Grade 10 Advanced Stream Mathematics (Bridge)
Scheme of Work, Term 2, Academic Year 2022-2023

Purpose
- to define the **required** Advanced Stream Mathematics Student Learning Outcomes to be covered during the term for this grade
- to **recommend** the pace at which the Student Learning Outcomes are to be covered. The term's content is broken down into nine teaching weeks, allowing the coverage of topics within each week to be flexible.

Assessment
- Assessment details for Term 2 will be communicated separately.

Teachers should incorporate the Standards for Mathematical Practice (SMPs) in their instruction when and where appropriate. The Standards for Mathematical Practice are

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Why are the Standards for Mathematical Practice important?
The Standards for Mathematical Practice set expectations for using mathematical language and representations to reason, solve problems, and model in preparation for careers and a wide range of college majors.

Week 1: Jan. 2 – 6, 2023

Chapter 5 – Circles

Lessons	Student Learning Outcomes	Common Core State Standards
C5L1 – Circles and Circumference	• Identify and use parts of a circle. • Solve problems involving the circumference of a circle.	**G.CO.1** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. **G.C.1** Prove that all circles are similar.
C5L2 – Measuring Angles and Arcs	• Identify central angles, major arcs, minor arcs, and semi-circles, and find their measures. • Find arc lengths.	**G.C.2** Identify and describe relationships among inscribed angles, radii, and chords. **G.C.5** Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
C5L3 – Arcs and Chords	• Recognize and use relationships between arcs and chords. • Recognize and use relationships between arcs, chords, and diameter.	**G.C.2** Identify and describe relationships among inscribed angles, radii, and chords. **G.MG.3** Apply geometric methods to solve problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

Week 2: Jan. 9 – 13, 2023		
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
C5L4 – Inscribed Angles	• Find measures of inscribed angles. • Find measures of angles of inscribed polygons.	**G.CO.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). **G.C.4** Construct a tangent line from a point outside a given circle to the circle.
C5L5 – Tangents	• Use properties of tangents. • Solve problems involving circumscribed polygons.	**G.CO.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). **G.C.4** Construct a tangent line from a point outside a given circle to the circle.
C5L6 – Secants, Tangents and Angle Measures	• Find measures of angles formed by lines intersecting on or inside a circle. • Find measures of angles formed by lines intersecting outside the circle.	**G.CO.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). **G.C.4** Construct a tangent line from a point outside a given circle to the circle.

Week 3: Jan. 16 – 20, 2023		
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
C5L7 – Special Segments in a Circle	• Find measures of segments that intersect in the interior of a circle. • Find measures of segments that intersect in the exterior of a circle.	**G.C.4** Construct a tangent line from a point outside a given circle to the circle.
Chapter 6 – Transformations and Symmetry		
C6L1 – Reflections	• Draw reflections. • Draw reflections in the coordinate plane.	**G.CO.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.5** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
C6L2 – Translations	• Draw translations. • Draw translations in the coordinate plane.	

Week 4: Jan. 23 – 27, 2023		
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
C6L3 – Rotations	• Draw rotations. • Draw rotations in the coordinate plane.	**G.CO.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.5** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
C6L4 – Symmetry	• Identify line and rotational symmetries in two-dimensional figures. • Identify plane and axis symmetries in three-dimensional figures.	**G.CO.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
C6L6 – Dilations	• Draw dilations. • Draw dilations in the coordinate plane.	**G.CO.2** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). **G.SRT.1** Understand similarity in terms of similarity transformations. Verify experimentally the properties of dilations given by a center and a scale factor. **G.SRT.1a** A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. **G.SRT.1b** The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

Week 5: Jan. 30 – Feb. 3, 2023

Chapter 7 – Probability and Measurement

Lessons	Student Learning Outcomes	Common Core State Standards
C7L1 – Representing Sample Spaces	• Represent sample spaces. • Use the Fundamental Counting Principle to count outcomes.	**S.CP.9** Use permutations and combinations to compute probabilities of compound events and solve problems.
C7L2 – Probability with Permutations and Combinations	• Use permutations with probability. • Use combinations with probability.	
C7L6 – Probabilities of Independent and Dependent Events	• Find probabilities of independent and dependent events. • Find probabilities of events given the occurrence of other events.	**S.CP.2** Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. **S.CP.3** Understand the conditional probability of A given B as $P(A \text{ and } B)|P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

Week 6: Feb. 6 – 10, 2023

Lessons	Student Learning Outcomes	Common Core State Standards
C7L7 – Probabilities of Mutually Exclusive Events	• Find probabilities of events that are mutually exclusive and events that are not mutually exclusive. • Find probabilities of complements.	**S.CP.1** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). **S.CP.7** Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.
Chapter 8 – Exponential and Logarithmic Functions and Relations		
C8L1 – Graphing Exponential Functions	• Draw exponential growth curves. • Draw curves of exponential decay.	**F.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **F.IF.7e** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

Week 7: Feb. 13 – 17, 2023

Lessons	Student Learning Outcomes	Common Core State Standards
C8L2 – Solving Exponential Equations and Inequalities	• Solve exponential equations. • Solve exponential inequalities.	**F.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
C8L3 – Logarithmic and Logarithmic Functions	• Evaluate logarithmic functions. • Graph logarithmic functions.	**F.IF.7e** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. **F.BF.5** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
C8L4 – Solving Logarithmic Equations and Inequalities	• Solve logarithmic equations. • Solve logarithmic inequalities.	**F.LE.4** For exponential models, express as a logarithm the solution to $a(b)^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

Week 8: Feb. 20 – 24, 2023

Lessons	Student Learning Outcomes	Common Core State Standards
C8L5 – Properties of Logarithms	• Simplify and evaluate expressions using the properties of logarithm, • Solve logarithmic equations using the properties of logarithms.	**F.BF.5** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. **F.LE.4** For exponential models, express as a logarithm the solution to $a(b)^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
C8L6 – Common Logarithms	• Solve exponential equations and inequalities using common logarithms. • Evaluate logarithmic expressions using the Change of Base Formula.	
C8L7 – Base e and Natural Logarithms	• Evaluate expressions involving the natural base and natural logarithm. • Solve exponential equations and inequalities using natural logarithms.	**F.IF.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. **F.IF.8b** Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = 1.02^t$, $y = 0.97^t$, $y = 1.01^{12t}$, $y = \frac{1.2^t}{10}$, and classify them as representing exponential growth or decay. **F.BF.5** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. **F.LE.4** For exponential models, express as a logarithm the solution to $a(b)^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

Week 9: Feb. 27 – March 3, 2023

Lessons	Student Learning Outcomes	Common Core State Standards
C8L8 – Using Exponential and Logarithmic Functions	- Use logarithms to solve problems involving exponential growth and decay. - Use logarithms to solve problems involving logistic growth.	**F.IF.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. **F.IF.8b** Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = 1.02^t$, $y = 0.97^t$, $y = 1.01^{12t}$, $y = \frac{1.2^t}{10}$, and classify them as representing exponential growth or decay. **F.BF.5** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. **F.LE.4** For exponential models, express as a logarithm the solution to $a(b)^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

Week 10: March 6 – 10, 2023
Week 11: March 13 – 17, 2023
Week 12: March 20 – 24, 2023

Term 2 Revision and End-of-Term Exam
Exam date to be determined by the Assessment Directorate

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