Pacing Guide - Pre-Calculus 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 Pre-Calculus 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 Pre-Calculus 11 curriculum document and Pre-Calculus 11 Outcomes (2022) that provide essential background information and describe learning opportunities and assessment tasks for each of the outcomes in the unit.**

Algebra and Number: Develop algebraic reasoning and number sense.	(30-35 hours)
Trigonometry: Develop trigonometric reasoning.	(10-15 hours)
Relations and Functions: Develop algebraic and graphical reasoning through the study of relations.	(55-60 hours)

Unit 1: Sequences and Series

Timeline	GCO/SCOs	Topic	Resources
		Problem Solving - Patterns Course Outline/Formalizing Norms etc.	Develop classroom norms
February	**Relations and Functions:** **RF09** Analyze arithmetic sequences and series to solve problems. **RF10** Analyze geometric sequences and series to solve problems.	Arithmetic sequences	**Curriculum document**: RF09 **Student Text**: Section 1.1
		Arithmetic series	**Curriculum document**: RF09 **Student Text**: Section 1.2
		Geometric sequences	**Curriculum document**: RF10 **Student Text**: Section 1.3
		Geometric series	**Curriculum document**: RF10 **Student Text**: Section 1.4
		Infinite geometric series	**Curriculum document**: RF10 **Student Text**: Section 1.5
		Applications of sequences and series	**Curriculum document**: RF9 and RF10 **Handout**: Sequences and Series Applications
		Problem solving with sequences and series	**Curriculum document**: RF9 and RF10 **Handout**: Challenge Yourself Sequences and Series
		Reinforcement, consolidation and assessment	**Student Text**: pp 66 -68 **Practice Test:** pp 69 - 70
		Approximately 14 hours	

Unit 2: Quadratic Functions

Timeline	GCO/SCOs	Topic	Resources
February -March	**Relations and Functions:** **RF03** Analyze quadratic functions of the form $y = a(x-p)^2 + q$ and determine the: ● vertex ● domain and range ● direction of opening ● axis of symmetry ● *x*- and *y*-intercepts. **RF04** Analyze quadratic functions of the form $y = ax^2 + bx + c$ to identify characteristics of the corresponding graph, including: ● vertex ● domain and range ● direction of opening ● axis of symmetry ● *x*- and *y*-intercepts and to solve problems. **RF05** Solve problems that involve quadratic equations.	Investigation quadratic functions in vertex form NOTE: only references to transformations are new to the students. Most of this section is review from M11.	**Curriculum document**: RF03 **Student Text**: Section 3.1 [Use any questions as review (all has been done in M11).]
	Investigation quadratic functions in standard form NOTE: only some applications where students have to determine a quadratic model from context are new to the students. Details are found in the curriculum guide.	**Curriculum document**: RF04 **Text**: Section 3.2 [Omit example 1, use example 2 as review of M11, example 3 is new.] #1-14, 20 REVIEW #15-19, 21 - 25 NEW
	Completing the square	**Curriculum document**: RF04 **Student Text**: Section 3.3 Questions 1, 2 NEW transformational language Questions 3 - 10, 12 REVIEW Questions 11, 13 - 17 NEW
	Graphical solutions to quadratic equations NOTE: Students have completed this material in M11.	**Curriculum document**: RF04, RF05 **Text**: Section 4.1 [Use any questions as review (all has been done in M11).] #1 - 5, 9 - 12 REVIEW #6, 7, 14 NEW #8 NEW if solved algebraically #13, 15 - 18 EXTENSION
	Factoring quadratic expressions NOTE: Students have completed simple factoring in Mathematics 10 and Mathematics 11. More complicated factoring skills are developed here.	**Curriculum document**: RF01, RF05 **Text**: Section 4.2 [Example 1 can be used as review, Example 2 is new, Examples 3 and 4 are review, Example 5 is new.] Questions 1 - 4, 7 - 10, 12, 13, 16, 18, 19, 26 REVIEW Questions 5, 6, 11, 14, 15, 17, 20 – 25, 27 – 29 NEW
	Solving quadratic equations by completing the square	**Curriculum document**: RF04,RF05 **Student Text**: Section 4.3
	The quadratic formula NOTE: Students have used the quadratic formula in M11. The derivation of the quadratic formula will be new.	**Curriculum document**: RF01, RF04,RF05 **Student Text**: Section 4.4 [Complete investigation on p244 since it is expected that the quadratic formula will be derived using completing the square. Example 1 will be new, Example 2 is review, Example 3 can be used to review

	RF01 Factor polynomial expressions of the form: $ax^2+bx+c,\ a\neq 0$ $a^2x^2-b^2y^2,\ a\neq 0,\ b\neq 0$ $a(f(x))^2+b(f(x))+c,\ a\neq 0$ $a^2(f(x))^2-b^2(g(y))^2,\ a\neq 0,\ b\neq 0$ where *a*, *b* and *c* are rational numbers.		and connect to completing the square, and Example 4 is new.] Questions 3 - 6, 11, 13, 14 REVIEW Questions 1, 2, 8 – 10, 12, 15 – 20 NEW Question 7 – only complete the square in NEW
		Applications	**Curriculum document**: RF05 **Student Text**: Sections 4.1,4.2, 4.2 and 4.4 (selected questions)
		Applications	**Curriculum document**: RF04, RF05 **Handouts**: Quadratic Applications 1, Quadratic Applications 2
		Reinforcement, consolidation and assessment	**Student Text**: pp p 198 - 200 and pp 258 - 260 **Practice Test**: pp 201 – 203 and pp 261 - 262
		Approximately 16 hours	

Unit 3: Systems of Equations and Inequations, and Linear and Quadratic Inequalities

**Note: RF08 (approximately 2 hours) was removed.
RF08 Solve problems that involve quadratic inequalities in one variable.

Timeline	GCO/SCOs	Topic	Resources
March -April	**Relations and Functions:** **RF06** Solve, algebraically and graphically, problems that involve systems of linear-quadratic and quadratic-quadratic equations in two variables **RF07** Solve problems that involve linear and quadratic inequalities in two variables.	Solving systems of equations graphically	**Curriculum document**: RF06 **Student Text**: Section 8.1
		Solving systems of equations algebraically	**Curriculum document**: RF06 **Student Text**: Section 8.2
		Reinforcement and consolidation	**Student Text:** pp 457 - 458
		Linear inequalities in two variables NOTE: Students have completed this material in M11.	**Curriculum document**: RF07 **Student Text:** Section 9.1 (OMIT except as review)
		Quadratic inequalities in two variables	**Curriculum document**: RF07 **Student Text**: Section 9.3
		Reinforcement, consolidation and assessment	**Student Text**: pp 508 - 509 **Practice Test:** pp 510 - 512
		Approximately 14 classes	

Unit 4: Radical Expressions and Equations and Trigonometry

Timeline	GCO/SCOs	Topic	Resources
April	**Algebra and Number:** **AN02** Solve problems that involve operations on radicals and radical expressions with numerical and variable radicands. **AN03** Solve problems that involve radical equations (limited to square roots). **Trigonometry:** **T01** Demonstrate an understanding of angles in standard position [0° to 360°]. **T02** Solve problems, using the three primary trigonometric ratios for angles from 0° to 360° in standard position. **T03** : Demonstrate an understanding of angles in standard position, expressed in degrees and radians. **T04 :** Develop and apply the equation of the unit circle.	Working with radicals	**Curriculum document**: AN02 **Student Text**: Section 5.1
		Multiplying and dividing radical expressions	**Curriculum document**: AN02 **Student Text**: Section 5.2
		Radical equations	**Curriculum document**: AN03 **Student Text**: Section 5.3
		Applying radical equations	**Curriculum document**: AN03 **Handout**: Solving Radical Equations Applications
		Radical review	**Student Text**: pp 304 - 305
		Angles in standard position	**Curriculum document**: T01 **Student Text**: Section 2.1
		Trigonometric ratios of any angle **Includes an introduction to the unit circle in degrees*	**Curriculum document**: T02 **Student Text**: Section 2.2
		Angles and angle measure	**Curriculum Document**: T03 (PC12T01) **NEW** **Student Text:** Pre-Calculus 12 Section 4.1 ***Radian Lab; Think About Radians***
		The unit circle	**Curriculum Document**: T04 (PC12T02) **NEW** **Student Text:** Pre-Calculus 12 Section 4.2 ***Unit Circle Activity–Paper plate activity***
		Reinforcement, consolidation and assessment	
		Approximately 14 hours	

Unit 5: Rational Expressions and Equations

Timeline	GCO/SCOs	Topic	Resources
May	**Algebra and Number:** **AN04** Determine equivalent forms of rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials). **AN05** Perform operations on rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials). **AN06** Solve problems that involve rational equations (limited to numerators and denominators that are monomials, binomials or trinomials).	Rational expressions	**Curriculum document**: AN04 **Student Text**: Section 6.1
		Multiplying and dividing rational expressions	**Curriculum document**: AN05 **Student Text**: Section 6.2
		Adding and subtracting rational expressions	**Curriculum document**: AN05 **Student Text**: Section 6.3
		Rational equations	**Curriculum document**: AN06 **Student Text**: Section 6.4
		Applying rational equations	**Curriculum document**: AN04,AN05,AN06 **Handout**: Applying and Interpreting Rational Equations
		Reinforcement, consolidation and assessment	**Student Text**: pp 352 - 354 **Practice Test**: pp 355
		Cumulative review and assessment	**Cumulative Reviews:** pp133 – 135 and pp264 – 265 **Cumulative Practice Tests**: pp 136 -137 and pp 266 - 267
		Approximately 17 hours	

Unit 6: Absolute Value and Reciprocal Functions

Timeline	GCO/SCOs	Topic	Resources
May -June	**Algebra and Number:** **AN01** Demonstrate an understanding of the absolute value of real numbers. **Relations and Functions:** **RF02** Graph and analyze absolute value functions (limited to linear and quadratic functions) to solve problems. **RF11** Graph and analyze reciprocal functions (limited to the reciprocal of linear and quadratic functions).	Absolute value	**Curriculum document**: AN01 **Student Text**: Section 7.1
		Absolute value functions	**Curriculum document**: RF02 **Student Text**: Section 7.2
		Absolute value equations	**Curriculum document**: RF02 **Student Text**: Section 7.3
		Applying absolute value functions	**Curriculum document**: RF02 **Handout:** Applying Absolute Value Functions
		Reciprocal functions (this section might naturally follow the unit on Rational functions)	**Curriculum document**: RF11 **Student Text**: Section 7.4
		Reinforcement, consolidation and assessment	**Student Text**: pp 410 - 412 **Practice Test:** pp 413 - 414
		Approximately 14 hours	