Mathology

Mathology 3 and Ontario Ministry of Education Long-Range Plan: by Topic

Ontario Ministry Long Range Plan	Pearson *Mathology*
Attributes and Numbers	**Big Ideas**
	• **Numbers are related in many ways.**
	• **Quantities and numbers can be grouped by or partitioned into equal-sized units.**
	• **Assigning a unit to a continuous attribute allows us to measure and make comparisons.**
	• **Regularity and repetition form patterns that can be generalized and predicted mathematically.**
	• **Formulating questions, collecting data, and consolidating data in visual and graphical displays help us understand, predict, and interpret situations that involve uncertainty, variability, and randomness.**
	• **2-D shapes and 3-D solids can be analyzed and classified in different ways by their attributes.**
	• **Numbers tell us how many and how much.**

Time: 10 days

Questions and Expectations	What to Look For	Little Books /Activity
		Fantastic Journeys - estimate quantities to 1000 - compare/order quantities to 1000
		Gallery Tour - describe and compare transformations - identify, describe, and compare 2-D shapes
		Goat Island - measure time, temperature, and length - explore units of measure and their relationships

Questions and Expectations	What to Look For	Little Books /Activity
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Questions and Expectations	What to Look For	Little Books /Activity
Developing an understanding of attributes D1.1 sort sets of data about people or things according to two and three attributes, using tables and logic diagrams, including Venn, Carroll, and tree diagrams, as appropriate E1.1 sort, construct, and identify cubes, prisms, pyramids, cylinders, and cones by comparing their faces, edges, vertices, and angles C1.1 identify and describe repeating elements and operations in a variety of patterns, including patterns found in real-life contexts	- *Are students able to identify the changing attributes and the core of a repeating pattern?* - *Can students extend a repeating pattern involving 2 attributes?* - *Are students able to create a tree diagram to show all possible combinations?* - *Are students able to use their tree diagram to determine the number of possible combinations?* - *Are students able to identify the attributes of the different shapes? Are they able to sort by different attributes?* - *Are students able to name the shapes of the faces of solids?*	Patterning and Algebra Unit 1: Patterns and Expressions 1: Describing and Extending Patterns Patterning and Algebra Unit 2: Repeating Patterns 10: Sorting with Attributes 11: Identifying and Extending Patterns ***12: Consolidation (Repeating Patterns)*** Data Management and Probability Unit 1: Data Management 1: Sorting People and Things 3: Collecting & Organizing Data Geometry Unit 1: 2-D Shapes 1: Sorting Polygons 3: What's the Sorting Rule? ***5: Consolidation (2-D shapes)*** Geometry Unit 2: 3-D Solids 6: Exploring Geometric Attributes of Solids Geometry Unit 4: Angles 18: Investigating Angles 19: Comparing Angles ***20: Consolidation (Angles)***
Counting collections and subsets of collections based on attributes B1.4 count to 1000, including by 50s, 100s, and 200s, using a variety of tools and strategies	- *Do students say 3-digit numbers without using the word "and"?* - *Are students able to bridge tens and hundreds when counting on and back?* - *Are students able to use patterns to help them skip-count forward and backward?*	Number Unit 1: Counting 1: Numbers All Around Us 2: Counting to 1000 3: Skip-Counting Forward and Backward ***4: Consolidation (Counting)*** Number Unit 7: Financial Literacy 35: Estimating and Counting Money
Reflection: *How can we organize numbers and shapes?*		

Ontario Ministry Long Range Plan	Pearson *Mathology*
Number Patterns, Relationships, and Equivalency	**Big Ideas** • **Quantities and numbers can be grouped by or partitioned into equal-sized units.** • **Numbers are related in many ways.** • **Quantities and numbers can be grouped by, and partitioned into, units to determine how many or how much.** • **Regularity and repetition form patterns that can be generalized and predicted mathematically.** • **Patterns and relations can be represented with symbols, equations, and expressions.** • **Quantities and numbers can be added and subtracted to determine how many or how much.** • **Objects can be located in space and viewed from multiple perspectives.**

Time: 20 days

Questions and Expectations	What to Look For	Little Books /Activity
		How Numbers Work - compose/decompose 3-digit numbers - find and use number patterns
		Finding Buster - compose to 1000 based on place value - compare/order numbers to 1000

Questions and Expectations	What to Look For	Little Books /Activity
Using patterns to develop an understanding of relationships among numbers, and multiplication and division facts C1.4 create and describe patterns to illustrate relationships among whole numbers up to 1000 B1.5 use place value when describing and representing multi-digit numbers in a variety of ways, including with base ten materials B2.2 recall and demonstrate multiplication facts of 2, 5, and 10, and related division facts, proving equivalence of quantities C2.2 determine whether given sets of addition, subtraction, multiplication, and division expressions are equivalent or not	*- Are students able to represent numbers with tens and ones?* *- Do students understand the values of the ones, tens, and hundreds?* *- Are students able to record numbers in different ways?* *- Can students use repeated addition to help solve problems involving equal groups?* *- Can students represent division as equal sharing and equal grouping?* *- How do students use repeated subtraction, number lines, and arrays to help to divide?* *- Are students able to write and explain the pattern rule?* *- Are students able to extend increasing and decreasing patterns?* *- Are students able to show patterns in different ways?* *- Can students apply the pattern rule to identify missing terms and errors?*	Number Unit 3: Place Value 9: Building Numbers 10: Representing Numbers in Different Ways 11: What's the Number? ***13: Consolidation (Place Value)*** Number Unit 6: Multiplication and Division 26: Exploring Multiplication 27: Exploring Division Patterning and Algebra Unit 1: Patterns and Expressions 3: Creating Patterns 4: Identifying Errors and Missing Terms 6: Exploring Multiplicative Patterns 7: Patterns in Whole Numbers ***9: Consolidation (Patterns and Expressions)***

Questions and Expectations	What to Look For	Little Books /Activity
Demonstrating and using equivalency to represent, compose, and decompose whole numbers and fractions B1.1 read, represent, compose, and decompose whole numbers up to and including 1000, using a variety of tools and strategies, and describe various ways they are used in everyday life B2.8 represent the connection between the numerator of a fraction and the repeated addition of the unit fraction with the same denominator using various tools and drawings, and standard fractional notation C2.1 describe how variables are used, and use them in various contexts as appropriate C2.3 identify and use equivalent relationships for whole numbers up to 1000, in various contexts	- *Do students vary the location of the unknown in an equation or do they always place it in the same position?* - *Are students able to use different strategies to solve for an unknown?* - *Are students able to solve for an unknown using the inverse operation?* - *Are students able to name a fractional part of a set?* - *Do students realize that the objects in a set can be different and that the parts do not have to be equal (e.g., can have different numbers of objects in each part)?* - *Do students write problems of different types? (e.g., result unknown, change unknown, start unknown, compare)*	Number Unit 4: Fractions 17: Partitioning Sets Number Unit 5: Addition and Subtraction 23: Creating and Solving Problems 24: Creating and Solving Problems with Larger Numbers
Using coding to show equivalent relationships C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves sequential, concurrent, and repeating events C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes	- *Are students able to give clear instructions using positional and directional language to accurately describe a route?* - *Are students able to interpret language, including the language of position and direction (e.g., up, down, left, right) to follow a route?* - *Do students realize that there are many different routes to the same location on a map?*	Geometry Unit 3: Mapping and Coding 11: Describing Location 13: Describing Movement on a Map
Reflection: *How can numbers help us with patterns, relationships, and equivalency?*		

Ontario Ministry Long Range Plan	Pearson *Mathology*
Comparison of Measures and Quantities	**Big Ideas** • **2-D shapes and 3-D solids can be analyzed and classified in different ways by their attributes.** • **Many things in our world (e.g., objects, spaces, events) have attributes that can be measured and compared.** • **Assigning a unit to a continuous attribute allows us to measure and make comparisons.**

Time: 25 days

Questions and Expectations	What to Look For	Little Books /Activity
		WONDERful Buildings - identify, describe, and compare 2-D shapes and 3-D solids - compose and decompose 2-D shapes and 3-D solids
		Measurement About YOU! - estimate, measure, and compare attributes - identify and relate measures
		The Bunny Challenge - estimate, measure, and compare area - estimate, measure, and compare perimeter

Questions and Expectations	What to Look For	Little Books /Activity
Comparison of Measures and Quantities **Comparing spatially and identifying congruence** E1.3 identify congruent lengths, angles, and faces of three-dimensional objects by mentally and physically matching them, and determine if the objects are congruent E2.5 use various units of different sizes to measure the same attribute of a given item, and demonstrate that even though using different-sized units produces a different count, the size of the attribute remains the same E2.7 compare the areas of two-dimensional shapes by matching, covering, or decomposing and recomposing the shapes, and demonstrate that different shapes can have the same area E2.8 use appropriate non-standard units to measure area, and explain the effect that gaps, and overlaps have on accuracy	- *Are students able to describe the geometric attributes of their solid?* - *Are students able to recognize real-world examples of their solid?* - *What strategies are students using to identify the net of their solid?* - *How are students comparing angles?* - *Are students able to identify an angle as being a right angle, less than a right angle, or greater than a right angle?* - *Do students realize that when they combine angles, the angles get bigger?*	Geometry Unit 1: 2-D shapes 2: Exploring Congruency **5: Consolidation (2-D Shapes)** Geometry Unit 2: 3-D Solids 6: Exploring Geometric Attributes of Solids 7: Building Solids 8: Constructing Skeletons 9: Working with Nets **10: Consolidation (3-D Solids)** Measurement Unit 2: Area, Mass, and Capacity 9: Measuring Area Using Non-Standard Units
Comparing measures using non-standard units* E2.3 use non-standard units appropriately to estimate, measure, and compare capacity, and explain the effect that overfilling or underfilling, and gaps between units, have on accuracy E2.4 compare, estimate, and measure the mass of various objects, using a pan balance and non-standard units	- *Do students minimize gaps and overlaps when covering the shapes?* - *How do students find the area of the rectangle (e.g., counting all, using skip-counting, using multiplication)?* - *Are students able to order the measures from least to greatest?* - *How are students estimating the mass and capacity of an object? Are they using referents? Are their estimates reasonable?*	Measurement Unit 3: Area, Mass, and Capacity 10: Measuring Area Using Standard Units 11: Measuring Mass Using Non-Standard Units 12: Measuring Capacity Using Non-Standard Units **13: Consolidation (Area, Mass, and Capacity)**

Questions and Expectations	What to Look For	Little Books /Activity
Comparing measures using standard units E2.1 use appropriate units of length to estimate, measure, and compare the perimeters of polygons and curved shapes, and construct polygons with a given perimeter E2.2 explain the relationships between millimetres, centimetres, metres, and kilometres as metric units of length, and use benchmarks for these units to estimate lengths E2.9 use square centimetres (cm^2) and square metres (m^2) to estimate, measure, and compare the areas of various two-dimensional shapes, including those with curved sides B1.3 round whole numbers to the nearest ten or hundred, in various contexts **Comparing quantities** B1.1 read, represent, compose, and decompose whole numbers up to and including 1000, using a variety of tools and strategies, and describe various ways they are used in everyday life B1.2 compare and order whole numbers up to and including 1000, in various contexts B2.9 use the ratios of 1 to 2, 1 to 5, and 1 to 10 to scale up numbers and to solve problems	*- Are students using the measuring tools correctly?* *- Do students know the relationships among the different standard units?*	Measurement Unit 1: Length, Perimeter, and Time 1: Estimating Length 2: Relating Millimetres, Centimetres, Metres, and Kilometres 3: Measuring Length 4: Introducing Perimeter 5: Measuring Perimeter 6: How Many Can You Make? ***8: Consolidation (Length, Perimeter, and Time)*** Number Unit 6: Multiplication and Division 33: Investigating Ratios
Reflection: How can we measure and compare quantities?		

Ontario Ministry Long Range Plan	Pearson *Mathology*	
Collection, Organization, Representation, and Analysis of Data, and Introduction to Mathematical Modelling	**Big Ideas** • **Formulating questions, collecting data, and consolidating data in visual and graphical displays help us understand, predict, and interpret situations that involve uncertainty, variability, and randomness.**	

Time: 30 days

Questions and Expectations	What to Look For	Little Books /Activity
		Math Makes Me Laugh - add/subtract to 1000 - estimate, compare, and order numbers to 1000
		Welcome to The Nature Park - interpret charts, tables, pictographs, and bar graphs - draw conclusions from data displays
Collecting, organizing, and representing data D1.2 collect data through observations, experiments, and interviews to answer questions of interest that focus on qualitative and quantitative data, and organize the data using frequency tables D1.3 display sets of data, using many-to-one correspondence, in pictographs and bar graphs with proper sources, titles, and labels, and appropriate scales	- *Are students able to write an appropriate survey question with reasonable answers?* - *How do students collect the data and organize the data?* - *Do they choose an appropriate scale/key?* - *Are students able to use the data to make convincing arguments and informed decisions about their feature?*	Data Management and Probability Unit 1: Data Management 2: Interpreting Graphs 3: Collecting & Organizing Data 4: Drawing Graphs ***6: Consolidation (Data Management)***

Questions and Expectations	What to Look For	Little Books /Activity
Posing a real-life situation that requires the process of mathematical modelling and involves the collection, organization, representation, and analysis of data* C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations** * Depending on the situation it may be appropriate to complete the mathematical modelling task now or continue as new learning is acquired ** One aspect of the mathematical modelling process is to identify things that change (variable) and things that remain the same		
Reflection: How can we collect, represent and analyze data to make informed decisions?		

Questions and Expectations	What to Look For	Little Books / Activity

Ontario Ministry Long Range Plan	Pearson *Mathology*	
Represent and Solve Problems Involving Addition and Subtraction	**Big Ideas** • **Quantities and numbers can be added and subtracted to determine how many or how much.** • **Quantities and numbers can be grouped by, and partitioned into, units to determine how many or how much.**	
Time: 35 days		
Questions and Expectations	**What to Look For**	**Little Books /Activity**
		Calla's Jingle Dress - multiply and divide to 50 - add and subtract to 100
		Planting Seeds - add/subtract to 1000 - develop concept of multiplication

Questions and Expectations	What to Look For	Little Books /Activity
Questions and Expectations	What to Look For	Little Books / Activity

Questions and Expectations	What to Look For	Little Books /Activity
C2.1 describe how variables are used, and use them in various contexts as appropriate		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves sequential, concurrent, and repeating events		
C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes		
E1.4 give and follow multi-step instructions involving movement from one location to another, including distances and half- and quarter-turns		
F1.1 estimate and calculate the change required for various simple cash transactions involving whole-dollar amounts and amounts of less than one dollar		

Questions and Expectations	What to Look For	Little Books /Activity
Representing multiplication and division, and the inverse relationship between them B2.1 use the properties of operations, and the relationships between multiplication and division, to solve problems and check calculations B2.6 represent multiplication of numbers up to 10 × 10 and division up to 100 ÷ 10, using a variety of tools and drawings, including arrays	- *Are students able to write a multiplication/division sentence for an array?* - *Do students realize that two multiplication sentences and two division sentences are possible for many arrays?* - *Do students recognize the relationship between multiplication and division?* - *What strategies are students using to multiply/divide (e.g., using counters, skip-counting, using a number line, using repeated addition/subtraction, using mental strategies, making arrays)?* - *Are students using the relationship between multiplication and division to help (e.g., knows 6 can be arranged into equal groups of 3 because 2 groups of 3 make 6)?*	Number Unit 6: Multiplication and Division 26: Exploring Multiplication 27: Exploring Division 28: Relating Multiplication and Division 32: Building Fluency: The Games Room
Reflection: How can we represent and solve problems using operations?		

Ontario Ministry Long Range Plan	Pearson *Mathology*
Parts and Wholes	**Big Ideas** • **Quantities and numbers can be grouped by or partitioned into equal-sized units.** • **Quantities and numbers can be grouped by, and partitioned into, units to determine how many or how much.**

Time: 20 days

Questions and Expectations	What to Look For	Little Books /Activity
		Hockey Homework - split wholes into equal parts (fractions) - compare fractions
		Sports Camp - equal sharing - repeated addition
Developing an understanding that "wholes" can be decomposed into "parts" and "parts" can be recomposed to make "wholes" E1.2 compose and decompose various structures, and identify the two-dimensional shapes and three-dimensional objects that these structures contain B1.6 use drawings to represent, solve, and compare the results of fair-share problems that involve sharing up to 20 items among 2, 3, 4, 6, 8, and 10 sharers, including problems that result in whole numbers, mixed numbers, and fractional amounts B1.7 represent and solve fair-share problems that focus on determining and using equivalent fractions, including problems that involve halves, fourths, and eighths; thirds and sixths; and fifths and tenths	- *Are students able to use different materials to model fractions?* - *Are students able to flexibly change the whole to show different fractions?* - *Do students understand that when working with a whole (area or length), the size of the parts must be equal, but when working with a set, the parts don't have to be equal sizes?* - *Do students understand that for the same whole, as the number of equal parts increases, the size of each unit gets smaller?* - *Do students understand the denominator of a fraction tells the number of equal parts in the whole, which tells us the unit. The numerator tells the number of parts counted.* - *Are students able to write a multiplication/division sentence for an array?*	Number Unit 4: Fractions 14: Exploring Equal Parts 15: Comparing Fractions 1 16: Comparing Fractions 2 17: Partitioning Sets ***18: Consolidation (Fractions)*** Number Unit 6: Multiplication and Division 29: Properties of Multiplication 30: Multiplying and Dividing Larger Numbers 31: Creating and Solving Problem ***34: Consolidation (Multiplication and Division)***

Questions and Expectations	What to Look For	Little Books /Activity
B2.1 use the properties of operations, and the relationships between multiplication and division, to solve problems and check calculations B2.2 recall and demonstrate multiplication facts of 2, 5, and 10, and related division facts B2.6 represent multiplication of numbers up to 10 × 10 and division up to 100 ÷ 10, using a variety of tools and drawings, including arrays B2.7 represent and solve problems involving multiplication and division, including problems that involve groups of one half, one fourth, and one third, using tools and drawings	*- Do students recognize the relationship between multiplication and division?* *- Can students use multiplication and division to help us make sense of real-life situations and to solve problems?*	
Reflection: How can we use fractions, multiplication and division to make sense of real life situations?		

Ontario Ministry Long Range Plan	Pearson *Mathology*	
Patterns and Likelihood of Events	**Big Ideas**	
	• **Objects can be located in space and viewed from multiple perspectives.**	
	• **Formulating questions, collecting data, and consolidating data in visual and graphical displays help us understand, predict, and interpret situations that involve uncertainty, variability, and randomness.**	

Time: 20 days

Questions and Expectations	What to Look For	Little Books /Activity
		Namir's Marvellous Masterpieces - investigate growing and shrinking patterns (further developed) - use equations to represent simple growing and shrinking patterns
		Chance - explore the likelihood of different outcomes - investigate the fairness of games

Questions and Expectations	What to Look For	Little Books /Activity
Predicting the likelihood of an event D2.1 use mathematical language, including the terms "impossible", "unlikely", "equally likely", "likely", and "certain", to describe the likelihood of events happening, and use that likelihood to make predictions and informed decisions	*- Do students connect the fairness of a game to equally likely outcomes?* *- Can students use mathematical language (e.g., equally likely) to explain why the game is unfair?*	Data Management and Probability Unit 2: Probability and Chance 8: Who's Likely to Win? ***9: Consolidation (Probability and Chance)***
Reflection: How can we create patterns and predict the likelihood of events?		

Questions and Expectations	What to Look For	Little Books / Activity

Ontario Ministry Long Range Plan	Pearson *Mathology*	
Mathematical Modelling	**Big Ideas**	
	This is an opportunity to apply mathematical concepts and skills from this grade to solve real-life problems that require the process of mathematical modelling using a variety of Big Ideas.	

Time: 15 days

Questions and Expectations	What to Look For	Little Books /Activity
		The Street Party - add/subtract to 1000 - compare/order numbers to 1000 (further developed)
		A Week of Challenges - use properties of equality to solve problems - use the language of algebra

Questions and Expectations	What to Look For	Little Books / Activity
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Questions and Expectations	What to Look For	Little Books /Activity
		<u>Patterning and Algebra Unit 1: Patterns and Expressions</u> 2: Representing Patterns 3: Creating Patterns <u>Data Management and Probability Unit 1: Data Management</u> 4: Drawing Graphs ***6: Consolidation (Data Management)*** <u>Data Management and Probability Unit 2: Probability and Chance</u> 7: Making Predictions <u>Geometry Unit 2: 3-D Solids</u> 7: Building Solids <u>Geometry Unit 3: Mapping and Coding</u> 16: Altering Code
Reflection: How can we apply mathematical concepts and skills to solve real-life problems.		