

MATHEMATICS G1-9 PROGRAMMING

OVERVIEW:

Mathematics is a universal language relying on a shared understanding of symbols and procedures to communicate ideas efficiently. It is a powerful tool used every day to solve real-life problems. The beauty of mathematics inspires curiosity about our world and the universe. As a subject, mathematics has historical roots in many cultures and continues to evolve in support of innovations. Mathematics involves learning across various disciplines, including arithmetic, algebra, geometry, statistics, and probability. In all disciplines, procedures may range from counting, calculating, and measuring to analyzing, modelling, and generalizing. Engaging with mathematics allows students to develop logical thinking skills, which contribute to effective decision making and problem solving. Students are able to extend their thinking beyond personal experiences through flexible and collaborative learning opportunities. Experiences with mathematics help students develop appreciation for the patterns and relationships that describe multiple aspects of the world and its future possibilities.

COMPONENTS:

- Numeracy is a foundational building block of learning and is developed in all subjects in different ways. Central to the development of numeracy, the mathematics curriculum helps students acquire and apply the knowledge and skills necessary to interact with quantitative and spatial information in a variety of situations. Foundational numeracy focuses on counting, comparing, and calculating* with numbers; describing, representing, and measuring shapes and objects; collecting, organizing, and interpreting data; and creating and interpreting diagrams, graphs, and tables. Numeracy skills support real-life pursuits, including telling time, using and managing money, following instructions, finding an address, and reading a schedule. With a focus on numeracy, the mathematics curriculum provides all students with a solid foundation of mathematical knowledge, understanding, and skills to set them up for future success.
- Mathematics education is an ongoing process of connecting students' concrete experiences to their comprehension of abstract concepts. A recognition of numbers and their application to counting and comparing form foundational knowledge and skills for students as they encounter a variety of quantitative information in their lives. The development of these skills supports students as they participate in family, community, and cultural activities. As their experiences broaden, students also learn that operations with numbers provide reliable and efficient options to counting and comparing. Students acquire knowledge of basic number facts that can be applied to addition, subtraction, multiplication, and division of larger numbers using commonly recognized algorithms. Students also communicate using conventional mathematical symbols and vocabulary. As students are exposed to more and varied quantitative information, they learn

about different number systems and their applications to various situations, such as decimals for money and integers for temperature. In developing algebraic thinking skills, students transfer their understanding of properties of numbers to new or abstract problems.

- Although mathematics is often considered the study of numbers, it also provides the tools to interpret spatial information in the world. The earliest mathematical experiences of children involve exploration of the space and objects around them. Mathematics provides the foundations for precisely describing, defining, and measuring spatial information. Students will learn geometric properties that relate to and distinguish shapes. They will also develop an understanding of measurement, progressing from direct comparison, to the use of non-standard units of measure, to accurately measuring with various standard units and tools. Examining shapes through measures and calculations of length, area, volume, and angle will allow students to build a broad understanding of spatial information. Students will extend their application of spatial knowledge and skills from concrete to abstract situations, precisely describing location and movement of shapes in a plane. They will develop knowledge of geometric properties, theorems, and formulas to appreciate complex patterns within traditional cultural designs, to solve immediate real-life problems, and to propose innovations.
- Throughout the study of mathematics, students apply their foundational knowledge, understandings, skills, and procedures to solve problems. They visualize and reason to move from what is known to what is sought. Thinking logically about a problem, choosing a strategy, reaching a conclusion, and justifying the solution helps students develop confidence in their mathematical thinking and decision making. These processes are reinforced by both literacy and numeracy skills and continue to develop throughout students' lives to support a wide variety of needs, such as financial literacy.
- The foundational knowledge and skills provided by the mathematics curriculum are important contributions to the future success of students. Students will apply abilities in computation, managing information, reasoning, and problem solving in daily life and in future educational pursuits and careers. Mathematics will help students interact in society with confidence and intellectual curiosity. Students will rely on their mathematical knowledge and skills as they continue into adulthood in our interconnected and ever-changing world.

***Note: Learning outcomes in the Mathematics Kindergarten to Grade 6 Curriculum are intended to be achieved without the support of calculators.**

PROGRAMS OF STUDY (ALBERTA EDUCATION):

Kindergarten and Grade 1

<https://curriculum.learnalberta.ca/curriculum/en/c/matk>

<https://curriculum.learnalberta.ca/curriculum/en/c/mat1>

Grade 2 and Grade 3

<https://curriculum.learnalberta.ca/curriculum/en/c/mat2>

<https://curriculum.learnalberta.ca/curriculum/en/c/mat3>

Grade 4 and Grade 5

<https://curriculum.learnalberta.ca/curriculum/en/c/mat4>

<https://curriculum.learnalberta.ca/curriculum/en/c/mat5>

Grade 6

Topic Organization:

Grade 1 and 2

- Number: Quantity is measured with numbers that enable counting, labeling, comparing, and operating.
- Geometry: Shapes are defined and related by geometric attributes.
- Measurement: Attributes such as length, area, volume, and angle are quantified by measurement.
- Patterns: Awareness of patterns supports problem solving in various situations.
- Time: Duration is described and quantified by time.
- Statistics: The science of collecting, analyzing, visualizing, and interpreting data can inform understanding and decision making.

Grade 3 and 4

- Number: Quantity is measured with numbers that enable counting, labeling, comparing, and operating.
- Algebra: Equations express relationships between quantities.
- Geometry: Shapes are defined and related by geometric attributes.
- Measurement: Attributes such as length, area, volume, and angle are quantified by measurement.
- Patterns: Awareness of patterns supports problem solving in various situations.
- Time: Duration is described and quantified by time.
- Statistics: The science of collecting, analyzing, visualizing, and interpreting data can inform understanding and decision making.

Grade 5 and 6

- Number: Quantity is measured with numbers that enable counting, labeling, comparing, and operating.
- Algebra: Equations express relationships between quantities.
- Geometry: Shapes are defined and related by geometric attributes.
- Coordinate Geometry: Location and movement of objects in space can be communicated using a coordinate grid.
- Measurement: Attributes such as length, area, volume, and angle are quantified by measurement.
- Patterns: Awareness of patterns supports problem solving in various situations.
- Statistics: The science of collecting, analyzing, visualizing, and interpreting data can inform understanding and decision making.

Overview:

The Grade 1-5 Math program is made up of two components. The primary component is Math U See and the secondary is Math Centres and Textbook work. For Math U See, each student will receive a

“Student Workbook” and a “Student Test Book”. The *Answer Keys* and *Instruction Videos* will be posted in the Google Classroom, along with an “Assignment” for each of the tests found in the *Test Booklet*. Although this program is a Mastery Program, it is important that teachers do all that they can to ensure they complete the applicable lessons for their grade’s curriculum by the end of the year (e.g. complement the lesson with lesson activities, with additional resources, with real-life applications, and with extensions to meet the required Alberta Education outcomes).

Math U See Instructions:

- Step 1- Teachers administer the lesson to the class. Teachers should watch the instruction video ahead of time and ensure they use the blocks in their teaching.
- Step 2- Students turn to the lesson number that they are on and starting at *Section A*, they work through the lesson book. Each table should have a large set of blocks and students must use them to “Build” their problems. The students should stop when they have completed *Section A*. If they are done before the rest of the class, they are to go pick a Math Centre to work on independently.
- Step 3- Once the class has completed *Section A*, the teacher will do *Section A* on the board with the class and the students will “mark” their own work.
- Step 4- The teacher should take note of how the students did. If the teacher believes they are ready to go on to *Section B*, then they can start the process again at step 2, but this time for *Section B*. If the teacher believes the students need more practice on A, the teacher can have the students do more problems until they are ready to move forward. Note that additional practice sheets can be found at <https://www.mathusee.com/e-learning/worksheets/>
- Step 5- Once students have completed *Section A-F*, they are ready for the *Lesson Test*. The test (found in the *Math U See Test Booklet*) should be administered to the class and handed in for marking by the teacher. The teacher should review each student’s test and ensure all students are at a level of mastery before moving onto the next Lesson. If they are not ready to move on, the teacher should continue instructing and having the students practice additional problems until the teacher is confident the students are ready to move on. Students should be “retested” accordingly and their assessment test mark replaced. Once students have mastered the lesson, the teacher can begin the next lesson, starting at Step 1 above and the process is repeated.

Student Exceptions: If there are students that are behind or slowing the class down, the teacher needs to get parents involved so that the student can work at home, following this same process. Student tests must be administered by the teacher, but the rest of the program can be completed at home with the parent.

Quick Reference- Math U See/Alberta Curriculum Comparison:

(This will be reviewed for the AB ED New Curriculum by a PLC in 2023/24)

Alberta Education Gr. Level	Math U See Book/Lessons
Grade 1	Alpha Book: Lessons 1-20
Grade 2	Alpha Book: Lessons 21-30 Beta Book: Lessons 1-10
Grade 3	Beta Book: Lessons 11-30 Gamma Book: Lessons 1-9
Grade 4	Gamma Book: Lessons 9-30 Delta Book: 1-12
Grade 5	Delta Book: 13-30

Math Portfolio - Centres and Textbook Tasks or Workbook Booklets:

Math U See covers much of the foundation numeracy in the Math Curriculum that builds on itself for Mastery Purposes, however, there is still a significant portion of the Alberta Curriculum that is not addressed directly. This is where Math Portfolios will be developed. In the 2023/24 year PLC's will work on developing these Portfolio Elements with the infusion of Entrepreneurship and FNMI contexts.

Student Resource Files for their Math class:

- *Unit Exams*- Teachers administer a paper copy of the exam, at the completion of each unit. The final is then placed in the student file upon completion. Exams are NOT to be uploaded to Google Drive.
- *Quizzes & Test Book* - Each student should receive a printed Quiz/Test Book with their name on it, for each Math Unit. It should be stored in a duotang and each should be given to the student at the start of a new unit. Once a unit is complete and grades are inputted, the duotang is stored by the teacher. There are a total of 4 units for each of these grades, and thus 4 completed quiz booklets. Quizzes & Test Books should not be uploaded to the Google Drive as they will be administered in class.
- *Workbook* - Each student should receive a printed Workbook with their name on it, for each of the four Math units. It should be stored in a duotang and each should be given to the student at the start of a new unit. Once a unit is complete and grades are inputted (engagement/completion grades only), the duotang is sent home for end-of-year revision. There are a total of 4 units for each of these grades. Workbooks and their Answer Key should be uploaded to Google Drive. A few printed copies of the answer keys should also be available in the classroom.
- *Unit Guide*: The student guide is for teachers to use an outline/schedule of their lessons and lesson objectives. Teachers should print one print copy of the guide for their own use and lesson preparation. Teachers should also upload the applicable unit guide to their Google Classroom for parents and students to view at home.
- *Secondary Textbook*: The student should be given access to a secondary textbook (e.g. Math Makes Sense) for supplement exploration and enrichment. The hard copy will be available in the classroom with the pdf available online. This will provide the teacher, student, and parent with

- additional resources that align with the Alberta Program of Studies.
- Portfolio Booklets or Centre Activities Files: Should be prepared and ready to complement the Math U See Program.

Teaching Process:

1. Using the Guide as an outline for the curriculum to be covered, teachers teach the applicable lesson to the class. After each lesson, students are to work in their workbook. They will correct their own work when completed however the teacher should be vigilant in walking around the classroom to spot check the work, answer questions and monitor how the students are progressing.
2. Once a student completes their workbook for the lesson, they should work on Math centres or projects that provide differentiated learning and authentic contexts for their numeracy skills (created by the teacher, centres link to the curriculum).
3. Quizzes should be pre-scheduled and students that do not finish their workbook questions before the quiz day, should be told that they need to finish their workbook as homework. It is important that parents are communicated with should this be common for a student because they will likely need help to keep up. In some cases, specific students may need to work at a different pace. In such cases, the teacher should create a learning plan for that specific student and get parents involved in the implementation of that plan. This is true for children that progress significantly slower OR faster than the class.
4. On quiz day, the teacher administers the quizzes. To help with marking the teacher can have students trade papers or have the students mark their own, then hand it in to the teacher for mark recording.
5. This process repeats itself for each lesson. Teachers should also schedule time, either before or after the Unit Exam, for project-based or secondary textbook applications that address Alberta Education’s core student competencies.
6. At the end of the unit, the teacher should administer the unit test. The Unit Exam is a summative assessment that should be marked by the teacher for both process and solution.

Assessment Weighting

Grades 1 through 5

Math U See Workbooks	30%
Math U See Tests	30%
Math Portfolio Tasks	20%
Math Portfolio Assessments	20%
Numeracy Final Test	Optional - 5%

- Student Portfolio that applied the UDL approach with Alberta Education Core Competencies and Program of Study Outcomes to build student skill sets.
- Entrepreneurship and FNMI elements are to be infused into the Portfolio Tasks

GRADES 7, 8, 9

PHILOSOPHY (OLD CURRICULUM):

A positive attitude is an important aspect of the affective domain and has a profound impact on learning. Environments that create a sense of belonging, encourage risk taking and provide opportunities for success help develop and maintain positive attitudes and self confidence within students. Students with positive attitudes toward learning mathematics are likely to be motivated and prepared to learn, participate willingly in classroom activities, persist in challenging situations and engage in reflective practices.

The main goals of mathematics education are to prepare students to:

- use mathematics confidently to solve problems
- communicate and reason mathematically
- appreciate and value mathematics
- make connections between mathematics and its applications
- commit themselves to lifelong learning
- become mathematically literate adults, using mathematics to contribute to society.

Students who have met these goals will:

- gain understanding and appreciation of the contributions of mathematics as a science, philosophy and art
- exhibit a positive attitude toward mathematics
- engage and persevere in mathematical tasks and projects
- contribute to mathematical discussions
- take risks in performing mathematical tasks
- exhibit curiosity.

Mathematical Processes include:

- Communication
- Connections
- Mental Mathematics and Estimation
- Problem Solving
- Reasoning
- Technology
- Visualization

Topic Outline:

Grade 7 - General Outcomes

- 7.1. Develop Number Sense (7)
- 7.2 Use patterns to describe the world and to solve problems (2)
- 7.3 Represent algebraic expressions in multiple ways (5)
- 7.4 Use direct and indirect measurement to solve problems (2)
- 7.5 Describe the characteristics of 3D and 2D shapes and analyze relationships among

- them (2)
- 7.6 Describe and analyze position and motion of objects and shapes (2)
- 7.7 Collect, display and analyze data to solve problems (3)
- 7.8 Use experimental or theoretical probabilities to represent and solve problems involving uncertainty (3)

(26 Specific Learner Outcomes)

Grade 8 - General Outcomes

- 8.1. Develop Number Sense (7)
- 8.2 Use patterns to describe the world and to solve problems (1)
- 8.3 Represent algebraic expressions in multiple ways (1)
- 8.4 Use direct and indirect measurement to solve problems (4)
- 8.5 Describe the characteristics of 3D and 2D shapes and analyze relationships among them (1)
- 8.6 Describe and analyze position and motion of objects and shapes (1)
- 8.7 Collect, display and analyze data to solve problems (1)
- 8.8 Use experimental or theoretical probabilities to represent and solve problems involving uncertainty (1)

(17 Specific Learner Outcomes)

Grade 9 - General Outcomes

- 9.1. Develop Number Sense (6)
- 9.2 Use patterns to describe the world and to solve problems (2)
- 9.3 Represent algebraic expressions in multiple ways (5)
- 9.4 Use direct and indirect measurement to solve problems (1)
- 9.5 Describe the characteristics of 3D and 2D shapes and analyze relationships among them (2)
- 9.6. Describe and analyze position and motion of objects and shapes (2)
- 9.7 Collect, display and analyze data to solve problems (3)
- 9.8 Use experimental or theoretical probabilities to represent and solve problems involving uncertainty (1)

(22 Specific Learner Outcomes)

Process and Required Materials:

Teachers will prepare:

- **Course Outlines**
 - **Unit Plans**
 - **Lesson Plans**
 - **Google Classrooms**
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- *Student TEXTBOOK:* This set of student materials relies on the Math Makes Sense textbook series. Teachers should have access to the Resource Binder and a Student Textbook (paper and digital). Students should have access to an in-class textbook (i.e. class set) and an online pdf copy of the same - either as one file or divided according to units of study. With few exceptions these books should not go home. In the case where exceptions are made, they should be signed out. The teacher should account for them at the end of the year. The teacher can use the textbook as a secondary resource for revision or adaptation, enrichment, and exploration of the math outcomes.
 - *Student UNIT Booklets:* These pdf files for each unit are for off-line reference to supplement in-class pedagogy by the teacher and as an on-line reference for parents and students to work with independently. These booklets should also be treated as “Textbooks” and as such should not be written in. Students should have a Math section in their binder with lined and/or graph paper, in which they can write their work that corresponds to the booklet. Within these books there are questions for each lesson. Students should be expected to do these questions in their binder and then self-mark them and correct their mistakes before moving on to their Student Activity Book for that lesson. With few exceptions these in-class hardcopy booklets should not go home. In the case where exceptions are made, they should be signed out. The teacher should account for them at the end of each unit.
 - *Student Activity Books :* Teachers should post to their Google Classroom the “Student Activity Books” for the Unit they are working on. Teacher’s should also print these Activity Books at the start of each unit in hardcopy for students. Each student should get a copy that they keep in a duotang. Once a student finishes the Practice Book questions for the lesson they are on, they should move onto the Student Activity Book for that lesson. When the lesson questions in the Activity Book are completed, the Activity Book should be turned into the teacher for marking.
 - *Unit Tests:* There is one “Assignment Test Booklet” for each unit. These Assignments should be printed and given to each student when ready. These assignments should be treated as Unit Tests although depending on the length of the assignment, the teacher may choose to spread out the assignment over one or two class periods. Note that assignments should not be taken home but should be supervised and worked on individually during class in the same way a test would be administered. Alternative Assessments from the Math Makes Sense Teacher Reference could also be used or incorporated.

- *Mid Term & Final Exams (for assessment)*: There is one midterm and a final test. Some students may require more than one period to complete their exam, extra time should be given to students based on their individual needs and abilities. Exams are done individually during class time and should be supervised.

Assessment Weighting:

Math 6, 7, 8, 9

PORTFOLIO ASSIGNMENTS:	20% *
UNIT LEARNING/QUESTION BOOKLETS:	40% *
UNIT TESTS:	20% *
Mid Term Exam: (Summative)	10%
Final Exam: (Summative)	10%

- Student Formative work should apply the UDL approach with Alberta Education Core Competencies and Program of Study Outcomes to build student skill sets with continuous feedback for continuous growth.
- Entrepreneurship and FNMI components for infusion are required in the student PORTFOLIO.

Mathematics 9-4

Topic Outline:

General Outcome 1 - demonstrate a number sense for whole numbers, common fractions, mixed numbers, decimals, percents and ratios; explore integers; and apply arithmetic operations to solve problems in everyday contexts. (14)

General Outcome 2 - use relationships to summarize, generalize and extend patterns to understand the environment and solve everyday problems. (3)

General Outcome 3 - use informal and concrete representations of equality and operations to solve problems in everyday contexts. (2)

General Outcome 4 - use measurement concepts, appropriate tools and results of measurement to

solve problems in everyday contexts, including:

- perimeter
- area
- surface area
- mass (weight)
- volume (capacity)
- angle measurements. (11)

General Outcome 5 - use visualization and symmetry to extend their awareness of objects and shapes and solve problems that involve classification and sketching. (6)

General Outcome 6 - create and examine patterns and designs that incorporate symmetry, tessellations, translations and reflections. (3)

General Outcome 7 - develop and implement a plan for collecting, displaying and examining data and information used in everyday applications. (8)

(47 Specific Learner Outcomes)

Process and Required Materials:

- *Student Workbook (Textbooks):* Teachers should post to their Google Classroom the “Workbook” for the current Theme that the student is working on. Students should go through their Workbook one lesson at a time and complete both the self-check questions and assignment questions. They should write the answers to both the practice questions and then for each assignment question in the section of their binder dedicated to Math. The student should then upload the “Assignment Questions” for submission to their teacher.
- A physical copy of the Student Workbooks will also be available in the class for student use, however they should not be written in nor taken home.
- *Resource Videos:* Videos for each theme are included in a document labeled “Math 9-4 Student Resource”. This resource should be posted on the Google Classroom plus each individual video link should be posted to the classroom under the applicable theme (for ease of access).
- *Project Work:* Application of the learning to summative projects should be developed, rather than summative formal exams.

Assessment Weighting:

Math 9-4

Workbook Assignment Questions: (formative) 60%

- Theme 1: 10%

- Theme 2: 10%
- Theme 3: 10%
- Theme 4: 10%
- Theme 5: 10%
- Theme 6: 10%

Portfolio of Student Projects: (formative) 40%*

- Student Formative work should apply the UDL approach with Alberta Education Core Competencies and Program of Study Outcomes to build student skill sets with continuous feedback for continuous growth.
- Entrepreneurship and FNMI elements are to be infused into the Portfolio Tasks