solving Problems Involving Similar Triangles		
MT1.01 verify, through investigation (e.g., using dynamic geometry software, concrete materials), properties of similar triangles (e.g., given similar triangles, verify the equality of corresponding angles and the proportionality of corresponding sides)	**1.3** Similar Triangles	19–29
MT1.02 determine the lengths of sides of similar triangles, using proportional reasoning	**1.3** Similar Triangles **Task:** Fix Up a Neighbourhood Park	19–29 92–93
MT1.03 solve problems involving similar triangles in realistic situations (e.g., shadows, reflections, scale models, surveying)	**1.4** Solve Problems Involving Similar Triangles **Task:** Fix Up a Neighbourhood Park	30–37 92–93
Solving Problems Involving the Trigonometry of Right Triangles		
MT2.01 determine, through investigation (e.g., using dynamic geometry software, concrete materials), the relationship between the ratio of two sides in a right triangle and the ratio of the two corresponding sides in a similar right triangle, and define the sine, cosine, and tangent ratios $\left(\text{e.g., } \sin A = \frac{\text{opposite}}{\text{hypotenuse}}\right)$	**2.1** The Pythagorean Theorem **2.2** Explore Ratio and Proportion in Right Triangles	46–53 54–62
MT2.02 determine the measures of the sides and angles in right triangles, using the primary trigonometric ratios and the Pythagorean theorem	**2.2** Explore Ratio and Proportion in Right Triangles **2.3** The Sine and Cosine Ratios **2.4** The Tangent Ratio **Task:** Fix Up a Neighbourhood Park	54–62 63–73 74–82 92–93
MT2.03 solve problems involving the measures of sides and angles in right triangles in real-life applications (e.g., in surveying, in navigation, in determining the height of an inaccessible object around the school), using the primary trigonometric ratios and the Pythagorean theorem	**2.4** The Tangent Ratio **2.5** Solve Problems Using Right Triangles **Task:** Fix Up a Neighbourhood Park	74–82 83–87 92–93
MT2.04 describe, through participation in an activity, the application of trigonometry in an occupation (e.g., research and report on how trigonometry is applied in astronomy; attend a career fair that includes a surveyor, and describe how a surveyor applies trigonometry to calculate distances; job shadow a carpenter for a few hours, and describe how a carpenter uses trigonometry)	**2.5** Solve Problems Using Right Triangles	83–87

	Chapter/Section	Pages
Solving Problems Involving Surface Area and Volume, Using the Imperial and Metric Systems of Measurement		
MT3.01 use the imperial system when solving measurement problems (e.g., problems involving dimensions of lumber, areas of carpets, and volumes of soil or concrete)	**1.1** Imperial Measure **1.2** Conversions Between Metric and Imperial Systems **9.1** Volume of Prisms and Pyramids **9.2** Surface Area of Prisms and Pyramids **9.3** Surface Area and Volume of Cylinders **9.4** Volume of Cones and Spheres **9.5** Solve Problems Involving Surface Area and Volume	6–11 12–18 364–371 372–380 381–390 391–397 398–405
MT3.02 perform everyday conversions between the imperial systems and the metric system (e.g., millilitres to cups, centimetres to inches) and within these systems (e.g., cubic metres to cubic centimetres, square feet to square yards), as necessary to solve problems involving measurement	**1.1** Imperial Measure **1.2** Conversions Between Metric and Imperial Systems **9.1** Volume of Prisms and Pyramids **9.2** Surface Area of Prisms and Pyramids **9.3** Surface Area and Volume of Cylinders **9.4** Volume of Cones and Spheres **9.5** Solve Problems Involving Surface Area and Volume	6–11 12–18 364–371 372–380 381–390 391–397 398–405
MT3.03 determine, through investigation, the relationship for calculating the surface area of a pyramid (e.g., use the net of a square-based pyramid to determine that the surface area is the area of the square base plus the area of the four congruent triangles)	**9.2** Surface Area of Prisms and Pyramids	372–380
MT3.04 solve problems involving the surface areas of prisms, pyramids, and cylinders, and the volumes of prisms, pyramids, cylinders, cones, and spheres, including problems involving the combinations of these figures, using the metric system or the imperial system, as appropriate	**9.1** Volume of Prisms and Pyramids **9.2** Surface Area of Prisms and Pyramids **9.3** Surface Area and Volume of Cylinders **9.4** Volume of Cones and Spheres **9.5** Solve Problems Involving Surface Area and Volume **Task:** Design a Game	364–371 372–380 381–390 391–397 398–405 412–413

Modeling Linear Relations

Overall Expectations

MLV.01 manipulate and solve algebraic equations, as needed to solve problems

MLV.02 graph a line and write the equation of a line from given information

MLV.03 solve systems of two linear equations, and solve related problems that arise from realistic situations

Specific Expectations

	Chapter/Section	Pages
Manipulating and Solving Algebraic Equations		
ML1.01 solve first-degree equations involving one variable, including equations with fractional coefficients (e.g., using the balance analogy, computer algebra systems, paper and pencil)	**4.1** Solve One- and Two-Step Linear Equations	154–162
ML1.02 determine the value of a variable in the first degree, using a formula (i.e., by isolating the variable and then substituting known values; by substituting known values and then solving for the variable) (e.g., in analytic geometry, in measurement)	**4.1** Solve One- and Two-Step Linear Equations **4.2** Solve Multi-Step Linear Equations **4.3** Model With Formulas	154–162 163–173 174–183
ML1.03 express the equation of a line in the form $y = mx + b$ given the form $Ax + By + C = 0$	**4.4** Convert Linear Relations From Standard Form	184–189
Graphing and Writing Equations of Lines		
ML2.01 connect the rate of change of a linear relation to the slope of a line, and define the slope as the ratio $m = \frac{\text{rise}}{\text{run}}$	**3.1** Slope as a Rate of Change	100–110
ML2.02 identify, through investigation, $y = mx + b$ as a common form for the equation of a straight line, and identify the special cases $x = a$, $y = b$	**3.1** Slope as a Rate of Change	100–110
ML2 03 identify, through investigation with technology, the geometric significance of m and b in the equation $y = mx + b$	**3.2** Investigate Slope and y-intercept Using Technology	111–117
ML2.04 identify, through investigation, properties of the slopes of lines and line segments (e.g., direction, positive or negative rate of change, steepness, parallelism), using graphing technology to facilitate investigations, where appropriate	**3.3** Properties of Slopes of Lines	118–127
ML2.05 graph lines by hand, using a variety of techniques (e.g., graph using the y-intercept and slope; graph $2x + 3y = 6$ using the x- and y-intercepts)	**3.5** Graph Linear Relations by Hand	138–145
ML2.06 determine the equation of a line, given its graph, the slope and y-intercept, the slope and a point on the line, or two points on the line	**3.4** Determine the Equation of a Line **Task:** Charity Fundraising	128–137 230–231
Solving and Interpreting Systems of Linear Equations		
ML3.01 determine graphically the point of intersection of two linear relations (e.g., using graph paper, using technology)	**5.1** Solve Linear Systems by Graphing **Task:** Charity Fundraising	198–204 230–231
ML3.02 solve systems of two linear equations involving two variables with integral coefficients, using the algebraic method of substitution or elimination	**5.2** Solve Linear Systems by Substitution **5.3** Solve Linear Systems by Elimination **Task:** Charity Fundraising	205–211 212–218 230–231
ML3.03 solve problems that arise from realistic situations described in words or represented by given linear systems of two equations involving two variables, by choosing an appropriate algebraic or graphical method	**5.4** Solve Problems Involving Linear Systems **Task:** Charity Fundraising	219–225 230–231

Quadratic Relations in the Form $y = ax^2 + bx + c$

Overall Expectations

QRV.01 manipulate algebraic expressions, as needed to understand quadratic relations
QRV.02 identify characteristics of quadratic relations
QRV.03 solve problems by interpreting graphs of quadratic relations

Specific Expectations

	Chapter/Section	Pages
Manipulating Quadratic Expressions		
QR1.01 expand and simplify second-degree polynomial expressions involving one variable that consist of the product of two binomials [e.g., $(2x + 3(x + 4)]$ or the square of a binomial [e.g., $(2x + 3)^2$], using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	**7.1** Multiply Two Binomials	280–289
QR1.02 factor binomials (e.g., $4x^2 + 8x$) and trinomials (e.g., $3x^2 + 9x - 15$) involving one variable up to degree two, by determining a common factor using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	**7.2** Common Factoring	290–297
QR1.03 factor simple trinomials of the form $x^2 + bx + c$ (e.g., $x^2 + 7x + 10$, $x^2 + 2x - 8$) using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	**7.4** Factor Trinomials of the Form $x^2 + bx + c$	306–311
QR1.04 factor the difference of squares of the form $x^2 - a^2$ (e.g., $x^2 - 16$)	**7.3** Factor a Difference of Squares	298–305
Identifying Characteristics of Quadratic Relations		
QR2.01 collect data that can be represented as a quadratic relation, from experiments using appropriate equipment and technology (e.g., concrete materials, scientific probes, calculators), or from secondary sources (e.g., the Internet, Statistics Canada); graph the data and draw a curve of best fit, if appropriate, with or without the use of technology	**6.2** Model Quadratic Relations	245–253
QR2.02 determine, through investigation using technology, that a quadratic relation of the form $y = ax^2 + bx + c$ $(a \neq 0)$ can be graphically represented as a parabola, and determine that the table of values yields a constant second difference	**6.4** Rates of Change in Quadratic Relations	264–271
QR2.03 identify the key features of a graph of a parabola (i.e., the equation of the axis of symmetry, the coordinates of the vertex, the y-intercept, the zeros, and the maximum or minimum value), using a given graph or a graph generated with technology from its equation, and use the appropriate terminology to describe the features	**6.1** Explore Non-Linear Relations **6.3** Key Features of Quadratic Relations	238–244 254–263

	Chapter/Section	Pages
QR2.04 compare, through investigation using technology, the graphical representations of a quadratic relation of the form $y = x^2 + bx + c$ and the same relation in the factored form $y = (x - r)(x - s)$ (i.e., the graphs are the same) and describe the connections between each algebraic representation and the graph (e.g., the y-intercept is c in the form $y = x^2 + bx + c$; the x-intercepts are r and s in the form $y = (x - r)(x - s)$	**8.2** Represent Quadratic Relations in Different Ways	329–335
Solving Problems by Interpreting Graphs of Quadratic Relations		
QR3.01 solve problems involving a quadratic relation by interpreting a given graph or a graph generated with technology from its equation (e.g., given an equation representing the height of a ball over elapsed time, use a graphing calculator or graphing software to graph the relation, and answer questions such as the following: What is the maximum height of the ball? After what length of time will the ball hit the ground? Over what time interval is the height of the ball greater than 3 m?)	**8.1** Interpret Quadratic Relations **8.4** Solve Problems Involving Quadratic Relations **Task:** Home Run Derby	320–328 344–351 356–357
QR3.02 solve problems by interpreting the significance of the key features of graphs obtained by collecting experimental data involving quadratic relations	**8.3** The Quadratic Relation $y = ax^2 + c$ **Task:** Home Run Derby	336–343 356–357