Pacing Guide - Extended Mathematics 11

Every September, teachers work hard to create a space that is safe and welcoming for all learners. The first weeks are a time to establish a sense of community, engage learners in rich interactive experiences to promote critical thinking and create opportunities for collaboration and discussion. This is an opportune time to develop a culture and a climate for mathematics learning, conducive to collaboration, risk taking and inquiry.

The following is a pacing guide for Mathematics 11, which provides an overview of the units. It is a reference tool to support teachers with the timing of yearlong learning. Teachers are encouraged to use their professional judgement and consider the needs of their students when planning for instruction. **For the purposes of planning your mathematics lessons, refer to the Extended Mathematics 11 curriculum document and Extended Mathematics 11 Outcomes (2022) that provide essential background information and describe learning opportunities and assessment tasks for each of the outcomes in the unit.**

****NOTE:**
Approximately 16 hours were removed from this course. This time will allow teachers to be responsive to the needs of students and to spend more time on areas of concern.

Note: You may access all the files referenced in this document HERE.

Measurement: Develop spatial sense and proportional reasoning.	(15-20 hours)
Geometry: Develop spatial sense.	(50-55 hours)
Logical Reasoning: Develop logical reasoning.	(15-20 hours)
Statistics: Develop statistical reasoning.	(30-35 hours)
Relations and Functions: Develop algebraic and graphical reasoning through the study of relations.	(50-55 hours)
Data Analytics: Develop the ability to reason with and make sense of data.	(30-35 hours)

Student Text: *Foundations of Mathematics 11* (Nelson) (print and digital)
DM 12: *Data Management 12* (McGraw-Hill) (digital)

Unit 1 - Linear Relations and Functions

**Note: LR02 (approximately 1 hour) removed
LR02: Students will be expected to analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.

Timeline	GCO/SCOs	Topic	Resources
September-October	**Relations and Functions:** **RF01** Model and solve problems that involve systems of linear inequalities in two variables.	**Assessing Prior Knowledge Activities:** Use an activity to determine where students need extra support with prior knowledge such as: ● determining an equation ● finding an intersection point ● substitution ● analyzing solutions, ● plotting points Use an activity to review vocabulary such as slope, y-intercept and x-intercept. Review and consolidation of algebraic skills.	**01. Review of Linear Systems** **(Link to Google folder)** Counter basket activity and practice worksheet Desmos polygraph activity + practice worksheet Desmos system of equations activity + practice worksheet
		Graphing linear inequalities in two variables	**Curriculum document**: RF01 **Student Text**: Section 6.1
		Exploring graphs of systems of linear inequations	**Curriculum document**: RF01 **Student Text**: Section 6.2
		Graphing to solve systems of linear Inequalities	**Curriculum document**: RF01 **Student Text**: Section 6.3
		Reinforcement and consolidation	**Student Text:** Mid-chapter review pp 321-323 or in-class assignment
		Introduction to linear programming	**Curriculum document RF01:** Lego activity or similar hands-on activity **02. Linear Programming Lab** **(Link to Google folder)** Model car multi-link cubes lab activity (variation of Lego activity found in curriculum guide)
		Optimization – creating a model	**Curriculum document**: RF01 **Student Text**: Section 6.4

		Optimization – exploring solutions	**Curriculum document**: RF01 **Student Text**: Section 6.5
		Optimization – linear programming	**Curriculum document**: RF01 **Student Text**: Section 6.6
		Reinforcement, consolidation and assessment	**Student Text**: pp 347-348
		Career Exploration – look for opportunities to explore how mathematics is used in various careers.	Video: Introduction to linear programming (10:49) https://www.youtube.com/watch?v=1CnFjNOewEU - Identify questions found in chapter 6 that are linked to specific careers such as example 2, page 327**.**
		Linear programming project	Student text: chapter task, p 351 OR **03. Cumulative linear programming project** **(Link to Google folder)**
		Approximately 26 hours	

Unit 2 - Quadratic Relations and Functions

**Note: LR02 (approximately 1 hour) removed
LR02: Students will be expected to analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.

Timeline	GCO/SCOs	Topic	Resources
November-December	**RF02** Demonstrate an understanding of the characteristics of quadratic functions, including: ● vertex ● intercepts ● domain and range ● axis of symmetry	Exploring quadratic relations	**Curriculum document**: RF02 **Student Text**: Section 7.1 **05. Introduction to Quadratics** **(Link to Google folder)**
		Properties of graphs of quadratic functions	**Curriculum document**: RF02 **Student Text**: Section 7.2
		Solving quadratic equations by graphing	**Curriculum document**: RF02 **Student Text**: Section 7.3 (omit example #2 and # 11, p. 381) Introduction to Graphing Technology (TI-84, Desmos, etc.)
		Solving quadratic equations by factoring	**Curriculum document**: RF02 **Student Text**: Section 7.5 (omit #18, p. 407) **Assessing Prior Knowledge Activities:** factoring **06. Factoring review** **(Link to Google folder)** *It is recommended that teachers begin with review of factoring quadratic expressions prior to beginning solving quadratic equations by factoring; see Google folder for activity options.*
		Factored form of a quadratic function	**Curriculum document**: RF02 **Student Text**: Section 7.4 (omit investigation, example #4 and #9, #16 and #21, pp. 392-395)
		Reinforcement and consolidation	**Student Text:** Mid-Chapter Review pp. 396-398 (omit #12 p. 398) or in-class assignment
		Vertex form of a quadratic function	**Curriculum document**: RF02 **Student Text**: Section 7.6 **07. Individual Vertex Form**

			(Link to Google folder) An investigation to explore how the parameters a, h, and k from the equation $y = a(x - h)^2 + k$ affect the graph of the quadratic function
		Solving quadratic equations using the quadratic formula	**Curriculum document**: RF02 **Student Text**: Section 7.7 (omit Learn about the Math, example #1 [p. 422-423] and question #11 [p. 429])
		Solving problems using quadratic models	**Curriculum document** : RF02 **Student Text**: Section 7.8 Omit Examples #2 (pp. 433), #4(p. 435), questions # 2 - #4, #6 - #9, #11, #12 (pp. 436-438)
		Reinforcement, consolidation and assessment	**Student Text**: pp. 440 – 444 Omit #14, #15, #17 (p. 444)
		Quadratics project	Student Text: Chapter Task p. 445 **08. Quadratics Project** **(Link to Google folder)** Students will be expected to demonstrate an understanding of the characteristics of quadratic functions (incorporates technology (Desmos or TI-84 CE))
		Approximately 25 hours	

Unit 3: Inductive and Deductive Reasoning

**Note: LR02 (approximately 1 hour) removed
LR02: Students will be expected to analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.

Timeline	GCO/SCOs	Topic	Resources
November-December	**Logical Reasoning:** **LR01** Analyze and prove conjectures, using inductive and deductive reasoning, to solve problems. (LR01.05, LR01.06, and LR01.08 removed)	Developing conjectures using investigation	**09. Logical Reasoning Stations Activity** **(Link to Google folder)**
		Making conjectures: inductive reasoning	**Curriculum document**: LR01 **Student Text**: Section 1.1 (p. 15 #20 and Math in Action problems would make good warm-up problems.)
		Exploring the validity of conjectures	**Curriculum document**: LR01 **Student Text**: Section 1.2 **10. Logical Reasoning Google slides** **(Link to Google folder)**
		Using reasoning to find a counterexample to a conjecture	**Curriculum document**: LR01 **Student Text**: Section 1.3
		Reinforcement and consolidation	**Student Text:** Mid-Chapter Review pp. 34-35 or in-class assignment
		Reasoning to Solve Problems	**Curriculum document**: LR01 **Student Text**: Section 1.6
		Reinforcement, consolidation and assessment	**Student Text**: pp. 58 – 59
		Approximately 16 hours	

Unit 4: Properties of Angles and Triangles

**Note: G01 (approximately 5 hours) and LR02 (approximately 1 hour) were removed.
G01: Derive proofs that involve the properties of angles and triangles.
LR02: Students will be expected to analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.

Timeline	GCO/SCOs	Topic	Resources
December-January	**Geometry:** **G02** Solve problems that involve the properties of angles and triangles. **(G02.02, G02.04, and G02.05 removed)**	Angles formed by parallel lines	**Curriculum document**: G02 **Student Text**: Section 2.2
		Reinforcement and consolidation	**Student Text:** Mid-Chapter Review. pp. 84-85 or in-class assignment
		Angle properties in triangles	**Curriculum document**: G02 **Student Text**: Section 2.3
		Angle properties in polygons	**Curriculum document**: G02 **Student Text**: Section 2.4
		Problem solving strategies – checkerboard quadrilaterals	**Student Text**: pp. 83
		Reinforcement, consolidation and assessment	**Student Text**: pp. 104 – 105
		Approximately 11 hours	

Unit 5: Proportional Reasoning

**Note: M01 (approximately 3 hours) was removed.
M01: Solve problems that involve the application of rates.

Timeline	GCO/SCOs	Topic	Resources
January-February	**Measurement:** **M02** Solve problems that involve scale diagrams, using proportional reasoning. **M03** Demonstrate an understanding of the relationships among scale factors, areas, surface areas and volumes of similar 2-D shapp.es and 3-D objects.	Scale diagrams	**Curriculum document**: M02 **Student Text**: Section 8.3
		Scale factors and 2D shapes	**Curriculum document**: M02, M03 **Student Text**: Section 8.4
		Similar objects: scale models and scale diagrams	**Curriculum document**: M02 **Student Text**: Section 8.5
		Scale factors and 3-D objects	**Curriculum document**: M02, M03 **Student Text**: Section 8.6
		Reinforcement, consolidation and assessment	**Student Text**: pp. 512 - 516
		Measurement project	Student Text: Chapter Task, pp.517 **14. Chapter Task - Measurement** **(Link to Google folder)**
		Approximately 20 hours	

Unit 6: Acute Angle Trigonometry

**Note: LR02 (approximately 1 hour) removed
LR02: Students will be expected to analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.

Timeline	GCO/SCOs	Topic	Resources
February-March	**Geometry:** **G03** Solve problems that involve the cosine law and the sine law. (G03.04 removed)	Exploring side-angle relationships in acute triangles	**Curriculum document**: G03 **Student Text**: Section 3.1 **15. Exploring Uniqueness of Triangles** **(Link to Google folder)** Note: The ambiguous case is not dealt with until later in the chapter. At this point, students notice that SSA does not give a unique triangle.
		Proving (demonstration only) and applying sine law	**Curriculum document**: G03 **Student Text**: Section 3.2
		Reinforcement and consolidation	**Student Text:** Mid-Chapter Review pp. 128-129 or in-class assignment
		Proving (demonstration only) and applying the cosine law	**Curriculum document**: G03 **Student Text**: Section 3.3
		Solving problems using acute triangles	**Curriculum document**: G03 **Student Text**: Section 3.4
		Exploring the primary trigonometric ratios of obtuse triangles	**Curriculum document**: G03 **Student Text**: Section 4.1
		Proving (demonstration only) and applying the sine and cosine laws for obtuse triangles	**Curriculum document**: G03 **Student Text**: Section 4.2
		Reinforcement and consolidation	**Student Text:** Mid-Chapter Review pp. 174-175 or in-class assignment
		Solving problems using oblique triangles	**Curriculum document**: G03 **Student Text**: Section 4.4 (ambiguous case no longer an expectation)
		Applying problem-solving strategies: analyzing an area puzzle	**Student Text**: pp. 187

		Reinforcement, consolidation and assessment (Acute and oblique triangle trigonometry)	**Student Text**: pp. 152-153 and pp. 198-199
		Trigonometry project The days assigned to this project do not have to be consecutive at the end of the unit.	Student Text: Chapter Task pp.201 Or Chapter Task p. 155 Or **17. Trigonometry Project** **(Link to Google folder)**
		Approximately 20 hours	

Unit 7: Statistical Reasoning

**Note: LR02 (approximately 1 hour) removed
LR02: Students will be expected to analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.

Timeline	GCO/SCOs	Topic	Resources
March-April	**Statistics:** **S01** Analyze, interpret, and draw conclusions from one-variable data using numerical and graphical summaries. **S02** Demonstrate an understanding of normal distribution, including: ● standard deviation ● *z*-scores. **S03** Interpret statistical data, using: ● confidence intervals ● confidence levels ● margin of error. (S03.07 removed)	Introduction to one-variable data: - review of circle graphs, bar graphs - reading and interpreting graphs - introduction to stem-and-leaf plot	**Curriculum document**: S01 **Digital Student Text (DM 12)**: Chapter 5 Prerequisite skills, pp. 194-195 and Section 5.1 pp.198-199 (Types of Data and Example #2) **NOTE:** DM 12 refers to the student text *Data Management 12* from McGraw Hill. Sections of this resource have been purchased in digital form and will be used in the Statistics and Data Analytics Units. DM 12 resources Teachers can access this material at https://ourcloud.nspes.ca/public.php?service=files&t=d32e4e5cf125a3c85d448a492ec958c2 Password: EM11
		Review mean, median and mode without technology. Explore and understand the 5-point summary using technology (1 var stats on TI-84). Introduction to box-and-whisker plot.	**Curriculum document**: S01 **Digital Student Text (DM 12)**: Chapter 6 Prerequisite skills, pp. 250-251 Section 6.1 Measures of Central Tendency - pp. 254-257 Example #1 - pp.263-265 #1, #2, #4, #5, #6, #7, #8, #9, #10 Section 6.2 Measures of Spread **18 - Paper Airplane Activity** **(Link to Google folder)**
		Range, interquartile range, and variance with technology. Continue with box-and-whisker plots and stem and leaf plots.	**Curriculum document**: S01 **Digital Student Text (DM 12)**: Section 6.2 Measures of Spread (omit percentiles) - Definition from p.269 - Example #2 Method #1 & Method #3 - pp.273-274 Example #3 - pp.275-277 #2, #3, #5, #7, #8, #11, #12
		Data gathering and visualizing activity where students:	**Curriculum document**: S01

		- gather and organize data - construct an appropriate graphical summary of one-variable data: circle graphs, bar graphs, stem-and-leaf plots, box-and-whisker plots - analyze the data to draw conclusions - justify these conclusions	**19: 1-Var Stats Activity** **(Link to Google folder)**
		Make and justify conclusions, from statistical summaries	**Curriculum document**: S01 **Digital Student Text (DM 12):** Section 6.4 Interpreting Statistical summaries
		Exploring data Frequency tables, histograms and frequency polygons	**Curriculum document**: S02 **Student Text**: Section 5.1 and 5.2 Technology: Using spreadsheets such as excel or Google sheets.
		Standard deviation	**Curriculum document**: S02 **Student Text**: Section 5.3
		Reinforcement and consolidation	**Student Text:** Mid-Chapter Review 238-239 or in-class assignment
		The normal distribution	**Curriculum document**: S02 **Student Text**: Section 5.4
		Z- scores	**Curriculum document**: S02 **Student Text**: Section 5.5 **20. z-scores** **(Link to Google folder)**
		Students explore confidence intervals through: - investigating central limit theorem - working with calculation of margin of error - working with confidence intervals	**Curriculum document**: S03 **Student Text**: Section 5.6 **21. Confidence Intervals** **(Link to Google folder)**

		Reinforcement, consolidation and assessment (Statistical Reasoning)	**Student Text**: pp. 198 – 199
		Approximately 32 hours	

Unit 8: Data Analytics

Timeline	GCO/SCOs	Topic	Resources
	Data Analytics:	Review of one variable data, Introduction to two-variable data sets and determine whether a set of data is one variable or two variable.	**Curriculum document**: DA01 **Digital Student Text (DM 12):** Section 5.1 Data Concepts and Graphical Summaries pp.

May-June	**DA01** Analyse, interpret, and draw conclusions from two-variable data using numerical, graphical, and algebraic summaries. **DA02** Critically analyze society's use of inferential statistics. **DA03** Analyze data, identify patterns and extract useful information and meaning from large, professionally collected data sets.		196-205 (note that pp.198-199 was used earlier)
		Generate scatter plots of two-variable data, by hand and using technology and review linear models	**Curriculum document**: DA01 Creating scatter plots using TI-84 or Google Slides and Linear Models. **Digital Student Text (DM 12):** Chapter 8 Prerequisite skills, pp. 380-381
		Line of best fit using linear regression and correlation coefficient	**Curriculum document**: DA01 **Digital Student Text (DM 12):** Section 8.1 Line of Best Fit - p. 382-390 (omit Method 2 (Fathom) from example 2, p. 387) - Questions #1-7, p. 390
		Residual plots	**Curriculum document**: DA01 **Digital Student Text(DM 12):** Section 8.3 Dynamic Analysis of Two-Variable Data pp. 404-415
		Make inferences, and make and justify conclusions, from statistical summaries of two-variable data	**Curriculum document**: DA01 **Digital Student Text (DM 12):** Section 8.4 Uses and Misuses of Data pp.422 #1-3, #5-7 ***Google Sheets or Excel instead of Fathom***
		Project/Activity	**22. 2-Var Stats Project** **(Link to Google folder)**
		Critically analyze society's use of statistics. Assess the accuracy, reliability, and relevance of statistical claims in the media.	**Curriculum document** : DA02 **Digital Student Text (DM 12):** Section 5.2 *Principles of Data Collection* pp. 206 – 211 Note: When discussing questions from this section, focus on the accuracy, reliability, and relevance of the sampling method used represent a population.
		Recognize and explain why conclusions drawn from statistical studies of the same relationship may differ	**Curriculum document**: DA02 Nelson Education: Foundations of Mathematics 11 Curriculum Supplement: Statistics **(this will link to a Nelson site via the M11 Moodle)** ● Part 2 – Points of View ● Part 3 – Bias and Objectivity

			• Part 4 – Relevance and Reliability Found on the M 11 Moodle under Provincial Curriculum Documents **23- Using statistics to support a point of view. *This is a project idea, NOT the files listed above.*** **(Link to Google folder)**
		Gather, interpret, and describe information about applications of data management in occupations	**Curriculum document**: DA02 Ask student to think about the data that schools collect about students and reflect on how this data might be used to make decisions (i.e. PowerSchool and Gradebook) Ask students to create a list of data that businesses collect about them and how this data may be used.
		Identify, discuss, and present multiple sides of the issues with supporting data.	**Curriculum document** : DA02 Have students in small groups create different points of view based on the same data, and debate it.
		Create infographics/data visualizations using the design principles of good data visualization.	**Curriculum document**: DA02 Ted Talk: https://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization Site on infographics/data visualizations for classroom: http://www.schrockguide.net/infographics-as-an-assessment.html Have students create and share an infographic. **24 - Infographics project** **(Link to Google folder)**
		Unit Review and Assessment of DA01 and DA02	*Alternate forms of assessment may work well with these outcomes.*
		What is data analytics?	**Curriculum document**: DA03 Lesson 1 from: **25. DA03 Lessons 1-6** **(Link to Google folder)**

		Interpreting and analyzing data	**Curriculum document**: DA03 Lessons 2 and 3 from: **25. DA03 Lessons 1-6** **(Link to Google folder)** **Digital Student Text (DM 12):** Section 5.4 Interpreting and Analyzing Data - pp. 222 – 229, examples 1 & 3 (omit example 2, p 226) - pp. 230 – 232 do # 1 -5,6ab, 8,9abc.
		Introduction to big data	**Curriculum document**: DA03 Lessons 4 and 5 from: **25. DA03 Lessons 1-6** **(Link to Google folder)**
		Working with big data	**Curriculum document**: DA03 Lesson 6 from: **25. DA03 Lessons 1-6** **(Link to Google folder)**
		Open data project	**Curriculum document**: DA03 **26. Data Project** **(Link to Google folder)**
		Approximately 33 hours	