

Mathematics Outcomes Progression 6-9

Supplementary Document

Website References

Website references contained within this document are provided solely as a convenience and do not constitute an endorsement by the Department of Education of the content, policies, or products of the referenced website. The department does not control the referenced websites and subsequent links, and is not responsible for the accuracy, legality, or content of those websites. Referenced website content may change without notice.

Regional Education Centres and educators are required under the Department's Public School Programs Network Access and Use Policy to preview and evaluate sites before recommending them for student use. If an outdated or inappropriate site is found, please report it to <curriculum@novascotia.ca>.

© Crown copyright, Province of Nova Scotia, 2021

Prepared by the Department of Education and Early Childhood Development

This is the most recent version of the current curriculum materials as used by teachers in Nova Scotia.

The contents of this publication may be reproduced in part provided the intended use is for non-commercial purposes and full acknowledgment is given to the Nova Scotia Department of Education.

Mathematics 6 - 9 Progression Chart

The **Foundational Outcomes** identified in this document represent outcomes determined to be relevant for future learning in mathematics. Decisions about foundational outcomes were made in consultation with teachers, provincial mathematics team, Board and Regional Centre staff. In response to feedback, some changes have been made to the 2020-21 foundational outcomes to ensure continuity of learning within and across grade levels. The foundational outcomes are meant to guide teachers in making decisions about creating learning experiences that will prepare and engage their learners in a responsive way. However, a teacher’s professional judgment remains the most important guide to effectively responding to the needs of their learners.

Colour coding has been used to identify outcomes and indicators as foundational (**green**), optional (**orange**) or non-foundational (**red**) for the 2021-2022 school year.

NUMBER PROGRESSION: WHOLE NUMBERS				
TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
SAYING NUMBER SEQUENCES, MEANINGFUL COUNTING, AND SKIP COUNTING	N01 Students will be expected to demonstrate an understanding of place value for numbers greater than one million and less than one-thousandth.	N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.		
REPRESENTING AND PARTITIONING WHOLE NUMBERS	N01 Students will be expected to demonstrate an understanding of place value for numbers greater than one million and less than one-thousandth.	N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.	N01 Students will be expected to demonstrate an understanding of perfect squares and square roots, concretely, pictorially and symbolically (limited to whole numbers).	
COMPARING AND ORDERING WHOLE NUMBERS	N01 Students will be expected to demonstrate an understanding of place value for numbers greater than one million and less than one-thousandth.	N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.		
PLACE VALUE – WHOLE NUMBERS	N01 Students will be expected to demonstrate an understanding of place value for numbers greater than one million and less than one-thousandth.	N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.		

NUMBER PROGRESSION: DECIMAL NUMBERS

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
<p>REPRESENTING DECIMAL NUMBERS</p>	<p>N01 Students will be expected to demonstrate an understanding of place value for numbers greater than one million and less than one-thousandth.</p>	<p>N04 Students will be expected to demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive repeating decimals (with one or two repeating digits) and positive fractions.</p> <p>N04.01 Predict the decimal representation of a given fraction using patterns.</p> <p>N04.02 Match a given set of fractions to their decimal representations.</p> <p>N04.03 Sort a given set of fractions as repeating or terminating decimals.</p> <p>N04.04 Express a given fraction as a terminating or repeating decimal.</p> <p>N04.05 Express a given repeating decimal as a fraction.</p> <p>N04.06 Express a given terminating decimal as a fraction.</p> <p>N04.07 Provide an example where the decimal representation of a fraction is an approximation of its exact value.</p> <p>N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.</p>	<p>N03 Students will be expected to demonstrate an understanding of and solve problems involving percents greater than or equal to 0%.</p>	<p>N03 Students will be expected to demonstrate an understanding of rational numbers by</p> <ul style="list-style-type: none"> ● comparing and ordering rational numbers ● solving problems that involve arithmetic operations on rational numbers
<p>COMPARING AND ORDERING DECIMAL NUMBERS</p>	<p>N01 Students will be expected to demonstrate an understanding of place value for numbers greater than one million and less than one-thousandth.</p>	<p>N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.</p> <p>N04 Students will be expected to demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive</p>		<p>N03 Students will be expected to demonstrate an understanding of rational numbers by</p> <ul style="list-style-type: none"> ● comparing and ordering rational numbers ● solving problems that involve arithmetic operations on rational numbers

		<p>repeating decimals (with one or two repeating digits) and positive fractions.</p> <p>N04.01 Predict the decimal representation of a given fraction using patterns.</p> <p>N04.02 Match a given set of fractions to their decimal representations.</p> <p>N04.03 Sort a given set of fractions as repeating or terminating decimals.</p> <p>N04.04 Express a given fraction as a terminating or repeating decimal.</p> <p>N04.05 Express a given repeating decimal as a fraction.</p> <p>N04.06 Express a given terminating decimal as a fraction.</p> <p>N04.07 Provide an example where the decimal representation of a fraction is an approximation of its exact value.</p>		
<p>PLACE VALUE – DECIMAL NUMBERS</p>	<p>N01 Students will be expected to demonstrate an understanding of place value for numbers greater than one million and less than one-thousandth.</p>	<p>N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.</p> <p>N04 Students will be expected to demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive repeating decimals (with one or two repeating digits) and positive fractions.</p> <p>N04.01 Predict the decimal representation of a given fraction using patterns.</p> <p>N04.02 Match a given set of fractions to their decimal representations.</p> <p>N04.03 Sort a given set of fractions as repeating or terminating decimals.</p> <p>N04.04 Express a given fraction as a terminating or repeating decimal.</p> <p>N04.05 Express a given repeating decimal as a fraction.</p> <p>N04.06 Express a given terminating decimal as a fraction.</p>		

		N04.07 Provide an example where the decimal representation of a fraction is an approximation of its exact value.		
--	--	--	--	--

NUMBER PROGRESSION: FRACTIONS				
TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
REPRESENTING FRACTIONS	<p>N04 Students will be expected to relate improper fractions to mixed numbers and mixed numbers to improper fractions.</p> <p>N06 Students will be expected to demonstrate an understanding of percent (limited to whole numbers) concretely, pictorially, and symbolically.</p> <p>N05 Students will be expected to demonstrate an understanding of ratio, concretely, pictorially, and symbolically.</p>	<p>N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.</p> <p>N04 Students will be expected to demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive repeating decimals (with one or two repeating digits) and positive fractions.</p> <p>N04.01 Predict the decimal representation of a given fraction using patterns.</p> <p>N04.02 Match a given set of fractions to their decimal representations.</p> <p>N04.03 Sort a given set of fractions as repeating or terminating decimals.</p> <p>N04.04 Express a given fraction as a terminating or repeating decimal.</p> <p>N04.05 Express a given repeating decimal as a fraction.</p> <p>N04.06 Express a given terminating decimal as a fraction.</p> <p>N04.07 Provide an example where the decimal representation of a fraction is an approximation of its exact value.</p> <p>SP04 Students will be expected to express probabilities as ratios, fractions, and percents.</p>	<p>N03 Students will be expected to demonstrate an understanding of and solve problems involving percents greater than or equal to 0%.</p> <p>N05 Students will be expected to solve problems that involve rates, ratios and proportional reasoning.</p> <p>N06 Students will be expected to demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically.</p>	<p>N03 Students will be expected to demonstrate an understanding of rational numbers by</p> <ul style="list-style-type: none"> comparing and ordering rational numbers solving problems that involve arithmetic operations on rational numbers

<p>COMPARING AND ORDERING FRACTIONS</p>	<p>N04 Students will be expected to relate improper fractions to mixed numbers and mixed numbers to improper fractions.</p>	<p>N07 Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and equivalent fractions and/or decimals.</p> <p>N04 Students will be expected to demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive repeating decimals (with one or two repeating digits) and positive fractions.</p> <p>N04.01 Predict the decimal representation of a given fraction using patterns.</p> <p>N04.02 Match a given set of fractions to their decimal representations.</p> <p>N04.03 Sort a given set of fractions as repeating or terminating decimals.</p> <p>N04.04 Express a given fraction as a terminating or repeating decimal.</p> <p>N04.05 Express a given repeating decimal as a fraction.</p> <p>N04.06 Express a given terminating decimal as a fraction.</p> <p>N04.07 Provide an example where the decimal representation of a fraction is an approximation of its exact value.</p>		<p>N03 Students will be expected to demonstrate an understanding of rational numbers by</p> <ul style="list-style-type: none"> comparing and ordering rational numbers solving problems that involve arithmetic operations on rational numbers
--	--	--	--	---

<p align="center">NUMBER PROGRESSION: OPERATIONS ADDITION AND SUBTRACTION</p>				
<p>TOPIC</p>	<p>MATHEMATICS 6</p>	<p>MATHEMATICS 7</p>	<p>MATHEMATICS 8</p>	<p>MATHEMATICS 9</p>
<p>ADDITION AND SUBTRACTION – BASIC FACTS</p>	<p>Basic addition and subtraction facts should be under control and students are expected to recall them when performing addition and subtraction of larger numbers.</p>	<p>Basic addition and subtraction facts should be under control and students are expected to recall them when performing addition and subtraction of larger numbers.</p>	<p>Basic addition and subtraction facts should be under control and students are expected to recall them when performing addition and subtraction of larger numbers.</p>	<p>Basic addition and subtraction facts should be under control and students are expected to recall them when performing addition and subtraction of larger numbers.</p>
<p>ADDITION AND SUBTRACTION MENTAL MATHEMATICS AND ESTIMATION</p>	<p>N02 Students will be expected to solve problems involving whole numbers and decimal numbers.</p>	<p>N02 Students will be expected to demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than one-digit divisors or more than two-digit</p>		<p>N03 Students will be expected to demonstrate an understanding of rational numbers by</p> <ul style="list-style-type: none"> comparing and ordering rational numbers

		multipliers, the use of technology is expected).		<ul style="list-style-type: none"> • solving problems that involve arithmetic operations on rational numbers
--	--	--	--	---

<p>ADDITION AND SUBTRACTION – CALCULATIONS</p>	<p>N02 Students will be expected to solve problems involving whole numbers and decimal numbers.</p> <p>N09 Students will be expected to explain and apply the order of operations, excluding exponents, with and without technology (limited to whole numbers).</p>	<p>N02 Students will be expected to demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than one-digit divisors or more than two-digit multipliers, the use of technology is expected).</p> <p>N05 Students will be expected to demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely, pictorially, and symbolically (limited to positive sums and differences).</p> <p>N06 Students will be expected to demonstrate an understanding of addition and subtraction of integers, concretely, pictorially, and symbolically.</p>		<p>N02 Students will be expected to demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents:</p> <ul style="list-style-type: none"> • $(a^m)(a^n) = a^{m+n}$ • $a^m \div a^n = a^{m-n}, m > n$ • $(a^m)^n = a^{mn}$ • $(ab)^m = a^m b^m$ • $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0.$ <p>N03 Students will be expected to demonstrate an understanding of rational numbers by</p> <ul style="list-style-type: none"> • comparing and ordering rational numbers • solving problems that involve arithmetic operations on rational numbers <p>N04 Students will be expected to explain and apply the order of operations, including exponents, with and without technology.</p> <p>PR06 Students will be expected to model, record and explain the operations of addition and subtraction of polynomial expressions, concretely, pictorially and symbolically (limited to polynomials of degree less than or equal to 2).</p>
---	---	---	--	--

**NUMBER PROGRESSION: OPERATIONS
MULTIPLICATION AND DIVISION**

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
MULTIPLICATION AND DIVISION – BASIC FACTS	Basic multiplication and division facts should be under control and students are expected to recall them when performing multiplication and division.	Basic multiplication and division facts should be under control and students are expected to recall them when performing multiplication and division.	Basic multiplication and division facts should be under control and students are expected to recall them when performing multiplication and division.	Basic multiplication and division facts should be under control and students are expected to recall them when performing multiplication and division.
MULTIPLICATION AND DIVISION – MENTAL MATHEMATICS AND ESTIMATIONS	<p>N02 Students will be expected to solve problems involving whole numbers and decimal numbers.</p> <p>N08 Students will be expected to demonstrate an understanding of multiplication and division of decimals (one-digit whole number multipliers and one-digit natural number divisors).</p>	<p>N01 Students will be expected to determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10, and why a number cannot be divided by 0.</p> <p>N01.01 Determine if a given number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10, and explain why.</p> <p>N01.02 Sort a given set of numbers based upon their divisibility using organizers such as Venn and Carroll diagrams.</p> <p>N01.03 Determine the factors of a given number using the divisibility rules.</p> <p>N01.04 Explain, using an example, why numbers cannot be divided by 0.</p>	<p>N01 Students will be expected to demonstrate an understanding of perfect squares and square roots, concretely, pictorially and symbolically (limited to whole numbers).</p> <p>N02 Students will be expected to determine the approximate square root of numbers that are not perfect squares (limited to whole numbers).</p> <p>N03 Students will be expected to demonstrate an understanding of and solve problems involving percents greater than or equal to 0%.</p> <p>N05 Students will be expected to solve problems that involve rates, ratios, and proportional reasoning.</p> <p>N06 Students will be expected to demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially, and symbolically.</p>	

**NUMBER PROGRESSION: OPERATIONS
MULTIPLICATION AND DIVISION (CONTINUED)**

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
MULTIPLICATION AND DIVISION - CALCULATIONS	<p>N02 Students will be expected to solve problems involving whole numbers and decimal numbers.</p> <p>N03 Students will be expected to demonstrate an understanding of factors and multiples by</p> <ul style="list-style-type: none"> determining multiples and factors of numbers less than 100 	<p>N01 Students will be expected to determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10, and why a number cannot be divided by 0.</p> <p>N01.01 Determine if a given number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10, and explain why.</p> <p>N01.02 Sort a given set of numbers based upon their divisibility using organizers such as Venn and Carroll diagrams.</p> <p>N01.03 Determine the factors of a given number using the divisibility rules.</p>	<p>N01 Students will be expected to demonstrate an understanding of perfect squares and square roots, concretely, pictorially and symbolically (limited to whole numbers).</p> <p>N02 Students will be expected to determine the approximate square root of numbers that are not perfect squares (limited to whole numbers).</p> <p>N03 Students will be expected to demonstrate an understanding of and</p>	<p>N05 Students will be expected to determine the exact square root of positive rational numbers</p> <p>N06 Students will be expected to determine an approximate square root of positive rational numbers.</p> <p>N01 Students will be expected to demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by</p>

	<ul style="list-style-type: none"> identifying prime and composite numbers solving problems using multiples and factors <p>N09 Students will be expected to explain and apply the order of operations, excluding exponents, with and without technology (limited to whole numbers).</p> <p>N08 Students will be expected to demonstrate an understanding of multiplication and division of decimals (one-digit whole number multipliers and one-digit natural number divisors).</p>	<p>N01.04 Explain, using an example, why numbers cannot be divided by 0.</p> <p>N02 Students will be expected to demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than one-digit divisors or more than two-digit multipliers, the use of technology is expected).</p> <p>N03 Students will be expected to solve problems involving percents from 1% to 100% (limited to whole numbers).</p>	<p>solve problems involving percents greater than or equal to 0%.</p> <p>N05 Students will be expected to solve problems that involve rates, ratios, and proportional reasoning.</p> <p>N06 Students will be expected to demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially, and symbolically.</p> <p>N07 Students will be expected to demonstrate an understanding of multiplication and division of integers, concretely, pictorially, and symbolically.</p>	<ul style="list-style-type: none"> representing repeated multiplication, using powers using patterns to show that a power with an exponent of zero is equal to one solving problems involving powers <p>N02 Students will be expected to demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents:</p> <ul style="list-style-type: none"> $(a^m)(a^n) = a^{m+n}$ $a^m \div a^n = a^{m-n}, m > n$ $(a^m)^n = a^{mn}$ $(ab)^m = a^m b^m$ $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0.$ <p>N03 Students will be expected to demonstrate an understanding of rational numbers by</p> <ul style="list-style-type: none"> comparing and ordering rational numbers solving problems that involve arithmetic operations on rational numbers <p>N04 Students will be expected to explain and apply the order of operations, including exponents, with and without technology.</p> <p>PR07 Students will be expected to model, record and explain the operations of multiplication and division of polynomial expressions (limited to polynomials of degree less than or equal to 2) by monomials, concretely, pictorially and symbolically.</p>
--	---	---	---	--

**NUMBER PROGRESSION:
RATIO, PERCENT, AND INTEGERS**

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
RATIO	N05 Students will be expected to demonstrate an understanding of ratio, concretely, pictorially, and symbolically.	SP04 Students will be expected to express probabilities as ratios, fractions, and percents.	N04 Students will be expected to demonstrate an understanding of ratio and rate. N05 Students will be expected to solve problems that involve rates, ratios, and proportional reasoning.	
PERCENT	N06 Students will be expected to demonstrate an understanding of percent (limited to whole numbers) concretely, pictorially, and symbolically.	N03 Students will be expected to solve problems involving percents from 1% to 100% (limited to whole numbers). SP04 Students will be expected to express probabilities as ratios, fractions, and percents.	N03 Students will be expected to demonstrate an understanding of and solve problems involving percents greater than or equal to 0%.	
INTEGERS	N07 Students will be expected to demonstrate an understanding of integers contextually, concretely, pictorially, and symbolically.	N06 Students will be expected to demonstrate an understanding of addition and subtraction of integers, concretely, pictorially, and symbolically.	N07 Students will be expected to demonstrate an understanding of multiplication and division of integers, concretely, pictorially, and symbolically.	

PATTERNS AND RELATIONS PROGRESSION

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
REPEATING PATTERNS				
INCREASING PATTERNS	PR01 Students will be expected to demonstrate an understanding of the relationships within tables of values to solve problems. PR02 Students will be expected to represent and describe patterns and relationships, using graphs and tables.	PR01 Students will be expected to demonstrate an understanding of oral and written patterns and their equivalent linear relations. PR02 Students will be expected to create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems.	PR01 Students will be expected to graph and analyze two-variable linear relations. PR02 Students will be expected to model and solve problems, concretely, pictorially, and symbolically, where a, b, and c are integers, using linear equations of the form $ax = b$; $x/a = b$, $a \neq 0$; $ax + b = c$; $x/a + b = c$, $a \neq 0$; $a(x + b) = c$	N01 Students will be expected to demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by <ul style="list-style-type: none"> representing repeated multiplication, using powers using patterns to show that a power with an exponent of zero is equal to one solving problems involving powers PR01 Students will be expected to generalize a pattern arising from a problem-solving context, using a linear equation, and verify by substitution. PR02 Students will be expected to graph a linear relation, analyze the graph, and interpolate or extrapolate to solve problems.

<p>DECREASING PATTERNS</p>	<p>PR01 Students will be expected to demonstrate an understanding of the relationships within tables of values to solve problems.</p> <p>PR02 Students will be expected to represent and describe patterns and relationships, using graphs and tables.</p>	<p>PR01 Students will be expected to demonstrate an understanding of oral and written patterns and their equivalent linear relations.</p> <p>PR02 Students will be expected to create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems.</p>	<p>PR01 Students will be expected to graph and analyze two-variable linear relations.</p> <p>PR02 Students will be expected to model and solve problems, concretely, pictorially, and symbolically, where a, b, and c are integers, using linear equations of the form $ax = b$; $x/a = b$, $a \neq 0$; $ax + b = c$; $x/a + b = c$, $a \neq 0$; $a(x + b) = c$</p>	<p>N01 Students will be expected to demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by</p> <ul style="list-style-type: none"> representing repeated multiplication, using powers using patterns to show that a power with an exponent of zero is equal to one solving problems involving powers <p>PR01 Students will be expected to generalize a pattern arising from a problem-solving context, using a linear equation, and verify by substitution</p> <p>PR02 Students will be expected to graph a linear relation, analyze the graph, and interpolate or extrapolate to solve problems.</p>
<p>EQUALITY</p>	<p>PR01 Students will be expected to demonstrate an understanding of the relationships within tables of values to solve problems.</p> <p>PR02 Students will be expected to represent and describe patterns and relationships, using graphs and tables.</p> <p>PR03 Students will be expected to represent generalizations arising from number relationships using equations with letter variables.</p> <p>PR04 Students will be expected to demonstrate and explain the meaning of preservation of equality concretely, pictorially, and symbolically.</p>	<p>PR01 Students will be expected to demonstrate an understanding of oral and written patterns and their equivalent linear relations.</p> <p>PR02 Students will be expected to create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems.</p> <p>PR03 Students will be expected to demonstrate an understanding of preservation of equality by modelling preservation of equality, concretely, pictorially, and symbolically applying preservation of equality to solve equations.</p> <p>PR03.01 Model the preservation of equality for each of the four operations, using concrete materials and/or pictorial representations; explain the process orally; and record the process symbolically.</p> <p>PR03.02 Write equivalent forms of a given equation by applying the preservation of equality, and verify using concrete materials (e.g., $3b = 12$ is equivalent to $3b + 5 = 12 + 5$ or $2r = 7$ is</p>	<p>PR01 Students will be expected to graph and analyze two-variable linear relations.</p> <p>PR02 Students will be expected to model and solve problems, concretely, pictorially, and symbolically, where a, b, and c are integers, using linear equations of the form $ax = b$; $x/a = b$, $a \neq 0$; $ax + b = c$; $x/a + b = c$, $a \neq 0$; $a(x + b) = c$</p>	<p>N01 Students will be expected to demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by</p> <ul style="list-style-type: none"> representing repeated multiplication, using powers using patterns to show that a power with an exponent of zero is equal to one solving problems involving powers <p>PR04 Students will be expected to explain and illustrate strategies to solve single variable linear inequalities with rational coefficients within a problem-solving context.</p>

		<p>equivalent to $3(2r) = 3(7)$.</p> <p>PR03.03 Solve a given problem by applying preservation of equality.</p> <p>PR04 Students will be expected to explain the difference between an expression and an equation.</p> <p>PR05 Students will be expected to evaluate an expression given the value of the variable(s).</p>		
--	--	---	--	--

PATTERNS AND RELATIONS PROGRESSION (CONTINUED)

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
VARIABLES	<p>PR01 Students will be expected to demonstrate an understanding of the relationships within tables of values to solve problems.</p> <p>PR02 Students will be expected to represent and describe patterns and relationships, using graphs and tables.</p> <p>PR03 Students will be expected to represent generalizations arising from number relationships using equations with letter variables.</p> <p>PR04 Students will be expected to demonstrate and explain the meaning of preservation of equality concretely, pictorially, and symbolically.</p>	<p>PR01 Students will be expected to demonstrate an understanding of oral and written patterns and their equivalent linear relations.</p> <p>PR02 Students will be expected to create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems.</p> <p>PR03 Students will be expected to demonstrate an understanding of preservation of equality by modelling preservation of equality, concretely, pictorially, and symbolically applying preservation of equality to solve equations.</p> <p>PR03.01 Model the preservation of equality for each of the four operations, using concrete materials and/or pictorial representations; explain the process orally; and record the process symbolically.</p> <p>PR03.02 Write equivalent forms of a given equation by applying the preservation of equality, and verify using concrete materials (e.g., $3b = 12$ is equivalent to $3b + 5 = 12 + 5$ or $2r = 7$ is equivalent to $3(2r) = 3(7)$).</p> <p>PR03.03 Solve a given problem by applying preservation of equality.</p>	<p>PR01 Students will be expected to graph and analyze two-variable linear relations.</p> <p>PR02 Students will be expected to model and solve problems, concretely, pictorially, and symbolically, where a, b, and c are integers, using linear equations of the form $ax = b$; $x/a = b$, $a \neq 0$; $ax + b = c$; $x/a + b = c$, $a \neq 0$; $a(x + b) = c$</p>	<p>PR01 Students will be expected to generalize a pattern arising from a problem-solving context, using a linear equation, and verify by substitution.</p> <p>PR02 Students will be expected to graph a linear relation, analyze the graph, and interpolate or extrapolate to solve problems.</p> <p>PR03 Students will be expected to model and solve problems, where a, b, c, d, e, and f are rational numbers, using linear equations of the form</p> <ul style="list-style-type: none"> • $ax = b$ • $\frac{x}{a} = b$, $a \neq 0$ • $ax + b = c$ • $\frac{x}{a} + b = c$, $a \neq 0$ • $ax = b + cx$ • $a(x + b) = c$ • $ax + b = cx + d$ • $a(bx + c) = d(ex + f)$ • $\frac{a}{x} = b$, $x \neq 0$ <p>where a, b, c, d, e and f are rational numbers.</p> <p>PR04 Students will be expected to explain and illustrate strategies to solve single variable linear inequalities with</p>

		<p>PR04 Students will be expected to explain the difference between an expression and an equation.</p> <p>PR05 Students will be expected to evaluate an expression given the value of the variable(s).</p> <p>PR06 Students will be expected to model and solve, concretely, pictorially, and symbolically, problems that can be represented by one-step linear equations of the form $x + a = b$, where a and b are integers.</p> <p>PR07 Students will be expected to model and solve, concretely, pictorially, and symbolically, where a, b, and c are whole numbers, problems that can be represented by linear equations of the form $ax + b = c$; $ax = b$; $x \div a = b$, $a \neq 0$</p>		<p>rational coefficients within a problem-solving context.</p> <p>PR05 Students will be expected to demonstrate an understanding of polynomials (limited to polynomials of degree less than or equal to 2).</p>
--	--	--	--	--

MEASUREMENT PROGRESSION				
TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
MEASUREMENT - LENGTH				
MEASUREMENT – PERIMETER	<p>M03 Students will be expected to develop and apply a formula for determining the</p> <ul style="list-style-type: none"> ● perimeter of polygons ● area of rectangles ● volume of right rectangular prisms 			
MEASUREMENT - MASS				
MEASUREMENT - VOLUME	<p>M03 Students will be expected to develop and apply a formula for determining the</p> <ul style="list-style-type: none"> ● perimeter of polygons ● area of rectangles ● volume of right rectangular prisms 		<p>M04 Students will be expected to develop and apply formulas for determining the volume of right rectangular prisms, right triangular prisms, and right cylinders.</p>	
MEASUREMENT - CAPACITY				
MEASUREMENT - AREA	<p>M03 Students will be expected to develop and apply a formula for determining the</p>	<p>M02 Students will be expected to develop and apply a formula for</p>	<p>M03 Students will be expected to determine the surface area of right rectangular prisms, right triangular</p>	

	<ul style="list-style-type: none"> perimeter of polygons area of rectangles volume of right rectangular prisms 	determining the area of triangles, parallelograms, and circles.	prisms, and right cylinders to solve problems. M03.01 Explain, using examples, the relationship between the area of 2-D shapes and the surface area of a given 3-D object. M03.02 Identify all the faces of a given prism, including right rectangular and right triangular prisms. M03.03 Identify all the faces of a given right cylinder. M03.04 Describe and apply strategies for determining the surface area of a given right rectangular or right triangular prism. M03.05 Describe and apply strategies for determining the surface area of a given right cylinder. M03.06 Solve a given problem involving surface area.	
MEASUREMENT - TIME				
MEASUREMENT - CIRCLES		M01 Students will be expected to demonstrate an understanding of circles by <ul style="list-style-type: none"> describing the relationships among radius, diameter, and circumference relating circumference to pi determining the sum of the central angles constructing circles with a given radius or diameter solving problems involving the radii, diameters, and circumferences of circles. 	M01 Students will be expected to develop and apply the Pythagorean theorem to solve problems.	M01 Students will be expected to solve problems and justify the solution strategy, using the following circle properties: <ul style="list-style-type: none"> The perpendicular from the centre of a circle to a chord bisects the chord. The measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc. The inscribed angles subtended by the same arc are congruent. A tangent to a circle is perpendicular to the radius at the point of tangency.
MEASUREMENT - TRIANGLES			M01 Students will be expected to develop and apply the Pythagorean theorem to solve problems.	

GEOMETRY PROGRESSION

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
-------	---------------	---------------	---------------	---------------

3-D OBJECTS	<p>M03 Students will be expected to develop and apply a formula for determining the</p> <ul style="list-style-type: none"> ● perimeter of polygons ● area of rectangles ● volume of right rectangular prisms 		<p>M02 Students will be expected to draw and construct nets for 3-D objects.</p> <p>G01 Students will be expected to draw and interpret top, front, and side views of 3-D objects composed of right rectangular prisms.</p>	<p>G01 Students will be expected to determine the surface area of composite 3-D objects to solve problems.</p>
2-D SHAPES	<p>M03 Students will be expected to develop and apply a formula for determining the</p> <ul style="list-style-type: none"> ● perimeter of polygons ● area of rectangles ● volume of right rectangular prisms <p>G01 Students will be expected to construct and compare triangles, including scalene, isosceles, equilateral, right, obtuse, or acute in different orientations.</p> <p>G02 Students will be expected to describe and compare the sides and angles of regular and irregular polygons.</p>	<p>G01 Students will be expected to perform geometric constructions, including</p> <ul style="list-style-type: none"> ● perpendicular line segments ● parallel line segments ● perpendicular bisectors ● angle bisectors <p>M02 Students will be expected to develop and apply a formula for determining the area of triangles, parallelograms, and circles.</p>		<p>G02 Students will be expected to demonstrate an understanding of similarity of polygons.</p> <p>G03 Students will be expected to draw and interpret scale diagrams of 2-D shapes.</p> <p>G04 Students will be expected to demonstrate an understanding of line and rotation symmetry.</p>
ANGLES	<p>M01 Students will be expected to demonstrate an understanding of angles by</p> <ul style="list-style-type: none"> ● identifying examples of angles in the environment ● classifying angles according to their measure ● estimating the measure of angles using 45°, 90°, and 180° as reference angles ● determining angle measures in degrees ● drawing and labelling angles when the measure is specified <p>M02 Students will be expected to demonstrate that the sum of interior angles is 180° in a triangle and 360° in a quadrilateral.</p>			<p>M01 Students will be expected to solve problems and justify the solution strategy, using the following circle properties:</p> <ul style="list-style-type: none"> ● The perpendicular from the centre of a circle to a chord bisects the chord. ● The measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc. ● The inscribed angles subtended by the same arc are congruent. ● A tangent to a circle is perpendicular to the radius at the point of tangency.
SORTING 3-D OBJECTS AND 2-D SHAPES				
TRANSFORMATIONAL GEOMETRY	<p>G03 Students will be expected to perform a combination of translation(s), rotation(s), and/or reflection(s) on a single 2-D shape, with</p>	<p>G02 Students will be expected to identify and plot points in the four quadrants of a Cartesian plane, using integral ordered pairs.</p>	<p>G02 Students will be expected to demonstrate an understanding of the congruence of polygons under a transformation.</p>	

	<p>and without technology, and draw and describe the image.</p> <p>G04 Students will be expected to perform a combination of successive transformations of 2-D shapes to create a design and identify and describe the transformations.</p> <p>G05 Students will be expected to identify and plot points in the first quadrant of a Cartesian plane using whole number ordered pairs.</p> <p>G06 Students will be expected to perform and describe single transformations of a 2-D shape in the first quadrant of a Cartesian plane (limited to whole number vertices).</p>	<p>G02.01 Label the axes of a four quadrant Cartesian plane and identify the origin.</p> <p>G02.02 Identify the location of a given point in any quadrant of a Cartesian plane using an integral ordered pair.</p> <p>G02.03 Plot the point corresponding to a given integral ordered pair on a Cartesian plane with units of 1, 2, 5, or 10 on its axes.</p> <p>G02.04 Draw shapes and designs in a Cartesian plane using given integral ordered pairs.</p> <p>G02.05 Create shapes and designs, and identify the points used to produce the shapes and designs, in any quadrant of a Cartesian plane.</p> <p>G03 Students will be expected to perform and describe transformations (translations, rotations, or reflections) of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral number vertices).</p>		
--	--	---	--	--

STATISTICS AND PROBABILITY PROGRESSION

TOPIC	MATHEMATICS 6	MATHEMATICS 7	MATHEMATICS 8	MATHEMATICS 9
<p>DATA MANAGEMENT</p>	<p>G05 Students will be expected to identify and plot points in the first quadrant of a Cartesian plane using whole number ordered pairs.</p> <p>SP01 Students will be expected to create, label, and interpret line graphs to draw conclusions.</p> <p>SP02 Students will be expected to select, justify, and use appropriate methods of collecting data, including questionnaires, experiments, databases, and electronic media.</p> <p>SP03 Students will be expected to graph collected data and analyze the graph to solve problems.</p>	<p>G02 Students will be expected to identify and plot points in the four quadrants of a Cartesian plane, using integral ordered pairs.</p> <p>G02.01 Label the axes of a four quadrant Cartesian plane and identify the origin.</p> <p>G02.02 Identify the location of a given point in any quadrant of a Cartesian plane using an integral ordered pair.</p> <p>G02.03 Plot the point corresponding to a given integral ordered pair on a Cartesian plane with units of 1, 2, 5, or 10 on its axes.</p> <p>G02.04 Draw shapes and designs in a Cartesian plane using given integral ordered pairs.</p> <p>G02.05 Create shapes and designs, and identify the points used to produce the shapes and designs, in any quadrant of</p>	<p>SP01 Students will be expected to critique ways in which data is presented.</p>	<p>SP01 Students will be expected to describe the effect on the collection of data of bias, use of language, ethics, cost, time and timing, privacy, and cultural sensitivity.</p> <p>SP02 Students will be expected to select and defend the choice of using either a population or a sample of a population to answer a question.</p> <p>SP03 Students will be expected to develop and implement a project plan for the collection, display, and analysis of data by</p> <ul style="list-style-type: none"> ● formulating a question for investigation ● choosing a data collection method that includes social considerations ● selecting a population or a sample ● collecting the data

		<p>a Cartesian plane.</p> <p>SP03 Students will be expected to construct, label, and interpret circle graphs to solve problems</p> <p>SP03.01 Identify common attributes of circle graphs, such as</p> <ul style="list-style-type: none"> ● title, label, or legend ● the sum of the central angles is 360° ● the data is reported as a percent of the total, and the sum of the percents is equal to 100% <p>SP03.02 Create and label a circle graph, with and without technology, to display a given set of data.</p> <p>SP03.03 Find and compare circle graphs in a variety of print and electronic media, such as newspapers, magazines, and the Internet.</p> <p>SP03.04 Translate percentages displayed in a circle graph into quantities to solve a given problem.</p> <p>SP03.05 Interpret a given or constructed circle graph to answer questions.</p>		<ul style="list-style-type: none"> ● displaying the collected data in an appropriate manner ● drawing conclusions to answer the question
STATISTICS		<p>SP01 Students will be expected to demonstrate an understanding of central tendency and range by</p> <ul style="list-style-type: none"> ● determining the measures of central tendency (mean, median, mode) and range ● determining the most appropriate measures of central tendency to report findings <p>SP02 Students will be expected to determine the effect on the mean, median, and mode when an outlier is included in a data set.</p>		
PROBABILITY	<p>SP04 Students will be expected to demonstrate an understanding of probability by</p> <ul style="list-style-type: none"> ● identifying all possible outcomes of a probability experiment 	<p>SP04 Students will be expected to express probabilities as ratios, fractions, and percents.</p>	<p>SP02 Students will be expected to solve problems involving the probability of independent events.</p>	<p>SP04 Students will be expected to demonstrate an understanding of the role of probability in society.</p>

	<ul style="list-style-type: none">● differentiating between experimental and theoretical probability● determining the theoretical probability of outcomes in a probability experiment● determining the experimental probability of outcomes in a probability experiment● comparing experimental results with the theoretical probability for an experiment	<p>SP05 Students will be expected to identify the sample space (where the combined sample space has 36 or fewer elements) for a probability experiment involving two independent events.</p> <p>SP06 Students will be expected to conduct a probability experiment to compare the theoretical probability (determined using a tree diagram, table, or other graphic organizer) and experimental probability of two independent events.</p>		
--	---	--	--	--