ADDISON WESLEY

QUÉBEC EDITION

Math Makes Sense

Elementary

Cycle 3
Year 1

Québec Teacher Companion

ISBN 0-321-31517-0

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PEARSON Education Canada

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Technology tools that are recommended for use with the Student Book are the TI-108 calculator, *Appleworks* software, and *Graphers* drawing software.

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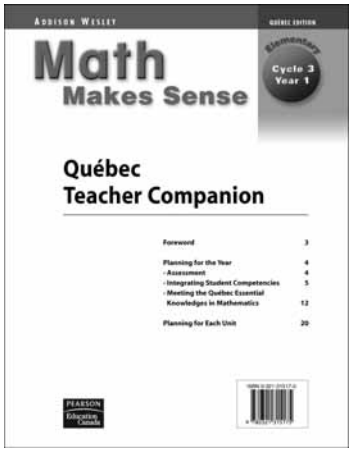
Foreword

Addison Wesley Mathematics Makes Sense is a comprehensive program designed to support teachers in delivering core mathematics instruction in a way that makes key mathematical concepts accessible to all students – letting you teach for conceptual understanding, and helping students make sense of the mathematics they learn.

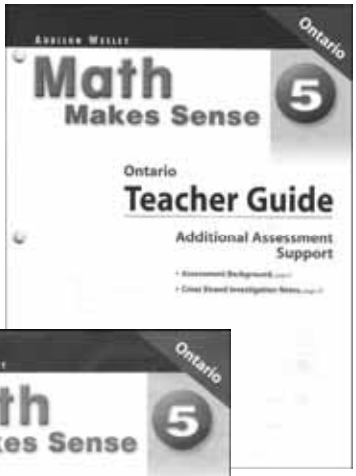
Your Teacher Guide was developed for a national text, and can be adapted for use in English-language schools in Québec for support of the Québec Education Program (QEP).

This **Québec Teacher Companion** provides additional support so that you can tailor the ***Math Makes Sense*** program to your specific needs. In particular, this module provides support to demonstrate how ***Math Makes Sense*** will help you nurture the development of the core competencies identified for the Québec Education Program, released by le Ministère de l'Education, du Loisir et de Sport du Québec, and provides tools to help you assess those competencies. Teaching notes highlight how specific Unit Problems might be expanded to more fully address the broad areas of learning, and help you create situational problems for work with your students.



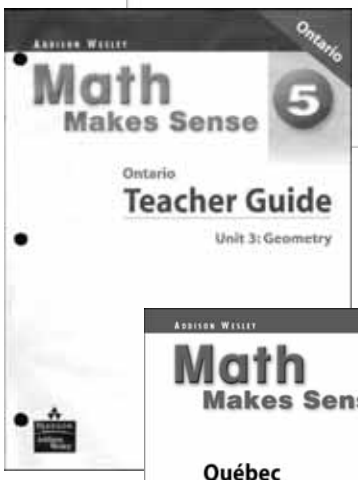
Planning for the Year

Assessment

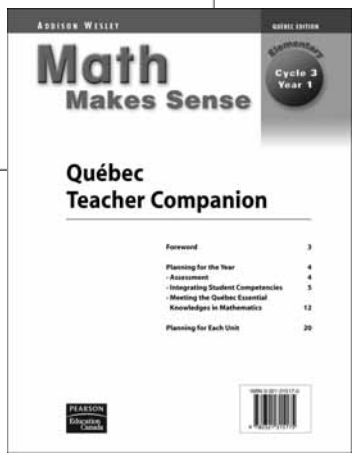


Your Teacher Guide includes a module entitled ***Additional Assessment Support***.

This module includes a variety of general-use rubrics, checklists, and other assessment tools. Go to this module for these assessment tools, as well as teaching notes and assessment support for the **Cross-Strand Investigations**.



Each individual ***Unit module*** in your Teacher Guide includes a **Planning for Assessment** chart, and a variety of assessment tools that are written for specific assessment of the content of the unit, in reproducible master format.



Your ***Québec Teacher Companion*** includes additional assessment tools to support the QEP program and the core competencies, with reproducible assessment tools for each unit.

The CD-ROM that accompanies your Teacher Guide provides assessment tools from the original Teacher Guide. Assessment tools from this Québec Teacher Companion are available in digital form as well, on the Pearson website. All are available in editable files that let you tailor these tools to the needs of your classroom.

Integrating Student Competencies

The Québec Education Program (QEP) emphasizes a competency-based approach to teaching and learning. At Cycle Three, there are nine identified cross-curricular competencies, and three subject-specific competencies.

The following tables demonstrate how the core competencies of the QEP are integrated throughout ***Addison Wesley Mathematics Makes Sense***, through a variety of key features that arise in every lesson, in every unit.

For detailed support that guides you in focusing on one competency in a particular unit, see the section in this module entitled **Planning for Each Unit**, starting on page 20.

Correlation of *Math Makes Sense* to QEP Cross-Curricular Competencies

QEP Competency	*Math Makes Sense* Cycle 3
Intellectual competencies • to use information	• **Explore** activities are opportunities for students to use given information to solve meaningful problems. Students frequently have the freedom to select the materials that best suit their needs for solving the problem, which enhances their creative thinking. • Students read for information before engaging in problem-solving opportunities that arise: in every lesson in **Explore** activities and in **Practice** questions; in every unit when approaching **Strategies Toolkits, Show What You Know** questions, or **Unit Problems**.
Intellectual competencies • to solve problems	• The Teacher Guide module **Building a Mathematics Community** provides practical suggestions for developing confident problem solvers in a positive, respectful, classroom environment. • Problem-solving opportunities arise in every lesson in **Explore** activities and in **Practice** questions. For more comprehensive problem-solving opportunities, **Strategies Toolkits**, **Unit Problems** and **Cross-Strand Investigations** regularly promote students' critical and creative thinking as they approach a new problem. • Self-Assessment opportunities, provided in the Teacher Guide, include such topics as **I am a Problem Solver**. • The use of technology enriches students' learning experiences and allows them to extend critical thinking and problem-solving skills.
Intellectual competencies • to exercise critical judgment	• Overall, the program promotes excellence, originality, and integrity in one's work, and supports appreciation for these qualities in the work of others. This comes through in the clarity of language, the accurate presentation of concepts, and the range of contexts and problems. • Self-Assessment opportunities, provided in the Teacher Guide in the form of reproducible masters, promote students' critical judgment. • The use of technology enriches students' learning experiences and allows them to extend critical thinking and problem-solving skills.

QEP Competency	*Math Makes Sense* Cycle 3
Intellectual competencies • to use creativity	• The Teacher Guide module **Building a Mathematics Community** provides practical suggestions for developing confident learners who know they can bring their own understanding, their own strategies, and their own ideas to any new problem situations. • Overall, the program promotes excellence, originality, and integrity in one's own work, and supports an appreciation for these qualities in the work of others. This comes through in the clarity of language, the clear, accurate presentation of mathematical concepts, and the range of contexts and problems provided across every unit. • In **Explore** activities, students frequently have the freedom to select the materials that best suit their needs for solving the problem, which enhances their creative thinking.
Methodological competencies • to adopt effective work methods	• The **Explore** in each lesson engages students in working together productively, harmoniously, and responsibly. • In each lesson, the **Show and Share** prompts regularly allow students to discuss how they worked with an **Explore** activity, whether they think they had an effective approach and why, and how they organized their work in ways that helped them to keep track of their results. • Each **Connect** reinforces the importance of clear communication and organized work by modelling mathematical solutions in a clear and readable presentation, following the conventions of mathematics. • For students who need support in organizing their work, the Teacher Guide provides a **Step-by-Step** master for each Assessment Focus question in each Practice set; this reproducible master provides greater structure for students who need it, and helps to build students' developing work habits.
Methodological competencies • to use information and communications technologies (ICT)	• **Technology** lessons in the Student Book highlight opportunities for learning new mathematical concepts, or reinforce new concepts just developed, through the use of calculators or computers. • When appropriate, activities in the Student Book suggest the use of a calculator or computer application to enrich the mathematics. • The **Numbers Every Day** feature in every lesson regularly includes suggestions related to calculator skills, to ensure students develop an understanding of how to use technology as a meaningful tool. • ***Addison Wesley Mathematics e-Tools*** software provides virtual manipulatives that help students develop mathematical concepts in the following ways: simultaneously connects the concrete with the symbolic; creates an interactive environment that is both open-ended and student controlled; and empowers students to build and observe dynamic mathematical representations and solutions; ***e-Tools*** is not required for success with the ***Math Makes Sense*** program, but it can help to enhance student achievement.

QEP Competency	*Math Makes Sense* Cycle 3
Personal and social competencies • to construct his/her identity	• The **Reflect** prompt in each lesson, with its opportunity for individual reflection, encourages students to examine their personal understanding, values, and abilities. • Contextual problems throughout the program showcase a variety of positive options for students' leisure and fitness pursuits – reading, hiking, swimming, healthy eating, and so on. • Photographs of children in the Student Book are representative of many cultures, and allow for a variety of activities suited to any gender, ethnicity, appearance, or ability. Students experience the positive effect of "seeing themselves" reflected in the pages of their ***Math Makes Sense*** Student Book. • The Teacher Guide module **Building a Math Community** provides practical suggestions for creating a respectful classroom environment in which students can be comfortable working within their own range of abilities, learning preferences, and strengths.
Personal and social competencies • to cooperate with others	• **Explore** activities and **Practice** questions provide for a range of cooperative grouping arrangements. Not only do students have multiple opportunities to cooperate with others, they also have regular opportunities to work in their preferred mode, while still being exposed to other grouping options to develop their cooperative learning skills. The recommended grouping for each **Explore** is indicated using a graphic icon in the Explore heading in the Student Book. • The Teacher Guide module **Building a Math Community** provides practical suggestions for grouping students, and offers support for teachers as they incorporate cooperative learning in the classroom.
Communication-related competency • to communicate appropriately	• Students' developing mathematical vocabulary is supported by the **Key Words** listed at the beginning of every unit, and connected to an illustrated **Glossary** at the back of the Student Book. • In each Explore, the **Show and Share** discussion questions prompt students to listen and become dynamic learners, receptive to communication from other students. • Each **Connect** models the correct use of mathematical language, codes, and conventions. • Opportunities for students to communicate their self-analysis and evaluation occur in the lesson and unit **Reflect** features, as well as in Self-Assessment opportunities suggested in the Teacher Guide. • As content allows, lessons feature the use of numbers and numeration in the media, arts, and the world of work. Technology lessons are included where appropriate for the students' level and the content at hand. This early exposure to media, arts, and technology, helps prepare students for future life in our increasingly complex world and the multi-media communication channels that it presents.

Correlation of *Math Makes Sense* to QEP Mathematics Competencies

QEP Competency	*Math Makes Sense* Cycle 3
Competency 1: to solve a situational problem • to model the situational problem	• Concrete materials are referenced regularly in **Explore** activities and in **Practice** questions, where modelling of mathematical ideas is central to the conceptual development. • **Strategies Toolkit** lessons provide explicit instruction in a variety of problem-solving strategies, by posing a problem that students investigate and solve on their own, then modelling a strategy with a new problem, and finally providing a selection of problems that can be solved in a variety of ways. • Problems that arise in **Unit Problem** and **Cross-Strand Investigation** features lend themselves well to a variety of modelling opportunities.
Competency 1: to solve a situational problem • to apply different strategies to work out a solution	• **Show and Share** in each lesson allows students to hear the possible solutions of other students. • Each lesson has a consistent **Explore/Connect/Practice** structure, to provide situational problems for students that are relevant to content and concepts. The **Connect** regularly presents multiple solutions for a given problem. • **Strategies Toolkit** lessons provide explicit instruction in a variety of problem-solving strategies, and present a selection of problems that can be solved in a variety of ways.
Competency 1: to solve a situational problem • to validate the solution	• **Show and Share,** in each lesson, gives students an opportunity to voice their mathematical explanations, validate their solutions, and listen to the possible solutions of others. • Students have regular opportunities to create and share problems with a friend, then validate work – in **Show and Share** suggestions; in **Practice** questions; in **Reflect** prompts; and in the closing part of many **Unit Problems**.
Competency 1: to solve a situational problem • to share information related to the solution	• The **Explore** activity introduces new concepts by presenting a situational problem to solve. Explore activities include whole group, partner, and independent problem-solving activities. • **Show and Share** occurs as part of the **Explore** in each lesson, to give students an opportunity to voice their mathematical explanations, validate their solutions, and listen to the possible solutions of others. • Students have regular opportunities to create and solve problems, and to share problems with a friend – in **Show and Share** suggestions; in **Practice** questions; in **Reflect** prompts; and in the closing part of many **Unit Problems**.
Competency 1: to solve a situational problem • to decode the elements of the situational problem	• Students working collaboratively in **Explore** or **Practice** sections will naturally decode problems as they work together to discuss their understanding. • For students who need extra support in decoding problems, the Teacher Guide provides a **Step-by-Step** master for the **Assessment Focus** question in each Practice set; this reproducible master helps the student break a challenging problem down into manageable, smaller tasks.

QEP Competency	*Math Makes Sense* Cycle 3
Competency 2: to reason using mathematical concepts and processes • to define the elements of the mathematical situation	• In each **Explore**, students apply mathematical reasoning as they define the elements of a problem to solve. • For students who need extra support, the **Step-by-Step** master in the Teacher Guide, provided for each **Assessment Focus** question, models for the student how she/he might isolate the defining elements of a mathematical situation. • **Connect** sections model – for students, teachers, and parents–the mathematical reasoning involved in defining the elements of a situation, whether it be a real-world application or a mathematical context. • **Unit Problems** and **Cross-Strand Investigations** provide rich opportunities for students to bring all of their reasoning abilities to bear on a specific open-ended problem.
Competency 2: to reason using mathematical concepts and processes • to justify actions or statements by referring to mathematical concepts and processes	• In each **Explore** activity, students must select a suitable strategy to solve the problem, and then follow the **Show and Share** discussion prompts to justify their actions, exchange information, and arrive at conclusions. • Each **Assessment Focus** question includes an opportunity for students to justify their ideas or explain their thinking. • **Connect** sections model the reasoning that underlies new concept development: relating mathematical concepts and processes to create a chain of thought that leads students to new insights. By exemplifying sound mathematical reasoning without solving the original problem in the **Explore**, the **Connect** reinforces students' reasoning abilities without detracting from the ideas that students themselves have brought to the problem.
Competency 2: to reason using mathematical concepts and processes • to mobilize mathematical concepts and processes appropriate to the given situation	• In each **Explore** activity, students apply their mathematical reasoning as they define the elements of a problem, select a suitable strategy to solve the problem, make decisions about ways to model the problem and to record their work, and then arrive at their own solutions. • **Practice** questions draw out student reasoning through thought-provoking problems that encourage students to model concepts, examine special cases, compare results, consider consequences, look for non-examples, and explain their thinking. • **Connect** sections model – for students, teachers, and parents–the mathematical reasoning students can build as they work with problems to develop new concepts. • **Unit Problems** and **Cross-Strand Investigations** provide rich opportunities for students to bring all of their mathematical understanding, and their reasoning abilities, to bear on a specific open-ended problem.

QEP Competency	*Math Makes Sense* Cycle 3
Competency 2: to reason using mathematical concepts and processes • to apply mathematical processes appropriate to the given situation	• In each **Explore** activity, students apply their mathematical reasoning to select a suitable strategy to solve the problem, make decisions about ways to model the problem and to record their work, and then arrive at their own solutions. • A range of meaningful **Practice** questions draws out student reasoning with thought-provoking problems in which students apply mathematical concepts and processes developed during the **Explore** and consolidated in the **Connect** section. • **Unit Problems** and **Cross-Strand Investigations** provide rich opportunities for students to apply their reasoning abilities to solve an open-ended problem.

QEP Competency	*Math Makes Sense* Cycle 3
Competency 3: to communicate by using mathematical language • to become familiar with mathematical vocabulary	• Each unit starts with a **Key Words** feature that teachers can use to create a word wall, and to reinforce important terminology. Key words are bold-faced the first time they appear in the unit and are defined in the illustrated **Glossary** at the back of the Student Book. • Mathematical concepts are regularly connected to real world situations drawn from Canadian culture, Canadian geography, and Aboriginal culture, in core lessons and also in **World of Work** pages, **Unit Problems**, and **Cross-Strand Investigations**. Students have an opportunity to observe how this language promotes understanding of the world.
Competency 3: to communicate by using mathematical language • to interpret or produce mathematical messages	• Each **Connect** section models the correct use of mathematical language, while providing explicit instruction in mathematics terms and concepts. • The Teacher Guide provides background regarding mathematical terms and concepts, so that teachers can model appropriate mathematical language. • Students' oral language is emphasized in **Explore** activities and in **Show and Share** prompts. These communication opportunities encourage students' use of everyday language to communicate their understanding, only introducing the formal terminology in the **Connect**, once students have grasped the underlying fundamental concepts of the lesson. • Students' written language is emphasized in **Assessment Focus** questions and in **Reflect** opportunities. • In addition to prompting students to explain their thinking in pictures, numbers, or words, each **Unit Problem** also includes a writing opportunity in a final **Reflect on the Unit,** in which students are prompted to think about and communicate their mathematical learning for the whole unit.
Competency 3: to communicate by using mathematical language • to make connections between mathematical language and everyday language	• In **Explore** activities there are communication opportunities that typically encourage students' use of everyday language to communicate their understanding, leaving the formal terminology to be established in the **Connect**, only after students have themselves articulated the underlying fundamental concepts of the lesson. • Mathematical concepts are regularly connected to real world situations drawn from Canadian culture, Canadian geography, and Aboriginal culture, in core lessons and also in **World of Work** pages, **Unit Problems**, and **Cross-Strand Investigations**. Students have an opportunity to observe how this language promotes understanding of the world. • **Math Link** features in the Student Book highlight connections between mathematics concepts and other disciplines. The Teacher Guide supports these connections with further background on cross-curricular connections.

Meeting the Québec Essential Knowledges in Mathematics

Arithmetic: Understanding and Writing Numbers

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlations	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
Natural numbers • natural numbers less than 1 000 000 (hundred thousands): reading, writing, representation, comparison, classification, order, equivalent expressions, writing numbers in expanded form, patterns, number line	6-21, 28-30, 362-364	
• power, exponent		(covered in Cycle 3, Year 2)
• approximation	throughout units	
Fractions • fractions: reading, writing, numerator, denominator, various representations, order, comparison, equivalent expressions, equivalent fractions	258-268, 274-279	
• percentages		(covered in Cycle 3, Year 2)
Decimals • up to three decimal places (tenths, hundredths, thousandths): reading, writing, various representations, order, equivalent expressions, writing numbers in expanded form	114-123	114-117 (prior knowledge) (thousandths covered in Cycle 3, Year 2)
• approximation	124-129, 202-204, 282-284	(percentages covered in Cycle 3, Year 2)
Using Numbers • converting from one type of notation to another: writing fractions, decimal numbers or percentages	270-276, 354-357	
• choosing the most suitable notation for a given context		
Integers • reading, writing, comparison, order, representation		(covered in Cycle 3, Year 2)

Arithmetic: Meaning of Operations Involving Numbers

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlation	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
Natural numbers • operation sense: multiplication (e.g. repeated addition, Cartesian product), product, factor, multiples of a natural number, division (repeated subtraction, sharing, number of times *x* goes into *y*), quotient, remainder, dividend, divisor, set of divisors of a natural number, properties of divisibility	47-57, 350-353	34-40 and 44-46 (prior knowledge)
• choice of operation: multiplication, division	68-70, throughout units	
• meaning of an equality relation (equation), meaning of an equivalence relation	350-353	(covered more in Cycle 3, Year 2)
• relationships between the operations	47-49	
• property of operations: distributive law	55-57	
• order of operations (series of operations involving natural numbers)		(covered in Cycle 3, Year 2)
Decimals • operation sense: multiplication and division	285-291, 294-299	
Fractions • operation sense (using objects and diagrams): addition, subtraction and multiplication by a natural number		(covered in Cycle 3, Year 2)

Arithmetic: Operations Involving Numbers

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlation	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
Natural numbers • approximating the result of an operation: addition, subtraction, multiplication, division	31-33, 41-43, 61-63	
• own processes for mental computation: addition, subtraction, multiplication, division	throughout units	
• conventional processes for written computation: multiplying a three-digit number by a two-digit number)		58-60 (prior knowledge) (covered in Cycle 3, Year 2)
• conventional processes for written computation: dividing a four-digit number by a two-digit number, expressing the remainder as a decimal that does not go beyond the second decimal place		64-67 (prior knowledge) (covered in Cycle 3, Year 2)
• series of operations in accordance with the order of operations		(covered in Cycle 3, Year 2)
• patterns: series of numbers, family of operations	6-19, 362-364	358-361 (extension)
• finding prime factors		(covered in Cycle 3, Year 2)
• divisibility by 2, 3, 4, 5, 6, 8, 9, 10		(covered in Cycle 3, Year 2)
Decimals • approximating the result of an operation	127-138, 202-207, 282-284	
• mental computation: addition, subtraction, multiplication, division	throughout units	
• written computation: multiplication whose product does not go beyond the second decimal place, division by a natural number less than 11	285-291, 294-299	
• mental computation: multiplication and division of decimals by 10, 100, 1000	139-143	

Arithmetic: Operations Involving Numbers continued

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlation	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
Fractions • establishing equivalent fractions	258-261	
• reducing fractions, irreducible fractions		(covered in Cycle 3, Year 2)
• adding fractions using objects and diagrams, when the denominator of one fraction is a multiple of the denominator of the other fraction		(covered in Cycle 3, Year 2)
• subtracting fractions using objects and diagrams, when the denominator of one fraction is a multiple of the denominator of the other fraction		(covered in Cycle 3, Year 2)
• multiplying a natural number by a fraction, using objects and diagrams		(covered in Cycle 3, Year 2)

Geometry: Geometric Figures and Spatial Sense

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlation	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
Space • locating objects on an axis	228-230	
• locating objects in a Cartesian plane	228-230 (first quadrant)	(four quadrants covered in Cycle 3, Year 2)
Solids • recognizing nets for convex polyhedrons	84-87	
• testing Euler's theorem (relationship between faces, vertices and edges of a convex polyhedron)		(covered in Cycle 3, Year 2)
Plane figures • describing triangles: right triangles, isosceles triangles, scalene triangles, equilateral triangles	80-83, 90-93	94-97 (extension)
• classifying triangles	80-83, 90-93	235-240 (extension)
• measuring angles in degrees using a protractor	84-93	
• studying the features of a circle: radius, diameter, circumference, central angle	316-318 (circumference)	(covered more in Cycle 3, Year 2)
Frieze patterns and tessellations • observing and producing (grids, tracing paper) frieze patterns by means of translations: translation, translation arrow (length, direction, sense)	231-234, 247-249, 368-373	241-243 (extension)
• observing and producing tessellations by means of translations	247-249, 368-373	

Measurement

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlation	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
Lengths: estimating and measuring • conventional units (km, m, dm, cm, mm)	308-310	314-315
• relationships between units of measure	311-313	
Angles: estimating and measuring • degree	84-93	
Surface areas: estimating and measuring • conventional units (m^2, dm^2, cm^2), relationships between the units of measure	331-343	319-330 (prior knowledge)
Volumes: estimating and measuring • conventional units (m^3, dm^3, cm^3), relationships between the units of measure	210-215	
Capacities: estimating and measuring • unconventional units	208-209	
• conventional units (L, mL), relationships between the units of measure	208-209, 213-215	
Masses: estimating and measuring • unconventional units		
• conventional units (kg, g), relationships between the units of measure	216-221	
Time: estimating and measuring • relationships between units of measure	194-196	197-199 (extension)
Temperatures: estimating and measuring • conventional units (ºC)		(covered in Cycle 3, Year 2)

Statistics

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlation	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
• formulating questions for a survey	178-180	
• collecting, describing and organizing data using tables	156-159, 163-165, 178-180	
• interpreting data using a circle graph	156-159, 182-185	166-168 and 172-177 (prior knowledge) 169-171 (extension)
• arithmetic mean (meaning, calculation)	160-162	

Probability

Québec Essential Knowledge	*Math Makes Sense* Cycle 3, Year 1 Correlation	*Math Makes Sense* Cycle 3, Year 1 Optional Pages
• experimentation with activities involving chance	383-388, 394-396	
• predicting the likelihood of an event (certainty, possibility, or impossibility)	380-382	
• probability that a simple event will occur (more likely, just as likely, less likely)	380-382	
• enumerating the possible outcomes of a random experiment using a table, a tree diagram	383-393	
• comparing the outcomes of a random experiment with known theoretical probabilities	394-396	
• doing simulations with or without a computer		(covered in Cycle 3, Year 2)

Planning for Unit 1: Number Patterns

Supporting Cross-Curricular Competencies

Unit Focus: to adopt effective work methods

Materials
Master Q1.1:
Unit Rubric: Number Patterns
Master Q1.2:
Performance Assessment Rubric: Charity Fundraising
Master Q1.3:
Peer and Self Assessment: Unit Problem (Unit 1)

Number Patterns is a fitting topic for emphasizing the importance of working effectively. Use these Student Book and Teacher Guide features to support students' development of effective work and management habits:

- The **Show and Share** section in each lesson (for example, on pages 6 and 9) prompts students to discuss how they worked in the **Explore** activity; encourage students to talk about whether they think they had an effective approach and why, and how they organized their work to keep track of their results.
- Each **Connect** section (for example, on pages 13 and 17) models an effective method for solving a problem.
- In each module of the Teacher Guide, a **Step-by-Step** master for each Assessment Focus question in each Practice set is provided; use these reproducible masters to provide greater structure to students who need it, and to help foster effective solution methods.

Use Master Q1.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Citizenship and Community Life

Educational Aim: to ensure that students take part in the democratic life of the classroom or the school and develop a spirit of openness to the world and respect for diversity

The Unit Problem can be opened up mathematically, and extended.

In small groups, have students brainstorm a list of charity events that take place in their school and community. Invite groups to share their lists with the class. Use the information to begin a table that lists the events, and includes:

- the sponsor(s) or organizer(s) of the event
- the purpose of the event (e.g., what the money is used for)
- why the event is needed
- interesting information about the event

In pairs, have students choose a charity event to research. Their research might include:

- interviewing organizers
- graphs and/or tables (e.g., showing the money raised over a period of time)
- collecting brochures and posters
- reporting on how people can get involved or support the event

Have students display their findings and present them to the class.
Use Master Q1.2: Performance Assessment Rubric and Master Q1.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q1.1 Unit Rubric: Number Patterns

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of number patterns by: - describing and explaining patterns - constructing and extending patterns - predicting and justifying pattern extensions	shows little understanding; may be unable to: - describe and explain patterns - construct and extend patterns - predict and justify pattern extensions	shows some understanding; partially able to: - describe and explain patterns - construct and extend patterns - predict and justify pattern extensions	shows understanding; able to: - describe and explain patterns - construct and extend patterns - predict and justify pattern extensions	shows thorough understanding; in various contexts, able to: - describe and explain patterns - construct and extend patterns - predict and justify pattern extensions
Processes • accurately: - identifies and extends patterns (two variables) - analyzes pattern rules for a growing pattern - develops charts to record and reveal patterns	limited accuracy; often makes major errors or omissions in: - identifying and extending patterns - analyzing pattern rules - constructing and interpreting charts	partially accurate; makes frequent minor errors or omissions in: - identifying and extending patterns - analyzing pattern rules - constructing and interpreting charts	generally accurate; makes few errors or omissions in: - identifying and extending patterns - analyzing pattern rules - constructing and interpreting charts	accurate; rarely makes errors or omissions in: - identifying and extending patterns - analyzing pattern rules - constructing and interpreting charts
Solves situational problems				
• uses number patterns to solve and create problems • validates and explains solutions	has difficulty using number patterns to solve and create problems; unable to validate or explain solutions	with some support or prompting, uses number patterns to solve and create familiar problems; sometimes able to validate and explain solutions	uses number patterns to solve and create problems; validates and explains results most of the time	uses number patterns in effective and often innovative ways to solve and create problems; always validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about number patterns, using exact mathematical language and a variety of concrete, visual, and symbolic representations	has difficulty interpreting and producing mathematical messages	partially able to interpret and produce mathematical messages about number patterns	interprets and produces mathematical messages about number patterns	interprets and produces precise mathematical messages about number patterns
Cross-curricular competency: to adopt effective work methods				
• derives satisfaction from successfully completing a task	rarely completes tasks successfully; does not make connections between own efforts and task	needs support to invest the time and energy needed to complete a task successfully; shows some satisfaction in result	in most cases, willing to invest time and energy needed to complete tasks successfully; derives satisfaction from doing so	self-directed; invests time and energy effectively to complete tasks with a high degree of success, and derives satisfaction from doing so

Master Q1.2

Performance Assessment Rubric: Charity Fundraising

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding by: - creating and interpreting a table - making reasonable predictions	shows little understanding; may be unable to create and interpret a table; predictions are not reasonable	shows partial understanding; may create a very simple table, or create a more complex table but has difficulty interpreting and predicting	shows understanding by creating an appropriate table and providing reasonable interpretations and predictions of an appropriate table	shows thorough understanding by creating, interpreting, and basing predictions on a relatively complex table
Processes • accurately: - calculates costs and profits - constructs table	limited accuracy; frequent major errors or omissions in: - calculating costs and profits - constructing table	somewhat accurate; frequent minor errors or omissions in: - calculating costs and profits - constructing table	generally accurate; few errors or omissions in: - calculating costs and profits - constructing table	accurate; rarely makes errors or omissions in: - calculating costs and profits - constructing table
Solves situational problems				
• uses appropriate patterning and estimation strategies to design a charity event, relate costs and profits, and determine how much money will be raised	designs a very simple and basic event; little effective use of patterning or estimation	uses some basic patterning and estimation strategies to design a relatively straightforward event (may be inefficient)	uses patterning and estimation strategies to design a charity event that has some complexity; may use inefficient strategies	uses efficient and effective strategies to design a charity event; shows some innovation and complexity
Communicates using mathematical language				
• uses exact mathematical language	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q1.3

Peer and Self Assessment: Unit Problem (Unit 1)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
The plan for the event works, and it is detailed.				
The work shows a correct way to calculate costs and the money to be raised.				
The tables clearly show number patterns that can be used to make predictions.				
Appropriate mathematical language is used to plan the event.				

Planning for Unit 2: Whole Numbers

Supporting Cross-Curricular Competencies

Unit Focus: to use information

Materials
Master Q2.1:
Unit Rubric: Whole Numbers
Master Q2.2:
Performance Assessment Rubric: On the Dairy Farm
Master Q2.3:
Peer and Self Assessment: Unit Problem (Unit 2)

The Whole Numbers unit provides students with opportunities to use information in meaningful contexts. The following Student Book features support students as they learn how to compare, group, organize, display, and question information:

- Lesson introductions (pages 28, 37, 44, 47, 52, and 68) prompt students to assess prior knowledge and make connections to new concepts; read and discuss lesson introductions with students.
- The **Explore** activities, **Practice** questions, and the **Strategies Toolkits** give students the chance to use given information to solve relevant problems; support students in selecting materials that best suit their needs for solving each problem.
- The **Connect** section in each lesson (for example, on pages 38, 48, and 53) allows for students to make connections between what they already know and new information; encourage students to share any connections they make with the class.

Use Master Q2.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Health and Well-Being

Educational Aim: to ensure that students adopt a self-monitoring procedure concerning the development of good living habits related to health, well-being, sexuality and safety

The Unit Problem can be opened up mathematically, and extended.

Have students consider the role of dairy products in their diets by completing one or more of the following activities:

- List commonly used dairy products.
- Record your consumption of dairy products for 2-3 days. Present your findings in a data display.
- Collect labels from dairy products that identify nutrients.
- Research to find the daily servings of dairy products, and daily requirements of some of the nutrients they contain.
- Compare various dairy products and determine how they contribute to nutrition.
- Research substitutes people can use if they are unable to consume dairy products.
- Create a personal diet plan for including the recommended amount of dairy products or dairy product substitutes in your daily food intake.

Use Master Q2.2: Performance Assessment Rubric and Master Q2.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q2.1

Unit Rubric: Whole Numbers

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of whole numbers by: - representing, comparing, and ordering numbers - approximating the result of operations - recognizing, modelling, and describing products, factors, multiples, and prime factors - choosing and explaining appropriate operations and methods	limited understanding; may be unable to: - represent, compare, and order numbers - approximate the result of operations - recognize, model, and describe products, factors, multiples, and prime factors - choose and explain appropriate operations and methods	some understanding; partially able to: - represent, compare, and order numbers - approximate the result of operations - recognize, model, and describe products, factors, multiples, and prime factors - choose and explain appropriate operations and methods	shows understanding; able to: - represent, compare, and order numbers - approximate the result of operations - recognize, model, and describe products, factors, multiples, and prime factors - choose and explain appropriate operations and methods	shows thorough understanding; able to: - represent, compare, and order numbers - approximate the result of operations - recognize, model, and describe products, factors, multiples, and prime factors - choose and explain appropriate operations and methods
Processes • accurately: - reads, writes, and represents numbers - uses own processes for mental computations - shows written computation (multiplication and division)	limited accuracy; often makes major errors or omissions in: - reading, writing, and representing numbers - mental computations - multiplying and dividing	partially accurate; makes frequent minor errors or omissions in: - reading, writing, and representing numbers - mental computations - multiplying and dividing	generally accurate; makes few errors or omissions in: - reading, writing, and representing numbers - mental computations - multiplying and dividing	accurate; rarely makes errors or omissions in: - reading, writing, and representing numbers - mental computations - multiplying and dividing
Solves situational problems				
• solves and creates problems using whole numbers, and validates and explains the solutions	has difficulty solving and creating problems using whole numbers; unable to validate or explain solutions	with some support or prompting, solves and creates problems using whole numbers in familiar contexts; needs help to validate and explain solutions	solves and creates problems using whole numbers; validates and explains solutions	solves and creates problems using whole numbers in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about whole numbers and number operations, using exact mathematical language and a variety of concrete, visual, and symbolic representations	has difficulty interpreting and producing mathematical messages about whole numbers and number operations	partially able to interpret and produce mathematical messages about whole numbers and number operations	interprets and produces mathematical messages about whole numbers and number operations	interprets and produces precise mathematical messages about whole numbers and number operations
Cross-curricular competency: to use information				
• selects appropriate information to solve problems involving whole numbers and number operations	has difficulty selecting appropriate information to solve problems involving whole numbers and number operations	with guidance, selects appropriate information to solve problems involving whole numbers and number operations	selects appropriate information to solve problems involving whole numbers and number operations	selects the most important and appropriate information in a variety of contexts to solve problems

Master Q2.2

Performance Assessment Rubric: On the Dairy Farm

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding of whole numbers by choosing and explaining appropriate strategies and procedures	shows little understanding; may be unable to choose or explain appropriate strategies and procedures	shows partial understanding by choosing and explaining (partially) appropriate strategies and procedures	shows understanding by choosing and explaining appropriate strategies and procedures	shows thorough understanding by choosing appropriate strategies and procedures for all tasks; offers complete and effective explanations
Processes • accurately: - multiplies and divides with whole numbers (may add and subtract) - reads and writes whole numbers	limited accuracy; makes frequent major errors or omissions in: - multiplying and dividing with whole numbers (may also add and subtract) - reading and writing whole numbers	partially accurate; makes frequent minor errors or omissions in: - multiplying and dividing with whole numbers (may also add and subtract) - reading and writing whole numbers	generally accurate; few errors or omissions in: - multiplying and dividing with whole numbers (may also add and subtract) - reading and writing whole numbers	accurate; very few, if any, errors or omissions in: - multiplying and dividing with whole numbers (may also add and subtract) - reading and writing whole numbers
Solves situational problems				
• chooses appropriate strategies to solve and create 1 and 2-step problems involving whole numbers, and estimates to check reasonableness of results	unable to use appropriate strategies to solve and create problems, including: - solving 1-step problems (#1 and #2) - solving 2-step problem (#3) - checking results - creating own problem (#4) (may be extremely simple or have missing information)	uses somewhat appropriate strategies, with partial success, to solve and create some of the problems, including: - solving 1-step problems (#1 and #2) - solving 2-step problem (#3) - checking results - creating own problem (#4) (may be very simple or modelled closely on #1-3)	uses appropriate strategies to successfully solve and create most of the problems including: - solving 1-step problems (#1 and #2) - solving 2-step problem (#3) - checking results - creating own problem (#4)	uses appropriate, efficient, and often innovative strategies to successfully solve and create problems including: - solving 1-step problems (#1 and #2) - solving 2-step problem (#3) - checking results - creating problem with some complexity (#4)
Communicates using mathematical language				
• uses exact mathematical language	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q2.3

Peer and Self Assessment: Unit Problem (Unit 2)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
The correct operation was chosen to solve each problem.				
The calculations are complete and correct.				
The story problem uses whole numbers, and it is challenging.				
The solution to the story problem is clearly explained, using appropriate mathematical language.				

Planning for Unit 3: Geometry

Supporting Cross-Curricular Competencies

Recommended Software: *Appleworks*

Unit Focus: to cooperate with others

Materials
Master Q3.1:
Unit Rubric: Geometry
Master Q3.2:
Performance Assessment Rubric: Bridges
Master Q3.3:
Peer and Self Assessment: Unit Problem (Unit 3)

The Geometry unit provides students with many opportunities to engage in group activities. Here are some of the Student Book features that promote teamwork:

- The **Explore** section in each lesson encourages students to work collaboratively to complete each activity (for example, on pages 80, 84, and 90); different groupings are recommended.
- The **Show and Share** section in each lesson (for example, on pages 90, 95, and 98) gives students a chance to share what they learned in the **Explore** activity.
- Encourage students to re-read the **Connect** in each lesson, in pairs or in a group, to reinforce understanding of new concepts (for example, on pages 91 and 95).
- Allow time for students to share answers to the **Reflect** activities to foster discussion and appreciation of their peers' ideas and opinions (for example, on pages 87 and 89).

Use Master Q3.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:

Personal and Career Planning

Educational Aim: to enable students to undertake and complete projects that develop their potential and help them integrate into society

The Unit Problem can be opened up mathematically, and extended.

Have students discuss careers where understanding geometry, such as shapes and spatial understanding, is important. For example, architect, artist, sculptor, landscaper, warehouse worker, mapmaker, and so on. Record students' ideas on chart paper. In pairs or groups, have students complete one or more of the following activities:

- Research the role of geometry in a particular career. Include data displays to show your research.
- Make a poster or brochure to advertise the importance of geometry in the world of work.
- Create a chart or table, by hand or by computer, showing jobs that involve geometry, and the training that is required.
- Invite one or more guests to explain how they use geometry in their careers.

Some students may be interested in investigating geometry in some of their favourite sports or leisure activities. Have students present their activities to the class.

Use Master Q3.2: Performance Assessment Rubric and Master Q3.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q3.1

Unit Rubric: Geometry

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of spatial relations by: - recognizing and constructing nets for polyhedrons - describing and distinguishing among triangles (right, isosceles, scalene, equilateral) - building and describing figures and solids - sketching 3-D objects given the front face	shows little understanding; may be unable to - recognize and construct nets for polyhedrons - describe and distinguish among triangles - build and describe figures and solids - sketch 3-D objects given the front face	some understanding; partially able to: - recognize and construct nets for polyhedrons - describe and distinguish among triangles - build and describe figures and solids - sketch 3-D objects given the front face	shows understanding; able to: - recognize and construct nets for polyhedrons - describe and distinguish among triangles - build and describe figures and solids - sketch 3-D objects given the front face	thorough understanding; able to: - recognize and construct nets for polyhedrons - describe and distinguish among triangles - build and describe figures and solids - sketch 3-D objects given the front face
Processes • accurately: - classifies triangles - sorts and names polygons by number of sides, angles, and vertices - measures angles in degrees using a protractor	limited accuracy; often makes major errors or omissions in: - classifying triangles - sorting and naming polygons by number of sides, angles, and vertices - measuring angles in degrees using a protractor	partially accurate; makes frequent minor errors or omissions in: - classifying triangles - sorting and naming polygons by number of sides, angles, and vertices - measuring angles in degrees using a protractor	generally accurate; makes few errors or omissions in: - classifying triangles - sorting and naming polygons by number of sides, angles, and vertices - measuring angles in degrees using a protractor	accurate; rarely makes errors or omissions in: - classifying triangles - sorting and naming polygons by number of sides, angles, and vertices - measuring angles in degrees using a protractor
Solves situational problems				
• solves and creates problems involving geometry, and validates and explains the solutions	has difficulty solving and creating problems involving geometry; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving geometry in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving geometry; validates and explains solutions	solves and creates problems involving geometry in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about geometry, using appropriate mathematical language, and a variety of concrete, visual, and symbolic representations	has difficulty interpreting and producing mathematical messages	partially able to interpret and produce mathematical messages about number patterns	interprets and produces mathematical messages about number patterns	interprets and produces precise mathematical messages about number patterns
Cross-curricular competency: to cooperate with others				
• listens actively and recognizes others' thoughts, ideas, interests, and needs	does not listen actively or consider others	with support, able to listen attentively, but may not offer support or feedback	listens actively in most situations; offers appropriate support and feedback to others	listens actively and supportively; recognizes the needs of others and offers helpful feedback

Master Q3.2

Performance Assessment Rubric: Bridges

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding by choosing appropriate procedures, discussing and explaining geometric properties, principles, and relationships, and their application (e.g., in creating strong bridges)	shows little understanding; may be unable to choose appropriate procedures or offer reasonable explanations	shows partial understanding by choosing appropriate procedures and offering some reasonable explanations	shows understanding by choosing appropriate procedures and giving reasonable explanations	shows thorough understanding by choosing appropriate procedures and giving in-depth and insightful explanations
Processes • accurately uses appropriate procedures to identify: - the length of the roadway - scalene, equilateral, and isosceles triangles - equal angles - regular polygons - the load the bridge will carry	limited accuracy; major errors or omissions in identifying: - the length of the roadway - scalene, equilateral and isosceles triangles - equal angles - regular polygons - the load the bridge will carry	partially accurate; frequent minor errors or omissions in identifying: - the length of the roadway - scalene, equilateral and isosceles triangles - equal angles - regular polygons - the load the bridge will carry	generally accurate; few errors or omissions in identifying: - the length of the roadway - scalene, equilateral and isosceles triangles - equal angles - regular polygons - the load the bridge will carry	accurate; very few, if any, errors or omissions in identifying: - the length of the roadway - scalene, equilateral and isosceles triangles - equal angles - regular polygons - the load the bridge will carry
Solves situational problems				
• chooses appropriate strategies, (e.g., estimating, measuring, sketching) to create a bridge and determine the load it can support	designs a bridge that does not meet requirements; may be unable to find the load (maybe because bridge will not stand up or bear any load at all)	designs a simple bridge that stands up and supports a load; may use a very light load (e.g., not approach maximum load bridge will bear)	designs a bridge that meets requirements and experiments to determine the load it will support	shows innovation; designs a relatively complex bridge that meets requirements; uses efficient and often innovative strategies to determine the load it will bear
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q3.3

Peer and Self Assessment: Unit Problem (Unit 3)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
Part 1: The bridge supports a load, stands up by itself, and spans a 35 cm gap.				
Part 2: The attributes and polygons in the bridge are identified and named.				
Part 3: The work shows the greatest mass (load) that the bridge could support.				
The attributes that make the bridge strong are explained logically.				

Planning for Unit 4: Decimals

Supporting Cross-Curricular Competencies

Unit Focus: to communicate appropriately

Materials
Master Q4.1:
Unit Rubric: Decimals
Master Q4.2:
Performance Assessment Rubric: Coins Up Close
Master Q4.3:
Peer and Self Assessment: Unit Problem (Unit 4)

The Decimals unit is suitable for highlighting correct terminology and appropriate communication in the mathematics classroom. Employ these Student Book features to support students' developing vocabularies:

- From **Key Words** on page 113, create a word wall for students' reference; continue to add words throughout the unit.
- Develop students' textbook skills by showing them how key words are highlighted the first time they appear in a lesson in the Student Book (for example, on page 118).
- Encourage students to create their own glossaries of key words – both new words and those learned in previous grades – by recording mathematical words they encounter in the unit, and referring to the **Glossary** starting on page 408 if they need support.
- The **Connect** section in each lesson models appropriate mathematical language (for example, on pages 114, 118, and 125); students can reference the **Connect** as they complete the **Reflect** activity at the close of each lesson. Note these **Reflect** suggestions frequently ask students to use words and pictures to explain their thinking.

Use Master Q4.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Citizenship and Community Life

Educational Aim: to ensure that students take part in the democratic life of the classroom or the school and develop a spirit of openness to the world and respect for diversity

The Unit Problem can be opened up mathematically, and extended.
Have students consider how rules of conduct, rights, responsibilities, and laws might be different on the "Planet of the Giants" than they are on Earth. In groups, have students work on one or more of the following activities to help develop their understanding of the importance of rules, rights, responsibilities, and laws in our daily lives:

- Develop a code of conduct for giants.
- Make a table or graph that compares the rules and laws in your community to a community of giants.
- Create a "Charter of Rights and Responsibilities" for the Planet of the Giants.
- Imagine that both humans and giants lived together. What special rules or understandings would be needed?

Provide opportunities for students to share their work.
Use Master Q4.2: Performance Assessment Rubric and Master Q4.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q4.1 Unit Rubric: Decimals

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of decimals and decimal operations by: - demonstrating and describing equivalent decimals - comparing and ordering decimals - approximating the result of an operation	limited understanding; may be unable to: - demonstrate and describe equivalent decimals - compare and order decimals - approximate the result of an operation	some understanding; partially able to: - demonstrate and describe equivalent decimals - compare and order decimals - approximate the result of an operation	shows understanding; able to: - demonstrate and describe equivalent decimals - compare and order decimals - approximate the result of an operation	thorough understanding; able to: - demonstrate and describe equivalent decimals - compare and order decimals - approximate the result of an operation
Processes • accurately works to two decimal places, including: - representing, reading, and writing decimals to hundredths - adding, subtracting, multiplying, and dividing - mentally multiplying and dividing by 10 and 100	limited accuracy; often makes major errors or omissions in: - representing, reading, and writing decimals to hundredths - adding, subtracting, multiplying, and dividing - mentally multiplying and dividing by 10 and 100	partially accurate; makes frequent minor errors or omissions in: - representing, reading, and writing decimals to hundredths - adding, subtracting, multiplying, and dividing - mentally multiplying and dividing by 10 and 100	generally accurate; makes few errors or omissions in: - representing, reading, and writing decimals to hundredths - adding, subtracting, multiplying, and dividing - mentally multiplying and dividing by 10 and 100	accurate; rarely makes errors or omissions in: - representing, reading, and writing decimals to hundredths - adding, subtracting, multiplying, and dividing - mentally multiplying and dividing by 10 and 100
Solves situational problems				
• solves and creates problems involving decimals, and validates and explains solutions	has difficulty solving and creating problems involving decimals; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving decimals in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving decimals; validates and explains solutions	solves and creates problems involving decimals in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about decimals, using mathematical language, and objects, drawings, tables, symbols, graphs, or words	has difficulty interpreting and producing mathematical messages about decimals	partially able to interpret and produce mathematical messages about decimals	interprets and produces mathematical messages about decimals	interprets and produces precise mathematical messages about decimals
Cross-curricular competency: to communicate appropriately				
• uses appropriate mathematical symbols and vocabulary	use of mathematical symbols and language is inconsistent and imprecise	use of mathematical symbols and language is generally correct but often imprecise	use of mathematical symbols and language is usually correct and shows increasing precision	use of mathematical symbols and language is consistently accurate and precise

Master Q4.2

Performance Assessment Rubric: Coins Up Close

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding of decimals and decimal operations by choosing and explaining appropriate strategies and procedures for each task	shows little understanding; may be unable to choose or explain appropriate strategies and procedures for most tasks	shows partial understanding by choosing and explaining (partially) appropriate strategies and procedures for some tasks	shows understanding by choosing and explaining appropriate strategies and procedures for most tasks	shows thorough understanding by choosing appropriate strategies and procedures for all tasks; offers complete and effective explanations
Processes • accurately: - adds, subtracts, multiplies, and divides with decimals - reads and writes decimals and money values	limited accuracy; makes frequent major errors or omissions in: - adding and subtracting with decimals - multiplying and dividing with decimals - reading and writing decimals and money values	partially accurate; makes frequent minor errors or omissions in: - adding and subtracting with decimals - multiplying and dividing with decimals - reading and writing decimals and money values	generally accurate; few errors or omissions in: - adding and subtracting with decimals - multiplying and dividing with decimals - reading and writing decimals and money values	accurate; very few, if any, errors or omissions in: - adding and subtracting with decimals - multiplying and dividing with decimals - reading and writing decimals and money values
Solves situational problems				
• uses appropriate strategies to solve and pose problems involving decimals and the value, mass, thickness, and diameter of coins	unable to use appropriate strategies to solve and create most problems involving decimals	uses some appropriate strategies, with partial success, to solve and create problems involving decimals	uses appropriate strategies to successfully solve and create problems involving decimals	uses appropriate, efficient, and often innovative strategies to successfully solve and create problems involving decimals
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q4.3

Peer and Self Assessment: Unit Problem (Unit 4)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
The strategies and processes used to solve each problem are shown.				
All answers are complete and correct.				
A challenging problem using decimals was created and solved.				
Appropriate mathematical language and symbols are used correctly.				

Planning for Unit 5: Data Management

Supporting Cross-Curricular Competencies

Recommended Software: *Appleworks*

Unit Focus: to exercise critical judgment

Materials
Master Q5.1:
Unit Rubric: Data Management
Master Q5.2:
Performance Assessment Rubric: In the Lab
Master Q5.3:
Peer and Self Assessment: Unit Problem (Unit 5)

The Data Management unit supports the use of critical judgement by encouraging students to show logic and intuition, while taking different contexts into account. Highlighted below are some of the Student Book and Teacher Guide features that support students' development of well-thought-out opinions:

- The **Explore** activities present students with a range of contexts and problems that aim to extend critical thinking and problem-solving skills; encourage students to formulate questions and make connections between the information presented and their existing knowledge.
- Each **Connect** section uses language that is clear, and communicates concepts in a logical, organized manner (for example, on page 161); discuss new concepts presented, encouraging students to express their judgments.
- In the Teacher Guide, there are various assessment tools that promote Self-Assessment (for example, Program Master 2: Self Assessment); utilize these tools to help develop students' critical judgment skills.

Use Master Q5.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Environmental Awareness

Educational Aim: to encourage students to develop an active relationship with their environment while maintaining a critical attitude toward exploitation of the environment, technological development and consumer goods

The Unit Problem can be opened up mathematically, and extended.
Discuss with students their relationship with the environment, particularly the one surrounding the school. Ask questions, such as:

- How do we affect the environment surrounding our school?
- What questions could we ask to investigate the impact we have on our environment?
- What actions could we take to improve our environment?

Students can find out more about their relationship with the environment by completing one or more of the following investigations. Have students predict the results and justify their predictions.

- Record and display the number and types of plants that surround the school.
- Count the various types of vehicles that go by the school, and display the results.
- Record the types of garbage found around the school, and create a plan to reduce the amount of garbage.
- Count and graph the number and type of recycled containers in a classroom recycling bin.

Use Master Q5.2: Performance Assessment Rubric and Master Q5.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q5.1 Unit Rubric: Data Management

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of data management by appropriately: - formulating survey questions - describing data in tables - discussing the reasonableness of data and results	limited understanding; may be unable to: - formulate survey questions - describe data in tables - discuss the reasonableness of data and results	some understanding; partially able to: - formulate survey questions - describe data in tables - discuss the reasonableness of data and results	shows understanding; able to: - formulate survey questions - describe data in tables - discuss the reasonableness of data and results	thorough understanding; in various contexts, able to: - formulate survey questions - describe data in tables - discuss the reasonableness of data and results
Processes • accurately: - collects and records data - interprets a circle graph - calculates mean	limited accuracy; often makes major errors or omissions in: - collecting and organizing data - interpreting a circle graph - calculating mean	partially accurate; makes frequent minor errors or omissions in: - collecting and organizing data - interpreting a circle graph - calculating mean	generally accurate; makes few errors or omissions in: - collecting and organizing data - interpreting a circle graph - calculating mean	accurate; rarely makes errors or omissions in: - collecting and organizing data - interpreting a circle graph - calculating mean
Solves situational problems				
• solves and creates problems involving data management, and validates and explains solutions	has difficulty solving and creating problems involving data management; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving data management in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving data management; validates and explains solutions	solves and creates problems involving data management in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about data management using mathematical language, and objects, drawings, tables, symbols, graphs, or words	has difficulty interpreting and producing mathematical messages about data management	partially able to interpret and produce mathematical messages about data management	interprets and produces mathematical messages about data management	interprets and produces precise mathematical messages about data management
Cross-curricular competency: to exercise critical judgment				
• verifies the appropriateness and accuracy of the data	unable to verify the accuracy and appropriateness of the data for the question posed; accepts without questioning	with support and specific criteria, verifies the accuracy and appropriateness of the data for the question posed	verifies the accuracy and appropriateness of the data for the question posed	verifies the accuracy and appropriateness of the data for the question posed in an increasing range of contexts

Master Q5.2

Performance Assessment Rubric: In the Lab

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding by analysing and explaining: - predicted results - another group's results (are they reasonable?) - own results (what they learned)	shows little understanding; may be unable to analyse or explain: - predicted results - another group's results - own results	shows partial understanding; offers some reasonable analysis and explanation of:: - predicted results - another group's results - own results	shows understanding by offering reasonable analyses and explanation of: - predicted results - another group's results - own results	shows thorough understanding by giving in-depth and insightful analyses and explanations of: - predicted results - another group's results - own results
Processes • uses appropriate processes to accurately: - collect and record data in a table - summarize results	limited accuracy; major errors or omissions in: - collecting and recording data in a table - summarizing results	somewhat accurate; frequent minor errors or omissions in: - collecting and recording data in a table - summarizing results	generally accurate; few errors or omissions in: - collecting and recording data in a table - summarizing results	accurate; rarely makes errors or omissions in: - collecting and recording data in a table - summarizing results
Solves situational problems				
• develops an appropriate question and designs an experiment to answer the question including: - choosing an appropriate sample - designing appropriate data collection methods - creating appropriate classifications and ranges for recording data - choosing an appropriate way of displaying data	designs an experiment that does not answer the question	develops a simple question, and designs an experiment that partially answers the question; design or plan is flawed in some way	develops a questions and designs an appropriate experiment to answer the question	shows innovation; develops a relatively complex question and experiment; uses efficient and often innovative strategies to answer the question
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q5.3

Peer and Self Assessment: Unit Problem (Unit 5)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
Part 1: The question chosen can be answered by doing an experiment. Reasonable predictions were made about the results				
Part 2: The data is recorded in a table.				
Part 3: Another group's results are evaluated and explained.				
Part 4: The presentation is clear and logical. Appropriate mathematical language is used.				

Planning for Unit 6: Measurement

Supporting Cross-Curricular Competencies

Unit Focus: to adopt effective work methods

Materials
Master Q6.1:
Unit Rubric: Measurement
Master Q6.2:
Performance Assessment Rubric: All Aboard!
Master Q6.3:
Peer and Self Assessment: Unit Problem (Unit 6)

Measurement is an appropriate topic to emphasize the value of working effectively. Use these Student Book and Teacher Guide features to support students' development of effective work and management habits:

- The **Show and Share** section in each lesson (for example, on pages 194 and 197) prompts students to discuss how they worked in the **Explore** activity; encourage students to talk about whether they think they had an effective approach and why, and how they organized their work to keep track of their results.
- Each **Connect** activity (for example, on pages 211 and 214) models an effective method for solving a problem.
- In each module of the Teacher Guide, a **Step-by-Step** master for each Assessment Focus question in each Practice set is provided; use these reproducible masters to provide greater structure to students who need it, and to help foster effective solution methods.

Use Master Q6.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Personal and Career Planning

Educational Aim: to enable students to undertake and complete projects that develop their potential and help them integrate into society

The Unit Problem can be opened up mathematically, and extended.

Prompt students to discuss jobs that involve transporting people and goods into Canada. Have students work in groups to research and report on a particular sector or area of transportation (e.g., railway shipping; rapid transit; buses; long distance trucking; cargo ships; air cargo; bicycles; road planning; highway maintenance). Direct students to appropriate electronic resources or databases.

Have each group present a report on various jobs and career opportunities in the sector they have chosen. Each student in the group should choose a specific job within the sector that is interesting to them, and present a PMI chart showing the "pluses" "minuses" and "interesting points" about the job or career.

Use Master Q6.2: Performance Assessment Rubric and Master Q6.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q6.1 Unit Rubric: Measurement

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of measurement by: - demonstrating and explaining relationships between capacity and volume - estimating volume - constructing objects of a specific volume - choosing and explaining appropriate procedures	limited understanding; may be unable to: - demonstrate and explain relationships between capacity and volume - estimate volume - construct objects of a specific volume - choose and explain appropriate procedures	some understanding; partially able to: - demonstrate and explain relationships between capacity and volume - estimate volume - construct objects of a specific volume - choose and explain appropriate procedures	shows understanding; able to: - demonstrate and explain relationships between capacity and volume - estimate volume - construct objects of a specific volume - choose and explain appropriate procedures	thorough understanding; in various contexts, able to: - demonstrate and explain relationships between capacity and volume - estimate volume - construct objects of a specific volume - choose and explain appropriate procedures
Processes • accurately: - relates units of measure (time, money, volume, capacity, mass) - estimates, measures, and compares mass, volume, and capacity	limited accuracy; often makes major errors or omissions in: - relating units of measure - estimating, measuring, and comparing mass, volume, and capacity	partially accurate; makes frequent minor errors or omissions in: - relating units of measure - estimating, measuring, and comparing mass, volume, and capacity	generally accurate; makes few errors or omissions in: - relating units of measure - estimating, measuring, and comparing mass, volume, and capacity	accurate; rarely makes errors or omissions in: - relating units of measure - estimating, measuring, and comparing mass, volume, and capacity
Solves situational problems				
• solves and creates problems involving measurement, and validates and explains solutions	has difficulty solving and creating problems involving measurement; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving measurement in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving measurement; validates and explains solutions	solves and creates problems involving measurement in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about measurement, using mathematical language and objects, drawings, tables, symbols, graphs, or words	has difficulty interpreting and producing mathematical messages about measurement	partially able to interpret and produce mathematical messages about measurement	interprets and produces mathematical messages about measurement	interprets and produces precise mathematical messages about measurement
Cross-curricular competency: to adopt effective work methods				
• chooses appropriate materials and tools; manages time to complete tasks	does not make appropriate use of materials or time; frequently does not complete tasks	with support, usually able to use materials and time appropriately; may be somewhat inefficient	uses materials and time appropriately; completes most tasks	uses materials and time efficiently and effectively, completes all tasks

Master Q6.2

Performance Assessment Rubric: All Aboard!

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding of measurement by choosing appropriate procedures, and giving reasonable explanations of the results	shows little understanding; may be unable to choose appropriate procedures or explain results	shows partial understanding by choosing appropriate procedures for most tasks and offering some reasonable explanations	shows understanding by choosing appropriate procedures and giving reasonable explanations in most cases	shows thorough understanding by choosing appropriate procedures for all parts of the problem and giving reasonable explanations
Processes • accurately calculates and/or measures, including units: - length and costs in table - change from $100 - time for one trip - volume of box car - number of boxcars for 120 t cargo - solution to own problem	limited accuracy; major errors or omissions in required calculations and recording of: - length and costs in table - change from $100 - time for one trip - volume of box car - number of boxcars for 120 t cargo - solution to own problem	partially accurate; frequent minor errors or omissions in: - length and costs in table - change from $100 - time for one trip - volume of box car - number of boxcars for 120 t cargo - solution to own problem	generally accurate; few errors or omissions in: - length and costs in table - change from $100 - time for one trip - volume of box car - number of boxcars for 120 t cargo - solution to own problem	accurate; very few, if any, errors or omissions in: - length and costs in table - change from $100 - time for one trip - volume of box car - number of boxcars for 120 t cargo - solution to own problem
Solves situational problems				
• uses appropriate strategies to design a track and create and solve an original problem	designs a very simple track that does not use close to $100 (or may exceed $100); creates very simple and basic problem; may be modelled closely on part of the Unit Problem (or may be unworkable)	designs a simple track that meets some of the requirements of the problem; may use inefficient strategies; creates a relatively straightforward problem	designs a track that meets the requirements of the problem; uses efficient strategies; creates a problem that has some complexity (e.g., involves more than one measurement)	designs a relatively complex track that meets the requirements of the problem; uses efficient and often innovative strategies; creates an innovative problem that has some complexity
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q6.3

Peer and Self Assessment: Unit Problem (Unit 6)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
Part 1: The track for the model railway meets the budget of $100.				
Part 2: The work is recorded accurately in a table.				
Parts 3 and 4: Answers are correct and complete.				
Part 5: A challenging measurement problem about the model railway was created and solved.				

Planning for Unit 7: Transformational Geometry

Supporting Cross-Curricular Competencies

Recommended Software: *Appleworks*

Unit Focus: to use creativity

Materials
Master Q7.1:
Unit Rubric: Transformational Geometry
Master Q7.2:
Performance Assessment Rubric: Geometry in Art
Master Q7.3:
Peer and Self Assessment: Unit Problem (Unit 7)

The Transformational Geometry unit encourages students to bring their own understanding, their own strategies, and their own ideas to new problem situations. Make use of these Student Book features that promote creative thinking:

- Many of the **Explore** activities allow students to select materials that best suit their needs for solving each problem; ensure a variety of materials are available for student use to encourage creative solutions (for example, on pages 231 and 235).
- The **Reflect** activities (for example, on pages 237 and 243) give students the opportunity to show originality in their thinking; in addition to students using words, pictures, and numbers to explain their thinking, encourage them to reflect on their learning in other ways (such as making a model or writing a poem).
- Encourage students to solve the Practice questions in the **Strategies Toolkit** lesson (Lesson 5) using a different strategy than the one highlighted.

Use Master Q7.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Media Literacy

Educational Aim: to develop students' critical and ethical judgment with respect to media and to give them opportunities to produce media documents that respect individual and collective rights

The Unit Problem can be opened up mathematically, and extended.

Use the Unit Problem to initiate a study of how people are represented in magazine advertisements. Begin by having students look for geometric patterns or tessellations in advertisements in magazines. Invite volunteers to describe the patterns they find. Then, in groups, have students find advertisements showing people. Have students analyse how the people are portrayed in the advertisements. Prompt students to look at some of the following components of each advertisement:

- What kinds of people are shown? (include gender, hair colour, body type, clothing, and so on)
- What are the people doing?
- What is the target audience for each advertisement?
- What values are shown in the advertisements?
- How might the advertisements affect how different people or groups think about themselves?

Students can make a table to record their analyses. Work with students to develop some guidelines for being an observant and critical consumer of print advertising.

Use Master Q7.2: Performance Assessment Rubric and Master Q7.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q7.1 Unit Rubric: Transformational Geometry

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of transformations, symmetry, and coordinates by: - creating and describing tessellations - recognizing and describing tessellations in the environment - describing position on a grid - describing and producing tiling patterns	limited understanding; may be unable to: - create and describe tessellations - recognize and describe tessellations in the environment - describe position on a grid - describe and produce tiling patterns	some understanding; partially able to: - create and describe tessellations - recognize and describe tessellations in the environment - describe position on a grid - describe and produce tiling patterns	shows understanding; able to: - create and describe tessellations - recognize and describe tessellations in the environment - describe position on a grid - describe and produce tiling patterns	thorough understanding; able to: - create and describe tessellations - recognize and describe tessellations in the environment - describe position on a grid - describe and produce tiling patterns
Processes • accurately: - recognizes a slide, turn, and flip - covers a surface using one or more tessellating shapes	limited accuracy; often makes major errors or omissions in: - recognizing a slide, turn, or flip - covering a surface using one or more tessellating shapes	partially accurate; makes frequent minor errors or omissions in: - recognizing a slide, turn, or flip - covering a surface using one or more tessellating shapes	generally accurate; makes few errors or omissions in: - recognizing a slide, turn, or flip - covering a surface using one or more tessellating shapes	accurate; rarely makes errors or omissions in: - recognizing a slide, turn, or flip - covering a surface using one or more tessellating shapes
Solves situational problems				
• solves and creates problems involving transformations, and validates and explains solutions	has difficulty solving and creating problems involving transformations; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving transformations in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving transformations; validates and explains solutions	solves and creates problems involving transformations in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about transformations, using mathematical language, and objects, drawings, tables, symbols, graphs, or words	has difficulty interpreting and producing mathematical messages about transformations	partially able to interpret and produce mathematical messages about transformations	interprets and produces mathematical messages about transformations	interprets and produces precise mathematical messages about transformations
Cross-curricular competency: to use creativity				
• experiments with new combinations of concepts, strategies, and processes to reach an objective	unable or unwilling to proceed in new ways; tries to follow procedures learned	with support and scaffolding, willing to try combining some of the concepts, strategies, and processes learned	experiments with combining some of the concepts, strategies, and processes learned to develop new methods	enjoys experimenting and taking risks to combine some of the concepts, strategies, and processes learned to develop innovative methods

Master Q7.2

Performance Assessment Rubric: Geometry in Art

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding by choosing appropriate procedures, and discussing and explaining ways to use transformations to make the tessellation	shows little understanding; may be unable to choose appropriate procedures or offer reasonable explanations	shows partial understanding by choosing appropriate procedures and offering some reasonable explanation	shows understanding by choosing appropriate procedures and giving reasonable explanations	shows thorough understanding by choosing appropriate procedures and giving in-depth and insightful explanations
Processes • accurately: - uses appropriate procedures to create a tessellation	limited accuracy; major errors or omissions in the tessellation	partially accurate; frequent minor errors or omissions in the tessellation	generally accurate; few errors or omissions in the tessellation	accurate; rarely makes errors or omissions in the tessellation
Solves situational problems				
• uses appropriate strategies to create a pattern for a tile that tessellates and makes a tessellation	uses simple or inappropriate strategies; tile does not tessellate	uses some appropriate strategies with partial success to - make a simple pattern for a tile that tessellates - create a simple tessellation	uses appropriate strategies to: - make a pattern for a tile that tessellates - create a tessellation	shows innovation; uses efficient and often innovative strategies to: - create a pattern for a tile that tessellates - create a tessellation
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q7.3

Peer and Self Assessment: Unit Problem (Unit 7)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
The pattern for the tile has no gaps or overlaps.				
The tiles are tessellated on Bristol board.				
Different ways to make the tessellation are described, using transformations.				
Descriptions are clear. Appropriate mathematical language is used to describe the tessellation.				

Planning for Unit 8: Fractions and Decimals

Supporting Cross-Curricular Competencies

Recommended Software: *TI-108 calculator*

Unit Focus: to solve problems

Materials
Master Q8.1:
Unit Rubric: Fractions and Decimals
Master Q8.2:
Performance Assessment Rubric: In the Garden
Master Q8.3:
Peer and Self Assessment: Unit Problem (Unit 8)

In the Fractions and Decimals unit, students solve problems in various contexts. Utilize these Student Book and Teacher Guide features to support students' development of effective problem solving skills:

- In all of the **Explore** activities and in **Practice** questions, problem-solving opportunities are presented in relevant contexts; encourage students to share their problem-solving strategies with the class.
- In the **Strategies Toolkit** lesson (Lesson 10), students approach new problems involving critical and creative thinking; review the given list of strategies and encourage students to solve the Practice questions using more than one strategy.
- In the Teacher Guide module **Grade 5 Planning and Program Masters**, Program Master 3 (Self-Assessment: Problem Solving) promotes individual reflection about the problem-solving process; use this assessment tool with any problem throughout the unit.

Use Master Q8.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:

Environmental Awareness and Consumer Rights and Responsibilities

Educational Aim: to encourage students to develop an active relationship with their environment while maintaining a critical attitude toward exploitation of the environment, technological development and consumer goods

The Unit Problem can be opened up mathematically, and extended.
Invite students to consider environmental benefits of gardening, particularly growing vegetables and fruits. Prompt some initial discussion with questions, such as:

- Why do people grow gardens?
- What kinds of gardens do people grow in our community?
- What gardening experiences have you had?
- What are some benefits of having a garden?

In pairs, challenge students to research a question related to the benefits of gardening on the environment, for example:

- How much money can a family save by growing their own vegetables in the summer?
- How can local gardens reduce pollution from vehicles?
- What is the effect of gardens on air quality?

Support students in developing and researching their questions. Have students present their research to the class.
Use Master Q8.2: Performance Assessment Rubric and Master Q8.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q8.1 Unit Rubric: Fractions and Decimals

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding by representing and explaining: - proper fractions - equivalent proper fractions - the comparison/ordering of decimals and fractions - relationship between fractions and decimals - operations with decimals (multiplication and division)	limited understanding; may be unable to demonstrate or descriibe: - proper fractions - equivalent proper fractions - the comparison/ ordering of decimals and fractions - relationship between fractions and decimals - operations with decimals	partially able to demonstrate or describe: - proper fractions - equivalent proper fractions - the comparison/ ordering of decimals and fractions - relationship between fractions and decimals - operations with decimals	shows understanding; able to demonstrate or describe: - proper fractions - equivalent proper fractions - the comparison/ ordering of decimals and fractions - relationship between fractions and decimals - operations with decimals	thorough understanding; able to demonstrate or describe: - proper fractions - equivalent proper fractions - the comparison/ ordering of decimals and fractions - relationship between fractions and decimals - operations with decimals
Processes • accurately: - reads, writes, and represents fractions - relates fractions to decimals - identifies equivalent fractions - approximates results of operations with decimals	limited accuracy; makes major errors or omissions in: - multiplying and dividing decimals - multiplying and dividing fractions	partially accurate; makes frequent minor errors or omissions in: - multiplying and dividing decimals - multiplying and dividing fractions	generally accurate; makes few errors or omissions in: - multiplying and dividing decimals - multiplying and dividing fractions	accurate; rarely makes errors or omissions in: - multiplying and dividing decimals - multiplying and dividing fractions
Solves situational problems				
• solves and creates problems involving fractions and decimals, and validates and explains solutions	has difficulty solving and creating problems involving fractions and decimals; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving fractions and decimals in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving fractions and decimals; validates and explains solutions	solves and creates problems involving fractions and decimals in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about fractions and decimals, using mathematical language, and objects, drawings, tables, symbols, graphs, or words	has difficulty interpreting and producing mathematical messages about fractions and decimals	partially able to interpret and produce mathematical messages about fractions and decimals	interprets and produces mathematical messages about fractions and decimals	interprets and produces precise mathematical messages about fractions and decimals
Cross-curricular competency: to solve problems				
• explains elements of a situational problem; recognizes similarities to other problems involving mathematical concepts and processes	unable to determine key elements of a new problem; does not make connections to previous problem-solving experiences	with scaffolding, identifies key elements of a new problem and recognizes similarities to previous problem-solving experiences	identifies key elements of a new problem and recognizes similarities to previous problem-solving experiences	identifies key elements of a new problem, and makes inferences to recognize similarities to previous problem-solving experiences

Master Q8.2

Performance Assessment Rubric: In the Garden

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding of decimals and decimal operations by choosing and explaining appropriate strategies and procedures for each part of the task, and recognizing when results are reasonable	shows little understanding; may be unable to choose or explain appropriate strategies and procedures for most parts of the task; may not recognize that results are not reasonable	shows partial understanding by choosing and explaining (partially) appropriate strategies and procedures for some part of the task; recognizes when results are extremely unlikely	shows understanding by choosing and explaining appropriate strategies and procedures for most tasks; recognizes when results are not reasonable	shows thorough understanding by choosing appropriate strategies and procedures for all tasks and offering complete and effective explanations; recognizes when results are not precise
Processes • accurately: - represents and describes fractions and decimals as regions of a rectangle (using grid paper) - multiplies and divides decimals	limited accuracy; makes frequent major errors or omissions in: - representing and describing fractions and decimals as regions of a rectangle - multiplying and dividing with decimals	partially accurate; makes frequent minor errors or omissions in: - representing and describing fractions and decimals as regions of a rectangle - multiplying and dividing with decimals	generally accurate; few errors or omissions in: - representing and describing fractions and decimals as regions of a rectangle - multiplying and dividing with decimals	accurate; very few, if any, errors or omissions in: - representing and describing fractions and decimals as regions of a rectangle - multiplying and dividing with decimals
Solves situational problems				
• uses appropriate strategies to solve and pose problems involving decimals and fractions, including: - creating plans that satisfy guidelines for a garden - solving problems posed by classmates - creating story problems involving multiplication and division with decimals - solving problems posed by classmates	unable to use appropriate strategies to solve and create most problems involving decimals and fractions, including: - creating garden plans - creating multiplication and division problems - solving classmates' problems	uses appropriate strategies to successfully solve and create some problems involving decimals and fractions, including: - creating garden plans - creating multiplication and division problems - solving classmates' problems	uses appropriate strategies to successfully solve and create most problems involving decimals and fractions, including: - creating garden plans - creating multiplication and division problems - solving classmates' problems	uses appropriate, efficient, and often innovative strategies to successfully solve and create problems involving decimals and fractions, including: - creating garden plans - creating multiplication and division problems - solving classmates' problems
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q8.3

Peer and Self Assessment: Unit Problem (Unit 8)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
Part 1: The garden follows the given guidelines.				
The decimal and fractional parts are calculated correctly.				
Part 2: The garden follows a classmate's guidelines.				
Part 3: There are challenging story problems about the garden that use decimals and fractions.				

Planning for Unit 9: Length, Perimeter, and Area

Supporting Cross-Curricular Competencies

Unit Focus: to construct his/her identity

Materials
Master Q9.1:
Unit Rubric: Length, Perimeter, and Area
Master Q9.2:
Performance Assessment Rubric: At the Zoo
Master Q9.3:
Peer and Self Assessment: Unit Problem (Unit 9)

The Length, Perimeter, and Area unit provides students with many opportunities to make decisions, express their thoughts and feelings, and take responsibility for their actions. Employ these Student Book and Teacher Guide features to support students as they develop their own identities:

- In each lesson, the **Reflect** prompt (for example, on pages 310 and 313) allows for individual reflection; encourage students to examine their personal understanding, thoughts, and opinions, and to share them with others in the class.
- The **Explore** activities and **Practice** questions include contextual problems that promote responsibility to one's self, peers, and community; highlight these positive options for students (such as healthy eating, active living, and participating in fundraising events).
- The Teacher Guide module **Building a Math Community** provides practical suggestions for creating a respectful classroom environment; revisit these ideas throughout the year.

Use Master Q9.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Media Literacy

Educational Aim: to develop students' critical and ethical judgment with respect to media and to give them opportunities to produce media documents that respect individual and collective rights

The Unit Problem can be opened up mathematically, and extended.

Direct students to the Unit Problem (page 346). Point out that the problem includes many features found in brochures or advertisements for attractions, such as a zoo (e.g., attractive graphics, bold print, colourful design, and so on). Provide students with a variety of brochures for attractions. Have students identify strategies and techniques advertisers use to convince people to visit their attraction. Have students comment on the use of graphs, charts, and/or statistics in the brochures (for example, "Book now and receive a 25% discount."). Invite volunteers to share their ideas with the class. In pairs, have students design their own "attraction" and create a brochure that will convince people to visit. Encourage students to include creative charts, graphs, or data in their brochure. Have students present and display their brochures.

Use students' presentations to discuss how consumers should analyse and question what they see in brochures or advertisements. For example: Who made the brochure? What do the writers/designers of the brochure want you to think or do? Should you believe everything the brochure says? What persuasive techniques are the designers of the brochure using?

Use Master Q9.2: Performance Assessment Rubric and Master Q9.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q9.1

Unit Rubric: Length, Perimeter, and Area

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding by demonstrating, explaining, using, and/or evaluating: - concepts of length, width, height, depth, thickness, perimeter, and circumference - the appropriateness of measuring units, tools, and procedures (in practical contexts)	shows little understanding; may be unable to demonstrate, explain, use, and/or evaluate: - concepts of linear dimensions, perimeter, area, and circumference - the appropriateness of measuring units, tools, and procedures	shows some understanding; partially able to demonstrate, explain, use, and/or evaluate: - concepts of linear dimensions, perimeter, area, and circumference - the appropriateness of measuring units, tools, and procedures	shows understanding; appropriately demonstrates, explains, uses, and/or evaluates: - concepts of linear dimensions, perimeter, area, and circumference - the appropriateness of measuring units, tools, and procedures	shows thorough understanding; appropriately demonstrates, explains, uses, and/or evaluates: - concepts of linear dimensions, perimeter, area, and circumference - the appropriateness of measuring units, tools, and procedures
Processes • accurately: - estimates, measures, and records length and surface area - relates units of measure	limited accuracy; often makes major errors or omissions in: - estimating and measuring length and surface area - relating units of measure	partially accurate; makes frequent minor errors or omissions in: - estimating and measuring length and surface area - relating units of measure	generally accurate; makes few errors or omissions in: - estimating and measuring length and surface area - relating units of measure	accurate; rarely makes errors or omissions in: - estimating and measuring length and surface area - relating units of measure
Solves situational problems				
• solves and creates problems involving length, perimeter, and area, and validates and explains solutions	has difficulty solving and creating problems involving length, perimeter and area; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving length, perimeter, and area in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving length, perimeter, and area; validates and explains solutions	solves and creates problems involving length, perimeter, and area in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about measurement	has difficulty interpreting and producing mathematical messages about measurement	partially able to interpret and produce mathematical messages about measurement	interprets and produces mathematical messages about measurement	interprets and produces precise mathematical messages about measurement
Cross-curricular competency: to construct his/her identity				
• identifies and uses personal strengths and preferences to choose tasks and strategies, and to overcome difficulties in tasks they do not like	unable to distinguish between tasks that draw on personal strengths and preferences and those that pose difficulties	with support, can identify some personal strengths and preferences, and sometimes recognizes how these can help with difficult tasks	identifies some personal strengths and preferences, and recognizes how these can help with difficult tasks	identifies personal strengths and preferences, and recognizes how to use these to create engagement and overcome limitations or difficulties

Master Q9.2

Performance Assessment Rubric: At the Zoo

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding of linear dimensions, perimeter, area, and their relationships by creating a reasonable area for each animal that reflects its size	shows little understanding; may be unable to: - choose appropriate procedures - select reasonable dimensions and areas for each animal	shows partial understanding by: - usually choosing appropriate procedures - selecting reasonable dimensions and areas for some animals	shows understanding by: - choosing appropriate procedures, in most cases - selecting reasonable dimensions and areas for most animals	shows thorough understanding by: - choosing appropriate procedures - selecting reasonable dimensions and areas for all animals
Processes • accurately: - measures and records the dimensions of each region - finds and records the perimeter and area of each section, including units - represents the design on a map	limited accuracy; often makes major errors or omissions in: - measuring and recording dimensions - finding and recording perimeter and area - representing the design on a map	partially accurate; makes frequent minor errors or omissions in: - measuring and recording dimensions - finding and recording perimeter and area - representing the design on a map	generally accurate; few errors or omissions in: - measuring and recording dimensions - finding and recording perimeter and area - representing the design on a map	accurate and precise; very few, if any, errors or omissions in: - measuring and recording dimensions - finding and recording perimeter and area - representing the design on a map
Solves situational problems				
• uses appropriate strategies, including estimating, to design a petting zoo that provides appropriate regions, varied by size and shape, for each animal within the given dimensions (rectangle 45 m by 36 m)	unable to design a zoo that includes required features; exceeds given size, or may be unrealistic	designs a zoo that includes most of the required features and is close to fitting within the required dimensions; several regions may be of unrealistic size for the animals	designs a zoo that includes the required features and fits within the required dimensions; some features may be of unrealistic size	designs a zoo that shows some innovation; includes required features (realistic size) and fits within the required dimensions; may introduce some additional complexity
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q9.3

Peer and Self Assessment: Unit Problem (Unit 9)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
The map for a petting zoo is labelled and meets the guidelines (45 m by 35 m with at least 5 different regions).				
The perimeter and area of each section is correct.				
The size of each region is reasonable for the animal it holds.				
Each region is a different shape and size.				

Planning for Unit 10: Patterns in Number and Geometry

Supporting Cross-Curricular Competencies

Recommended Software: *Appleworks, TI-108 calculator*

Unit Focus: to use information and communication technologies

Materials
Master Q10.1:
Unit Rubric: Patterns in Number and Geometry
Master Q10.2:
Performance Assessment Rubric: Squares Everywhere!
Master Q10.3:
Peer and Self Assessment: Unit Problem (Unit 10)

In the Patterns in Number and Geometry unit, opportunities exist for students to use various technologies (e.g., computers, calculators) to reinforce new concepts. Employ these Student Book and Teacher Guide features to support students' development of technology-based skills:

- The **Technology** lesson (pages 371-373) gives students a chance to explore tiling patterns using a computer; review the steps with students before they begin their tiling patterns.
- The **Numbers Every Day** feature regularly includes suggestions related to calculator skills (for example, on page 353); encourage students to check their solutions using a calculator (for example, on page 359, students can check their estimates with a calculator).
- The ***e-Tools*** software provides virtual manipulatives that help students develop mathematical concepts and enhance student success; the ***e-Tools*** appropriate for this unit include Geometry Shapes.

Use Master Q10.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Citizenship and Community Life

Educational Aim: to ensure that students take part in the democratic life of the classroom or the school and develop a spirit of openness to the world and respect for diversity

The Unit Problem can be opened up mathematically, and extended.

Draw students' attention to the picture of the quilt on page 377. Tell students that in some cultures, quilting is part of their tradition. Ask:

- How might a tradition, like quilting, bring people together?
- Where might you see patterns or designs, like a quilt or tapestry, in a community?
- Why might people in a community display quilts or tapestries?

Elicit from students that people might decorate a community-gathering place, such as a public library or community centre, with patterns and designs contributed by community members to promote respect and diversity for others' cultures.

Consider one of the following activities:

- Have students design and create a class quilt or tapestry, then donate it to a community library or centre.
- Have students look for patterns and designs created by community members and displayed in a community building, such as a library, hospital, community centre, and so on. Have students draw a picture of the design, tell what patterns they see, and reflect on its significance.

Use Master Q10.2: Performance Assessment Rubric and Master Q10.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q10.1 Unit Rubric: Patterns in Number and Geometry

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of number concepts and patterns by demonstrating, applying, and explaining: - patterns in multiplication - patterns in tables - tiling patterns	shows little understanding; may be unable to demonstrate, apply, and explain: - patterns in multiplication - patterns in tables - tiling patterns	shows some understanding; partially able to demonstrate, apply, and explain: - patterns in multiplication - patterns in tables - tiling patterns	shows understanding; able to demonstrate, apply, and explain: - patterns in multiplication - patterns in tables - tiling patterns	shows thorough understanding; appropriately demonstrates, applies, and explains: - patterns in multiplication - patterns in tables - tiling patterns
Processes • accurately: - identifies a pattern rule and predicts the next term - identifies and extends multiplication patterns - uses mental math to multiply - constructs tables to record patterns	limited accuracy; makes major errors or omissions in: - identifying a pattern rule and predicting the next term - identifying and extending multiplication patterns - using mental math to multiply - constructing tables to record patterns	partially accurate; makes frequent minor errors or omissions in: - identifying a pattern rule and predicting the next term - identifying and extending multiplication patterns - using mental math to multiply - constructing tables to record patterns	generally accurate; makes few errors or omissions in: - identifying a pattern rule and predicting the next term - identifying and extending multiplication patterns - using mental math to multiply - constructing tables to record patterns	accurate; rarely makes errors or omissions in: - identifying a pattern rule and predicting the next term - identifying and extending multiplication patterns - using mental math to multiply - constructing tables to record patterns
Solves situational problems				
• solves and creates problems involving patterns in number and geometry, and validates and explains solutions	has difficulty solving and creating problems involving patterns in number and geometry; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving patterns in number and geometry in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving patterns in number and geometry; validates and explains solutions	solves and creates problems involving patterns in number and geometry in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about patterns and patterning, using mathematical language, and objects, drawings, tables, symbols, graphs, or words	has difficulty interpreting and producing mathematical messages about patterns and patterning	partially able to interpret and produce mathematical messages about patterns and patterning	interprets and produces mathematical messages about patterns and patterning	interprets and produces precise mathematical messages about patterns and patterning
Cross-curricular competency: to use information and communication technologies				
• uses technology to explore and create patterns	unable to use technology to explore and create patterns	with step-by-step support, can use technology to explore and create patterns	uses technology to explore and create patterns	uses technology effectively to explore and create increasingly complex patterns

Master Q10.2

Performance Assessment Rubric: Squares Everywhere!

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding by: - interpreting and creating tables to discover a pattern - explaining findings and predictions related to side lengths and areas	shows little understanding; may be unable to: - create and interpret tables - explain findings and predictions	shows partial understanding; may have some difficulty: - creating and interpreting tables - explaining findings and predictions	shows understanding by: - creating and interpreting appropriate tables - giving reasonable explanations and interpretations	shows thorough understanding by: - creating and offering thorough and insightful interpretations of tables - giving insightful explanations and interpretations
Processes • accurately: - records information in tables - identifies patterns - uses patterns to predict area from a given side length	limited accuracy; makes frequent major errors or omissions in: - recording information in tables - identifying patterns - using patterns to predict area from a given side length	partially accurate; makes frequent minor errors or omissions in: - recording information in tables - identifying patterns - using patterns to predict area from a given side length	generally accurate; few errors or omissions in: - recording information in tables - identifying patterns - using patterns to predict area from a given side length	accurate; very few, if any, errors or omissions in: - recording information in tables - identifying patterns - using patterns to predict area from a given side length
Solves situational problems				
• chooses and carries out appropriate patterning strategies to solve problems and create a tiling pattern	unable to choose and carry out appropriate patterning strategies; may create a very simple and basic tiling pattern	chooses and carries out some basic patterning strategies; creates a simple design (or, a more complex one that has flaws)	chooses and carries out patterning strategies; creates an appropriate tiling pattern that has some complexity; may have minor flaws	chooses and carries out efficient and effective strategies; creates a tiling pattern that shows some innovation and complexity
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q10.3

Peer and Self Assessment: Unit Problem (Unit 10)

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
All the squares are drawn and labelled accurately on grid paper.				
Tables show the side lengths and the areas of the squares.				
There is a clear explanation of the patterns found in the tables.				
An interesting pattern with squares is created. It is coloured to show a design.				

Planning for Unit 11: Probability

Supporting Cross-Curricular Competencies

Unit Focus: to use information

Materials
Master Q11.1:
Unit Rubric: Probability
Master Q11.2:
Performance Assessment Rubric: At the Pet Store!
Master Q11.3:
Peer and Self Assessment: Unit Problem (Unit 11)

The Probability unit provides students with opportunities to use information in meaningful contexts. The following Student Book features support students as they learn how to compare, group, organize, display, and question information:

- Lesson introductions (pages 380 and 386) prompt students to assess prior knowledge and make connections to new concepts; read and discuss lesson introductions with students.
- The **Explore** activities, **Practice** questions, and the **Strategies Toolkits** give students the chance to use given information to solve relevant problems; support students in selecting materials that best suit their needs for solving each problem.
- The **Connect** section in each lesson (for example, on pages 381 and 384) allows for students to make connections between what they already know and new information; encourage students to share any connections they make with the class.

Use Master Q11.1: Unit Rubric, to support your ongoing assessment during the unit, with a focus on the cross-curricular competency highlighted here.

Addressing Broad Areas of Learning:
Health and Well-Being

Educational Aim: to ensure that students adopt a self-monitoring procedure concerning the development of good living habits related to health, well-being, sexuality and safety

The Unit Problem can be opened up mathematically, and extended.

Invite students to share any experiences with a classroom or school pet. Have students consider how pets help keep people healthy and well, for example, by reducing stress, promoting relaxation, helping people feel needed, and increasing exercise. Tell students about pets who have "special jobs," such as pets who visit hospitals or care homes, dogs who visit libraries so children who have trouble reading can read to a "friend," and so on. In groups, have students brainstorm and/or research other examples of "special jobs" pets have in supporting people's health and wellness.

In pairs, have students design and conduct a survey about the health benefits of owning a pet. Students can conduct their surveys at home or at school, and then present their findings to the class. Have students reflect individually about the health benefits of owning a pet, then draw conclusions.

Use Master Q11.2: Performance Assessment Rubric and Master Q11.3: Peer and Self Assessment to support the assessment of the Unit Problem.

Master Q11.1 Unit Rubric: Probability

This assessment tool is designed to record overall student performance as you accumulate evidence by reviewing portfolios, observation records, unit assessment activities, and other work. It can be used to guide feedback and help prepare for reporting. It should not be used for just one specific activity.

To create a profile of a student's achievement, use a highlighter to identify behaviours you have observed.

	Level 1	Level 2	Level 3	Level 4
Uses mathematical processes and concepts				
Concepts • shows understanding of probability by appropriately: - using concepts and language of probability to describe events and predictions - comparing the likelihood of events - explaining the results of probability experiments and simulations	limited understanding; may be unable to: - use concepts and language of probability to describe events and predictions - compare the likelihood of events - explain the results of probability experiments and simulations	some understanding; partially able to: - use concepts and language of probability to describe events and predictions - compare the likelihood of events - explain the results of probability experiments and simulations	shows understanding; able to: - use concepts and language of probability to describe events and predictions - compare the likelihood of events - explain the results of probability experiments and simulations	thorough understanding: able to: - use concepts and language of probability to describe events and predictions - compare the likelihood of events - explain the results of probability experiments and simulations
Processes • accurately: - lists all possible outcomes of an experiment (single event) - makes reasonable predictions about the likelihood of events - uses fractions to describe probability	limited accuracy; often makes major errors or omissions in: - listing possible outcomes - predicting outcomes - using fractions to describe probability	partially accurate; makes frequent minor errors or omissions in: - listing possible outcomes - predicting outcomes - using fractions to describe probability	generally accurate; makes few errors or omissions in: - listing possible outcomes - predicting outcomes - using fractions to describe probability	accurate; rarely makes errors or omissions in: - listing possible outcomes - predicting outcomes - using fractions to describe probability
Solves situational problems				
• solves and creates problems involving probability, and validates and explains solutions	has difficulty solving and creating problems involving probability; unable to validate or explain solutions	with some support or prompting, solves and creates problems involving probability in familiar contexts; needs help to validate and explain solutions	solves and creates problems involving probability; validates and explains solutions	solves and creates problems involving probability in effective and often innovative ways; validates and explains solutions
Communicates using mathematical language				
• interprets and produces messages about probability, using mathematical language, and objects, drawings, tables, symbols, graphs, or words	has difficulty interpreting and producing mathematical messages about probability	partially able to interpret and produce mathematical messages about probability	interprets and produces mathematical messages about probability	interprets and produces precise mathematical messages about probability
Cross-curricular competency: to use information				
• uses information gathered to answer probability questions	has difficulty recognizing how the information gathered can be used to answer a question	uses information gathered to answer probability questions when the question is very similar to those experienced previously	uses information gathered to answer a variety of probability questions	uses information gathered effectively and efficiently to answer probability questions in a variety of familiar and new contexts

Master Q11.2

Performance Assessment Rubric: At the Pet Store!

	Level 1	Level 2	Level 3	Level 4
Uses mathematical concepts and processes				
Concepts • shows understanding by analysing and explaining: - differences between predicted probabilities and actual events - procedures used to determine probabilities and calculate the number of each type of fish	shows little understanding; may be unable to analise or explain: - differences between predicted probabilities and actual events - procedures used to determine probabilities and calculate the number of each type of fish	shows partial understanding by offering some reasonable analysis and explanation of: - differences between predicted probabilities and actual events - procedures used to determine probabilities and calculate the number of each type of fish	shows understanding by offering reasonable analyses and explanation of: - differences between predicted probabilities and actual events - procedures used to determine probabilities and calculate the number of each type of fish	shows thorough understanding by: giving in-depth and insightful analyses and explanations of: - differences between predicted probabilities and actual events - procedures used to determine probabilities and calculate the number of each type of fish
Processes • accurately determines: - the number of fish of each colour, given the probability fractions and total number - the number of fish (cubes) needed to represent the listed probabilities (expressed in fractions) - the number of fish of each type needed to match the probabilities chosen	limited accuracy; major errors or omissions in determining: - the number of fish of each colour (Part 1) - the number of fish/cubes of each colour that are needed to match given probabilities (Part 2) - the number of fish of each type needed to match the probabilities chosen (Part 3)	partially accurate; frequent minor errors or omissions in determining: - the number of fish of each colour (Part 1) - the number of fish/cubes of each colour that are needed to match given probabilities (Part 2) - the number of fish of each type needed to match the probabilities chosen (Part 3)	generally accurate; few errors or omissions in determining: - the number of fish of each colour (Part 1) - the number of fish/cubes of each colour that are needed to match given probabilities (Part 2) - the number of fish of each type needed to match the probabilities chosen (Part 3)	accurate; very few, if any, errors or omissions in determining: - the number of fish of each colour (Part 1) - the number of fish/cubes of each colour that are needed to match given probabilities (Part 2) - the number of fish of each type needed to match the probabilities chosen (Part 3)
Solves situational problems				
• chooses and carries out appropriate strategies, including using tables and diagrams, to solve the probability problems and design the composition of the fish tank	may be unable to choose and use appropriate strategies to solve the probability problems and design the composition of the fish tank	uses some appropriate strategies, with partial success, to solve the probability problems and design the composition of the fish tank	successfully uses appropriate strategies to solve the probability problems and design the composition of the fish tank	successfully uses appropriate, and often innovative strategies to solve the probability problems and design the composition of the fish tank
Communicates using mathematical language				
• uses mathematical language correctly	uses few appropriate mathematical terms	uses some appropriate mathematical terms	uses appropriate mathematical terms	uses a range of appropriate mathematical terms with precision
• represents and describes his/her thinking and solutions clearly, using objects, drawings, tables, symbols, or words	does not represent his/her thinking and solutions clearly	represents his/her thinking and solutions with some clarity; may be hard to follow in places	represents his/her thinking and solutions clearly	represents his/her thinking and solutions clearly and precisely

Master Q11.3 **Peer and Self Assessment: Unit Problem (Unit 11)**

Names: _____

4=Excellent/Always
3=Very satisfactory/Most of the time
2=Satisfactory/Sometimes
1=Needs further work/Rarely or never

	Self Assessment		Peer Assessment	
	Rating	Explanation	Rating	Explanation
Part 1: The answer shows the correct number of each colour of fish in the tank.				
Part 2: The number of cubes in the bag matches the given probabilities.				
Part 3: The probabilities match the fish tank.				
All procedures and results are explained clearly.				

Addison Wesley Mathematics Makes Sense

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