Grade 11 Essential Mathematics (30S)

Grade 11 Essential Mathematics (30S) is intended for students whose post-secondary planning does not include a focus on mathematics and science-related fields. Grade 11 Essential Mathematics is a one-credit course consisting of two half-credits each emphasizing consumer applications, problem solving, decision making, and spatial sense. Grade 11 Essential Mathematics builds on the knowledge and skills of Grade 10 Essential Mathematics and provides a foundation for the topics studied in Grade 12 Essential Mathematics.

Students are expected to work both individually and in small groups on mathematical concepts and skills encountered in everyday life in a technological society.

Assessment of Grade 11 Essential Mathematics should be a balance of assessment *for* learning, assessment *as* learning, and assessment *of* learning. Assessment tools used in Grade 11 Essential Mathematics should be varied and may include observation, homework, learning conversations or interviews, summative unit essays, demonstrations, presentations, performance tasks, learning logs, projects, investigations, reflective journals, portfolios, quizzes, tests, and examinations. An appropriately prepared portfolio requires a consistent effort throughout the school term and a commitment to completing quality work on a daily basis.

The following table lists the units of study for each half-course along with an estimated number of hours for each unit. The time for each unit includes instructional and assessment time.

Grade 11 Essential Mathematics (35S) Half Course III		**Grade 11 Essential Mathematics (35S) Half Course IV**	
Unit	Suggested Hours	Unit	Suggested Hours
Analysis of Games and Numbers	7	Analysis of Games and Numbers	5
Interest and Credit	18	Managing Money	16
3-D Geometry	16	Relations and Patterns	16
Statistics	14	Trigonometry	5
		Design Modelling	13
Total	**55**	**Total**	**55**

General and Specific Learning Outcomes with Achievement Indicators by Course

Grade 11 Essential Mathematics – Half Course III

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Strand: Analysis of Games and Numbers	**General Learning Outcome:** Develop critical thinking skills.

	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*

11E3.A.1.	Analyze puzzles and games that involve numerical reasoning, using problem-solving strategies. [C, CN, PS, R]
	
	It is intended that this learning outcome be integrated throughout the course by using puzzles and games such as cribbage, magic squares, and Kakuro.
		■ Determine, explain, and verify a strategy to solve a puzzle or to win a game such as
		  ■ guess and check
		  ■ look for a pattern
		  ■ make a systematic list
		  ■ draw or model
		  ■ eliminate possibilities
		  ■ simplify the original problem
		  ■ work backward
		  ■ develop alternative approaches
		■ Identify and correct errors in a solution to a puzzle or in a strategy for winning a game.
		■ Create a variation on a puzzle or a game, and describe a strategy for solving the puzzle or winning the game.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Grade 11 Essential Mathematics – Half Course III

Strand: Interest and Credit		**General Learning Outcome:** Develop an understanding of credit and the effects of interest.
	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E3.I.1.	Demonstrate an understanding of compound interest. [CN, ME, PS, T]	■ Solve a problem that involves simple interest, given three of the four values in the formula I = Prt. ■ Compare simple and compound interest, and explain their relationship. ■ Solve, using a formula, a contextual problem that involves compound interest. ■ Solve "what if" questions involving compound interest using technology. ■ Explain, using examples, the effect of different compounding periods on calculations of compound interest. ■ Estimate, using the Rule of 72, the time required for a given investment to double in value. ■ Compare the advantages and disadvantages of different types of investment options.
11E3.I.2.	Demonstrate an understanding of credit options, including ■ credit cards ■ loans [CN, ME, PS, R]	■ Compare advantages and disadvantages of different types of credit options, including bank or store credit cards, personal loans, lines of credit, overdraft. ■ Make informed decisions related to the use of credit, such as service charges, interest, payday loans, or sales promotions, and explain the reasoning. ■ Describe strategies to use credit effectively, such as negotiating interest rates, planning payment timelines, reducing accumulated debt, or timing purchases. ■ Compare credit card options from various companies and financial institutions. ■ Solve a contextual problem that involves credit cards or loans. ■ Solve a contextual problem that involves credit linked to sales promotions.
11E3.I.3.	Solve problems that require the manipulation and application of formulas related to ■ simple interest ■ finance charges [CN, PS, R]	■ Solve a contextual problem involving the application of a formula that does not require manipulation. ■ Solve a contextual problem involving the application of a formula that requires manipulation. ■ Explain or verify that different forms of the same formula are equivalent. ■ Describe, using examples, how a given formula is used in a trade or an occupation. ■ Create and solve a contextual problem that involves a formula. ■ Identify and correct errors in a solution to a problem that involves a formula.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Grade 11 Essential Mathematics – Half Course III

Strand: 3-D Geometry	**General Learning Outcome:** Develop an understanding of spatial relationships applied to volume and surface area.

	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E3.G.1.	Solve problems that involve SI and imperial units in surface area measurements. [C, CN, ME, PS, V] It is intended that arithmetic operations on decimals and fractions be integrated into the problems.	■ Explain, using examples, the difference between volume and surface area. ■ Explain, using examples, including nets, the relationship between area and surface area. ■ Explain how a referent can be used to estimate surface area. ■ Estimate the surface area of a 3-D object. ■ Illustrate, using examples, the effect of dimensional changes on surface area. ■ Solve a contextual problem that involves the surface area of 3-D objects, including spheres, and that requires the manipulation of formulas.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Strand: 3-D Geometry *(continued)*	**General Learning Outcome:** Develop an understanding of spatial relationships applied to volume and surface area.

Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*

11E3.G.2. Solve problems that involve SI and imperial units in volume and capacity measurements. [C, CN, ME, PS, V]
 	
It is intended that arithmetic operations on decimals and fractions be integrated into the problems.
	■ Explain, using examples, the difference between volume and capacity.
	■ Identify and compare referents for volume and capacity measurements in SI and imperial units.
	■ Estimate the volume or capacity of a 3-D object or container, using a referent.
	■ Identify a situation where a given SI or imperial volume unit would be used.
	■ Convert a volume measurement expressed in one SI unit cubed to another SI unit cubed.
	■ Convert a volume measurement expressed in one imperial unit cubed to another imperial unit cubed.
	■ Describe the relationship between the volumes of
	  ■ cones and cylinders with the same base and height
	  ■ pyramids and prisms with the same base and height
	■ Determine the volume of cones, cylinders, prisms, pyramids, spheres, and composite 3-D objects, using a variety of measuring tools such as rulers, tape measures, calipers, or micrometers.
	■ Determine the capacity of cones, cylinders, prisms, pyramids, and spheres using a variety of measuring tools such as graduated cylinders, measuring cups, or measuring spoons.
	■ Illustrate, using examples, the effect of dimensional changes on volume.
	■ Solve a contextual problem that involves the volume of a 3-D object, including composite 3-D objects or the capacity of a container.
	■ Solve a contextual problem that involves the volume of a 3-D object and requires the manipulation of formulas.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Strand: 3-D Geometry *(continued)*		**General Learning Outcome:** Develop an understanding of spatial relationships applied to volume and surface area.
	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E3.G.3.	Solve problems that require the manipulation and application of formulas related to ■ volume and capacity ■ surface area [CN, PS, R]	■ Solve a contextual problem involving the application of a formula that does not require manipulation. ■ Solve a contextual problem involving the application of a formula that requires manipulation. ■ Explain or verify that different forms of the same formula are equivalent. ■ Describe, using examples, how a given formula is used in a trade or an occupation. ■ Create and solve a contextual problem that involves a formula. ■ Identify and correct errors in a solution to a problem that involves a formula.

[C]	Communication
[CN]	Connections
[ME]	Mental Mathematics and Estimation
[PS]	Problem Solving
[R]	Reasoning
[T]	Technology
[V]	Visualization

Grade 11 Essential Mathematics – Half Course III

Strand: Statistics		**General Learning Outcome:** Develop statistical reasoning.
	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E3.S.1.	Solve problems that involve creating and interpreting graphs, including ■ bar graphs ■ histograms ■ line graphs ■ circle graphs [C, CN, PS, R, T, V]	■ Determine the possible graphs that can be used to represent a data set, and explain the advantages and disadvantages of each. ■ Create, with or without technology, a graph to represent a data set. ■ Describe the trends in the graph of a data set. ■ Interpolate or extrapolate values from a graph. ■ Explain, using examples, how the same graph can be used to justify more than one conclusion. ■ Explain, using examples, how different graphic representations of the same data set can be used to emphasize a point of view. ■ Solve a contextual problem that involves the interpretation of a graph.

Grade 11 Essential Mathematics – Half Course IV

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Strand: Analysis of Games and Numbers	**General Learning Outcome:** Develop critical-thinking skills.

	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*

11E4.A.1.	Analyze puzzles and games that involve numerical reasoning, using problem-solving strategies. [C, CN, PS, R]
	
	It is intended that this learning outcome be integrated throughout the course by using puzzles and games such as cribbage, magic squares, and Kakuro.
		■ Determine, explain, and verify a strategy to solve a puzzle or to win a game such as
		  ■ guess and check
		  ■ look for a pattern
		  ■ make a systematic list
		  ■ draw or model
		  ■ eliminate possibilities
		  ■ simplify the original problem
		  ■ work backward
		  ■ develop alternative approaches
		■ Identify and correct errors in a solution to a puzzle or in a strategy for winning a game.
		■ Create a variation on a puzzle or a game, and describe a strategy for solving the puzzle or winning the game.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Grade 11 Essential Mathematics – Half Course IV

Strand: Managing Money		**General Learning Outcome:** Develop an understanding of managing money.
Specific Learning Outcomes *It is expected that students will:*		**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E4.M.1.	Solve problems that involve personal budgets. [CN, PS, R, T]	■ Identify income and expenses that should be included in a personal budget. ■ Explain considerations that must be made when developing a budget, including prioritizing, recurring, and unexpected expenses. ■ Create a personal budget, with or without technology, based on given income and expense data. ■ Collect income and expense data, and create a budget. ■ Modify a budget to achieve a set of personal goals. ■ Investigate and analyze, with or without technology, "what if …" questions related to personal budgets.
11E4.M.2.	Demonstrate an understanding of financial institution services used to access and manage finances. [C, CN, R, T]	■ Describe the type of banking services available from various financial institutions, such as online services. ■ Describe the types of accounts and related service charges available at various financial institutions. ■ Identify the type of account that best meets the needs for a given set of criteria. ■ Identify and explain, for different accounts, the various record-keeping options such as deposit slips, withdrawal slips, cancelled cheques, account statements, cheque register, and receipts. ■ Identify and explain various automated teller machine (ATM) service charges. ■ Describe the advantages and disadvantages of online banking. ■ Describe the advantages and disadvantages of debit card purchases. ■ Describe ways that ensure the security of personal and financial information, such as passwords, encryption, protection of personal identification number (PIN), and other personal identity information.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Grade 11 Essential Mathematics – Half Course IV

Strand: Relations and Patterns		**General Learning Outcome:** Develop proportional reasoning.
	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E4.R.1.	Demonstrate an understanding of slope ■ as rise over run ■ as rate of change by solving problems. [C, CN, PS, V]	■ Describe contexts that involve slope, such as ramps, roofs, road grade, flow rates within a tube, skateboard parks, or ski hills. ■ Explain, using diagrams, the difference between two slopes, and describe the implications. ■ Describe the conditions under which a slope will be either zero or undefined. ■ Explain, using examples and illustrations, slope as rise over run. ■ Verify that the slope of an object, such as a ramp or a roof, is constant. ■ Explain, using illustrations, the relationship between slope and angle of elevation. ■ Explain the implications, such as safety and functionality, of different slopes in a context. ■ Explain, using examples and illustrations, slope as rate of change. ■ Solve a contextual problem that involves slope.
11E4.R 2.	Solve problems by applying proportional reasoning and unit analysis. [C, CN, PS, R]	■ Explain the process of unit analysis used to solve a problem involving proportions such as km/h, or revolutions per minute. ■ Solve a problem, using unit analysis. ■ Explain, using an example, how unit analysis and proportional reasoning are related. ■ Solve a problem within or between systems, using proportions or tables.

[C]	Communication
[CN]	Connections
[ME]	Mental Mathematics and Estimation
[PS]	Problem Solving
[R]	Reasoning
[T]	Technology
[V]	Visualization

Grade 11 Essential Mathematics – Half Course IV

Strand: Relations and Patterns *(continued)*		**General Learning Outcome:** Develop proportional reasoning.
	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E4.R.3.	Solve problems that require the manipulation and application of formulas related to slope and rate of change. [CN, PS, R]	■ Solve a contextual problem involving the application of a formula that does not require manipulation. ■ Solve a contextual problem involving the application of a formula that requires manipulation. ■ Explain or verify that different forms of the same formula are equivalent. ■ Describe, using examples, how a given formula is used in a trade or an occupation. ■ Create and solve a contextual problem that involves a formula. ■ Identify and correct errors in a solution to a problem that involves a formula.
11E4.R.4.	Solve problems that involve scale. [PS, R, T, V]	■ Describe contexts in which a scale representation is used. ■ Determine, using proportional reasoning, the dimensions of an object from a given scale drawing or model. ■ Construct a model of a 3-D object, given the scale. ■ Draw, with or without technology, a scale diagram of an object. ■ Solve a contextual problem that involves scale.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Grade 11 Essential Mathematics – Half Course IV

Strand: Relations and Patterns *(continued)*		**General Learning Outcome:** Develop proportional reasoning.
	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E4.R.5.	Demonstrate an understanding of linear relations by ■ recognizing patterns and trends ■ graphing ■ creating tables of values ■ writing equations ■ interpolating and extrapolating ■ solving problems [CN, PS, R, T, V]	■ Identify and describe the characteristics of a linear relation represented in a graph, table of values, number pattern, or equation. ■ Sort a set of graphs, tables of values, number patterns, or equations into linear and non-linear relations. ■ Write an equation for a context involving direct or partial variation. ■ Create a table of values for an equation of a linear relation. ■ Sketch the graph for a table of values. ■ Explain why the points should or should not be connected on the graph for a context. ■ Create, with or without technology, a graph to represent a data set. ■ Describe the trends in the graph of a data set. ■ Sort a set of scatterplots according to the trends represented (linear, nonlinear, or no trend). ■ Solve a contextual problem that requires interpolation or extrapolation. ■ Relate slope and rate of change to linear relations. ■ Match contexts with their corresponding graphs, and explain the reasoning. ■ Solve a contextual problem involving the application of a formula for a linear relation.

[C]	Communication
[CN]	Connections
[ME]	Mental Mathematics and Estimation
[PS]	Problem Solving
[R]	Reasoning
[T]	Technology
[V]	Visualization

Grade 11 Essential Mathematics – Half Course IV

Strand: Trigonometry	**General Learning Outcome:** Develop spatial sense related to triangles.
Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E4.TG.1. Solve problems that involve two and three right triangles. [CN, PS, T, V]	■ Identify all of the right triangles in a given illustration for a context. ■ Determine whether a solution to a problem that involves two or three right triangles is reasonable. ■ Sketch a representation of a descriptive problem in a 2-D or 3-D context. ■ Solve a contextual problem that involves angles of elevation or angles of depression. ■ Solve a contextual problem that involves two or three right triangles, using the primary trigonometric ratios.

[C]	Communication	**[PS]**	Problem Solving
[CN]	Connections	**[R]**	Reasoning
[ME]	Mental Mathematics and Estimation	**[T]**	Technology
		[V]	Visualization

Grade 11 Essential Mathematics – Half Course IV

Strand: Design Modelling		**General Learning Outcome:** Develop spatial sense.
	Specific Learning Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific learning outcome.*
11E4.D.1.	Model and draw 3-D objects and their views. [CN, R, V]	■ Draw a 2-D representation of a 3-D object. ■ Draw, using isometric dot paper, a 3-D object. ■ Draw to scale top, front, and side views of a 3-D object. ■ Construct a model of a 3-D object, given the top, front, and side views. ■ Draw a 3-D object, given the top, front, and side views. ■ Determine if views of a 3-D object represent the object, and explain the reasoning. ■ Identify the point of perspective of a one-point perspective drawing of a 3-D object. ■ Draw a one-point perspective view of a 3-D object.
11E4.D.2.	Draw and describe exploded views, component parts, and scale diagrams of simple 3-D objects. [CN, V]	■ Draw the component parts of an exploded diagram, and explain their relationship to the original 3-D object. ■ Sketch an exploded view of a 3-D object to represent the component parts. ■ Draw to scale the component parts of a 3-D object. ■ Sketch a 2-D representation of a 3-D object, given its exploded view. ■ Solve a contextual problem that involves scale.