**UNITED ARAB EMIRATES
MINISTRY OF EDUCATION**

الإمـارات العـربيـة المتحـدة
وزارة التـربيــة والتـعـلـيـم

Grade 8 Elite Stream Mathematics
Scheme of Work, Term 2, Academic Year 2022-2023

Purpose
- to define the **required** Elite 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.

Integrated I Module 8 – Exponential Functions		
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
M8L1 – Exponential Functions	• Recognize situations modelled by linear or exponential functions. • Graph exponential functions, showing intercepts and end behavior.	**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. **F.LE.1** Distinguish between situations that can be modeled with linear functions and with exponential functions. **F.LE.1c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. **F.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.
M8L2 – Transformations of Exponential Functions	• Apply translations to exponential functions. • Apply dilations to exponential functions. • Apply reflections to exponential functions. • Use transformations to identify exponential functions from graphs and write equations of exponential functions.	**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. **F.BF.3** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
M8L3 – Writing Exponential Functions	• Construct exponential functions by using a graph, a description, or two points. • Create equations and solve problems involving exponential growth. • Create equations and solve problems involving exponential decay.	**F.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). **F.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.

	Week 2: Jan. 9 – 13, 2023	
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
M8L4 – Transforming Exponential Expressions	• Use the properties of exponents to transform expressions for exponential functions.	**A.SSE.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. **A.SSE.3c** Use the properties of exponents to transform expressions for exponential functions. *For example, the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* **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 $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.*
M8L5 – Geometric Sequences	• Identify and generate geometric sequences. • Construct and use exponential functions for geometric sequences.	**F.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. **F.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
M8L6 – Recursive Formulas	• Calculate terms in sequences by using recursive formulas. • Write arithmetic and geometric sequences recursively and use them to model situations.	**F.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by $f_0 = f_1 = 1$, $f_{n+1} = f_n + f_{n-1}$ for $n \geq 1$.* **F.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

Week 3: Jan. 16 – 20, 2023		
Integrated I Module 9 – Statistics		
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
M9L1 – Measures of Center	• Represent sets of data by using measures of center. • Represent sets of data by using percentiles.	**S.ID.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
M9L2 – Representing Data	• Represent sets of data by using dot plots. • Determine whether discrete or continuous graphical representations are appropriate. • Represent sets of data by using bar graphs or histograms.	**N.Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **S.ID.1** Represent data with plots on the real number line (dot plots, histograms, and box plots).
M9L3 – Using Data	• Identify potential bias in sampling methods and questions. • Identify potential bias in statistics and representations of data.	**S.IC.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population. **S.IC.6** Evaluate reports based on data.
M9L4 – Measures of Spread	• Determine measures of spread, including the range and interquartile range, of a data set. • Determine the standard deviation of a data set.	**N.Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **S.ID.1** Represent data with plots on the real number line (dot plots, histograms, and box plots).

Week 4: Jan. 23 – 27, 2023

Lessons	Student Learning Outcomes	Common Core State Standards
M9L5 – Distributions of Data	• Interpret differences in the shapes of distributions. • Account for the possible effects of extreme data points.	**S.ID.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
M9L6 – Comparing Sets of Data	• Describe the effects that linear transformations have on measures of center and spread.	**S.ID.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. **S.ID.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
M9L7 – Summarizing Categorical Data	• Organize categorical data in a two-way frequency table. • Determine and interpret the values in a two-way relative frequency table.	**S.ID.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

Week 5: Jan. 30 – Feb. 3, 2023

Integrated I Module 10 – Tools of Geometry

Lessons	Student Learning Outcomes	Common Core State Standards
M10L2 – Points, Lines, and Planes	• Identify points, lines, and planes. • Identify intersections of lines and planes.	**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.MG.1** Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
M10L3 – Line Segments	• Calculate measures of line segments. • Apply the definition of congruent line segments to find missing values.	**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.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.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*
M10L4 – Distance	• Find the length of a line segment on a number line. • Find the distance between two points on the coordinate plane.	**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.

Week 6: Feb. 6 – 10, 2023

Lessons	Student Learning Outcomes	Common Core State Standards
M10L5 – Locating Points on a Number Line	• Find a point on a directed line segment on a number line that is a given fractional distance from the initial point. • Find a point that partitions a directed line segment on a number line in a given ratio.	**G.GPE.6** Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
M10L6 – Locating Points on a Coordinate Plane	• Find a point on a directed line segment on the coordinate plane that is a given fractional distance from the initial point. • Find a point that partitions a directed line segment on the coordinate plane in a given ratio.	
M10L7 – Midpoints and Bisectors	• Find the coordinate of a midpoint on a number line. • Find the coordinates of the midpoint or endpoint of a line segment on the coordinate plane. • Find missing values using the definition of a segment bisector.	**G.GPE.6** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **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.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*

Week 7: Feb. 13 – 17, 2023

Integrated I Module 11 – Angles and Geometric Figures

Lessons	Student Learning Outcomes	Common Core State Standards
M11L1 – Angles and Congruence	• Analyze figures using the definitions of angles and parts of angles. • Calculate angle measures using the definitions of congruent angles and angle bisectors. • Analyze figures using the characteristics of adjacent angles, linear pairs of angles, and vertical angles.	**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.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.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*
M11L2 – Angle Relationships	• Calculate angle measures using the characteristics of complementary and supplementary angles. • Calculate angle measures using the characteristics of perpendicular lines. • Demonstrate understanding of what can and cannot be assumed from a diagram.	
M11L3 – Two-Dimensional Figures	• Find perimeters, circumferences, and areas of two-dimensional geometric shapes. • Calculate the measures of real-world objects.	**G.GPE.7** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. **G.MG.1** Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Week 8: Feb. 20 – 24, 2023		
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
M11L4 – Transformations in the Plane	• Analyze figures to identify the types of rigid motions represented. • Calculate the coordinates of the vertices of images given the coordinates of the preimages.	**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).
M11L5 – Three-Dimensional Figures	• Identify and determine characteristics of three-dimensional figures. • Calculate surface areas and volumes.	**G.MG.1** Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). **G.GMD.3** Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
M11L6 – Two-Dimensional Representations of Three-Dimensional Figures	• Identify the orthographic drawings that best model selected three-dimensional figures. • Calculate surface areas of three-dimensional figures represented by nets, and determine the correct nets for three-dimensional geometric figures.	**G.MG.1** Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Week 9: Feb. 27 – March 3, 2023		
Lessons	**Student Learning Outcomes**	**Common Core State Standards**
M11L7 – Precision and Accuracy	• Determine the levels of precision and accuracy in real-world scenarios. • Calculate the approximate error of measurements. • Choose the appropriate level of accuracy of measurements when reporting quantities.	**N.Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
M11L8 – Representing Measurements	• Determine the correct number of significant figures in recorded measurements. • Round measurements to the correct number of significant figures.	

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**