

HIGH PRAIRIE SCHOOL DIVISION NUMERACY FRAMEWORK



Mission

To inspire, lead, and empower success through accountability and resilience, creating a culture of lifelong learning.

Vision

High Prairie School Division will inspire students to learn, lead, and succeed in an ever-changing world.

Revised: April 30, 2025

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FOREWORD

Mathematics is central to the development of numeracy: the ability to work with number values and spatial information in a variety of situations. Mathematics is necessary in many pursuits of daily life, including comparing costs, locating a destination, interpreting a schedule, or adapting a recipe. Students become numerate as they learn the basic math skills and knowledge of mathematics that are useful both in and beyond their learning environments. As students learn and apply mathematics, they build critical thinking skills. Students will continue to use their mathematical learning as they contemplate new ideas in their schools, communities, and future workplaces (Fort Vermillion).

Mathematical proficiency involves conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition (Kilpatrick, et al., 2001).

The purpose of the High Prairie School Division K-12 Numeracy Framework is to provide a comprehensive and coherent guide for the development of numeracy skills among students from kindergarten through twelfth grade. This framework is designed to foster a deep and lasting understanding of mathematical concepts, ensuring that all students acquire the essential numerical and problem-solving skills necessary for success in their academic pursuits and beyond as outlined in the eight principles.

Stakeholders

Recognizing our current student levels of achievement and diverse goals, we all share in striving to help our students achieve their potential. This includes understanding where students are coming from and where they need to go by the end of the school year, grade level transition from one school to another or in the community as productive citizens. Our students' success depends upon everyone's involvement and engagement. Stakeholders, schools, and communities need to connect through open communication and opportunities for input and feedback.

Special thanks are given to the Numeracy Committee who provided the guidance and input to make this project happen. The team of dedicated educators who developed this document include:

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MINISTERIAL ORDER ON STUDENT LEARNING

Education in Alberta will promote the acquisition of skills and the pursuit of knowledge with wisdom, while valuing equality of opportunity, parental responsibility, personal responsibility and excellence, and respect for difference and the inherent dignity of each individual. Students will understand the rights and benefits of democratic citizenship and their personal and community responsibilities.

Students will explore life opportunities that develop their unique talents and potential, provide a sense of purpose and belonging, and affirm the dignity of work. They will become life-long learners, who will cultivate the virtues of wisdom, courage, self-control, justice, charity, and hope.

VISION FOR STUDENT LEARNING

Students will gain the knowledge and skills to form the foundations for successful and fulfilling lives, and make meaningful contributions to their communities and the world.

FOUNDATIONS FOR LEARNING

Literacy and numeracy are the foundational building blocks of learning. They shall be pervasive across all subjects and grades and specifically taught using age-appropriate, complete texts of high quality in language classes and standard algorithms in mathematics. These foundations establish core knowledge, shared civic and cultural literacy, and skills that enable students to solve problems, think critically as they become active and informed citizens leading healthy lives of meaning.

OUTCOMES FOR LEARNING

Knowledge development

Students will demonstrate mastery in foundational, subject-specific content, and a familiarity with and appreciation of the great works and ideas of world history, with an emphasis on the cultures and institutions that have shaped the history of Canada. The development of literacy and numeracy will be reinforced, enriched, and supplemented by the study of Alberta, Canadian, and world history, geography, mathematics, science, technology, philosophy,

literature, languages, mental and physical wellness, and the arts, which shall be taught with specific factual content, quality original texts and sources where applicable, and measurable outcomes. Students will demonstrate competence in managing personal finance and applying their critical thinking to engaging with various media.

Students will integrate the broad knowledge base of these subjects to learn to think for themselves, solve problems creatively, collaborate, and communicate effectively. Students will be encouraged to approach the world with intellectual curiosity and humility, understanding our inherited traditions, engaging new ideas and diverse viewpoints, questioning assumptions with reason, evaluating sources of information with discernment, and applying their learning in a variety of life and work situations.

Character development

Students develop honesty, integrity, and self-reliance through the application of their knowledge and skills. They recognize truth, beauty, and goodness through exposure to the best and most enduring art and writing across different time periods and places. They will demonstrate resilience and good judgement in a rapidly-changing world, building positive relationships and taking responsibility for their personal health and well-being. Students will demonstrate a commitment to the common good by exercising compassion, empathy, and support for each other in our diverse society.

Community engagement

Students will demonstrate an understanding of the needs, beliefs, and expectations of diverse communities, and identify connections that transcend difference. They will recognize the impact of their actions and demonstrate an understanding of our rights and freedoms, which are secured by Canadian law and reflect our shared history and traditions, as well as the social and organizational skills required for civic participation. Students will demonstrate an understanding of economic development and entrepreneurship, and will recognize the responsibility we share for environmental stewardship and sustainability.

Students will demonstrate respect for others and an understanding of our political institutions as they prepare to participate knowledgeably and responsibly in our parliamentary democracy and our constitutional Monarchy. They will understand Canadian and world history, our debt to previous generations, and our obligations to future generations. All students will see themselves, their families, and their communities in the curriculum, with space in the curriculum for the study of local traditions, history, and geography, including Alberta's Francophone history. Students will develop an understanding of and respect for the histories, contributions, and perspectives of Indigenous peoples in Alberta and Canada, including Treaty Rights and the importance of Reconciliation.

CONCLUSION

Parents deserve the best from those who help them educate their children. Students will be coached to develop intellectual ability and practical skills by caring and knowledgeable teachers. They will inherit a rich, interconnected knowledge base and be practiced in free, lively, and respectful dialogue with varied viewpoints.

<https://www.alberta.ca/ministerial-order-on-student-learning>

DEFINITIONS

Numeracy

"Alberta Education defines numeracy as the ability, confidence and willingness to engage with quantitative and spatial information to make informed decisions in all aspects of daily living. A numerate individual has the confidence and awareness to know when and how to apply quantitative and spatial understandings at home, at school, at work or in the community" (Alberta Education, 2015).

Mathematical Communication

"Mathematical communication is a way of sharing ideas and clarifying understanding. When students are challenged to communicate the results of their thinking to others orally or in writing, they learn to be clear, convincing, and precise in their use of mathematical language. Explanations include mathematical arguments and rationales, not just procedural descriptions or summaries. Listening to

others' explanations gives students opportunities to develop their own understandings" (NCTM, 2020, p. 17).

Fostering Engagement

"Fostering engagement occurs when a student's activity is directed toward doing mathematics, learning mathematics, completing a mathematics task, or otherwise participating in school mathematics" (Jansen, Curtis, & Mohammad Mirzaei et al., 2023, p. 426).

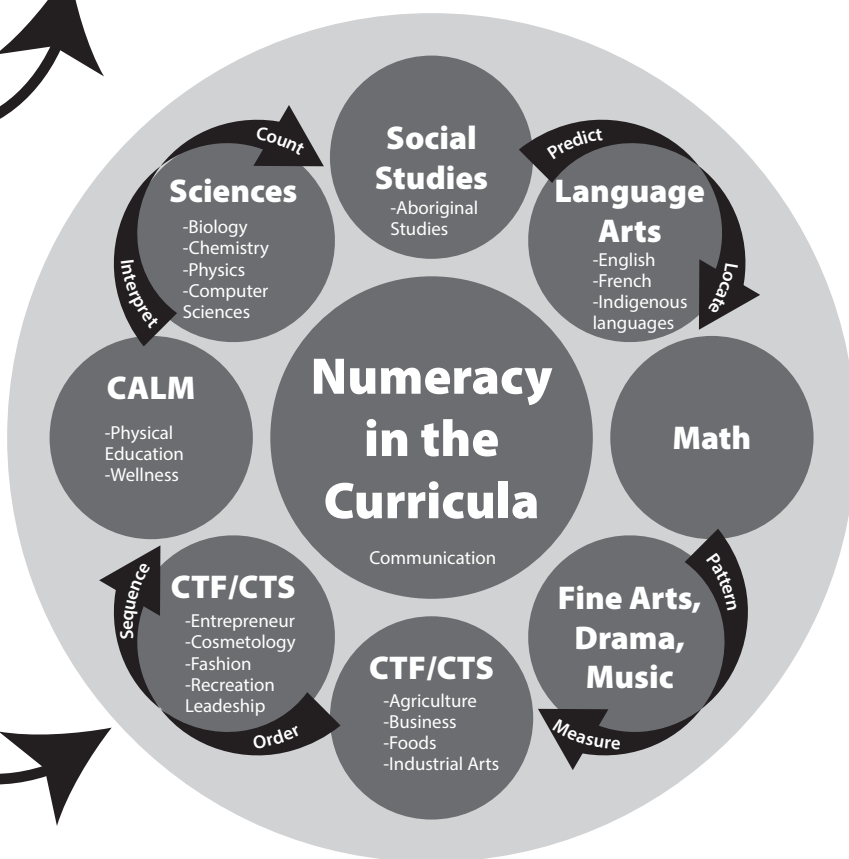
Real-World Applications

"Mathematics educators rely on the real world applications because it offers a way to connect instruction to students' experiences. It is a source of rich contexts in which students engage in mathematical processes and from which mathematical ideas can grow" (Otten, 2011, p. 24).



Students move through four different progressions of numeracy skills, from building to enhancing, then refining and mastering by the end of Grade 12. Each level is foundational to foster mathematical skills and ensures that students are numerate as they progress through their years with High Prairie School Division.

Teachers are expected to identify where numeracy is embedded in their curriculum or content area. For example, where do you see the following verbs in your curriculum: count, locate, measure, order, pattern, predict, represent, and sequence?



REASONING AND PROBLEM SOLVING

is the ability to use mathematical understanding, number sense, and logical thinking to analyze and solve problems.

CLEAR MATHEMATICAL GOALS

help in providing instructional directions and purpose to deepen understanding, promote a mathematical mindset, and support lifelong mathematical thinkers.

MATHEMATICAL CONNECTIONS

involve recognizing, applying, and representing the relationships among mathematical concepts and between mathematics and other disciplines or real-world experiences.

SHARED LEARNING

focuses on collaborative approaches to understanding, analyzing, and applying mathematical concepts, enhancing learning through group interaction and mathematical discourse.

NUMERACY FRAMEWORK

STUDENT UNDERSTANDING

requires students to explain, relate, apply, transfer, and extend their mathematical knowledge.

INTENTIONAL QUESTIONING

involves using carefully crafted questions to stimulate student thinking, uncover understanding, guide the learning process, and assess students' reasoning in mathematics.

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CONFIDENCE BUILDING

supports productive struggle in learning mathematics to foster a positive attitude and self-assurance in students regarding their ability to understand and apply mathematical concepts.

BUILDING FLUENCY

allows students to move from conceptual understanding to procedural fluidity. It involves developing speed and accuracy in mathematical calculations and procedures.

CLEAR MATHEMATICAL GOALS

RATIONALE

Setting clear goals in numeracy is a critical component of effective teaching and learning. It helps in providing direction and purpose to the educational process, ensuring that both teaching and learning activities are focused on achieving specific, meaningful objectives within the Alberta Curriculum. Clear goals support students in understanding the purpose of their learning, staying motivated, and experiencing a sense of accomplishment as they meet these objectives. "The practice of establishing clear goals that indicate what mathematics students are learning provides the starting point and foundation for intentional and effective teaching" (NCTM, 2014, p. 14).

GRADES K-3: BUILDING FOUNDATIONS FOR GOAL SETTING

Mathematical Communications

Teaching students why goals are important and how they help in learning.

- Examples: Incorporating discussions about goals; storytime focusing on characters achieving goals.

Fostering Engagement

Using visual aids to help students track and understand their progress in math.

- Examples: Using student stamina charts; criteria and reflection goal posters in the classroom.

Real-World Applications

Setting attainable goals for young learners.

- Examples: Counting goals (connect to Counting Principles); mastering number recognition; addition and subtraction operations; problem-solving goals.

GRADES 4-6: ENHANCING GOAL SETTING AND TRACKING

Mathematical Communications

Teaching students to monitor their own progress and reflect on their learning.

- Examples: Math portfolio for which students select examples of math to show growth; charts and graphs to track achievement of goals; regular self-assessment check-ins.

Fostering Engagement

Setting goals that require collaboration and teamwork.

- Examples: Using group projects with specific objectives; class challenges with achievement tracking; opportunities to share learning.

Real-World Applications

Connecting math goals to practical, real-life scenarios.

- Examples: Including financial literacy in budgeting; measuring in different units; and problem-solving.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING GOALS AND SELF-DIRECTED LEARNING****Mathematical Communications**

Practice reviewing and adjusting goals as needed using analytical thinking.

- Examples: Scheduling goal review sessions; discussions on adapting goals based on progress; mentorship programs and accountability partners to support learning and goal progress.

Fostering Engagement

Building long-term goals using short-term objectives.

- Examples: Helping students manage goals by creating personalized step-by-step plans; planning for the academic year; setting semester and quarterly mathematics goals.

Real-World Applications

Setting goals in preparation for higher-level math courses.

- Examples: Goal-setting for high school readiness; exploring mathematical careers using myBlueprint.

GRADES 10-12: MASTERY GOAL SETTING AND PREPARATION FOR FUTURE ENDEAVORS**Mathematical Communications**

Fostering an understanding of the importance of continuous learning and goal setting beyond school.

- Examples: Incorporating seminars on lifelong learning in math; alumni talks about goal setting in college and career.

Fostering Engagement

Setting specific goals that build and expand on previous mathematical concepts and applications.

- Examples: Solving equations involving multiple steps; focusing on the connections between concepts in mathematics such as factorization or simplifying algebraic expression.

Real-World Applications

Focusing on goals related to future academic and career paths.

- Examples: Using research projects on math-related careers and math applications with personal career interests; setting goals for

college; trades or career-related plans.

CROSS-CURRICULAR STRATEGIES**Reasoning and Problem Solving**

- Incorporating frequent check-ins to review and adjust goals as necessary.

Mathematical Connections

- Facilitating continuous emphasis on real-world application of numeracy.

Shared Learning

- Using teacher and peer feedback to inform goal adjustment and setting
- Engaging parents in the goal-setting process to support learning outside of the classroom.

Intentional Questionings

- Encouraging the continuous use of different levels of questioning to reinforce the application of numeracy in different content areas (e.g. open-ended questions).

Building Fluency

- Encouraging a mindset where setting and working towards goals is part of personal and academic growth.

Confidence Building

- Teaching and empowering students to take the lead in setting their own learning goals and celebrating progress.

Students Understanding

- Aligning goals with assessment criteria to provide clear targets for students that are attainable and challenging to promote growth.

REASONING AND PROBLEM SOLVING

RATIONALE

Reasoning and problem-solving is the ability to use mathematical understanding, number sense, and logical thinking to tackle and solve problems, whether they are abstract mathematical puzzles or practical, real-world situations. These skills are fundamental in mathematics education as they enable students to apply their knowledge in diverse and meaningful ways.

GRADES K-3: BUILDING FOUNDATIONS IN REASONING AND PROBLEM-SOLVING

Mathematical Communications

Grasping basic concepts of quantity, size, and number relationships.

- Examples: Comparing quantities; more, less or equal; using simple graphing examples.

Using language to describe mathematical concepts and processes.

- Examples: Describing mathematical processes in words; discussing how math problems are solved in different contexts.

Fostering Engagement

Introduction to simple mathematical problems.

- Examples: Solving basic addition and subtraction word problems; fractions; multiplication; division; puzzles.

Real-World Applications

Understanding patterns, sequences, and categorization.

- Examples: Pattern recognition games; sorting exercises.

GRADES 4-6: ENHANCING REASONING AND PROBLEM-SOLVING SKILLS

Mathematical Communications

Reading and interpreting data from charts, graphs, and tables.

- Examples: Creating and interpreting graphs; applying introductory statistical activities to everyday routines.

Fostering Engagement

Understanding and solving problems involving fractions and decimals.

- Examples: Solving fraction puzzles; comparing and converting decimal problems using money as one potential manipulative; number lines.

Real-World Applications

Solving multi-step problems using basic operations.

- Examples: Solving word problems involving more challenging scenarios; using logic puzzles; collaborative problem-solving.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING AND APPLYING REASONING AND PROBLEM-SOLVING****Mathematical Communications**

Interpreting data, understanding probability and statistics.

- Examples: Exploring probability experiments; analyzing statistical data.

Fostering Engagement

Understanding and solving problems related to geometry or any mathematical concepts.

- Examples: Using geometric solids to construct models of buildings, etc.; solving problems involving angles and measurements.

Real-World Applications

Applying mathematical reasoning to real-life situations.

- Examples: Using daily, weekly or monthly expenses as a component of budgeting exercises; applying measurement to solve real-life problems.

GRADES 10-12: MASTERY IN REASONING AND PROBLEM SOLVING**Complex Algebraic and Geometric Problem Solving****Mathematical Communications**

Evaluating and interpreting data sets.

- Examples: Statistical analysis, interpreting scientific data; using measures of central tendency to solve problems.

Fostering Engagement

Applying trigonometry and introductory pre-calculus in problem-solving.

- Examples: Using trigonometric problem solving; pre-calculus applications; solving math problems involving triangles.

Real-World Applications

Using appropriate methods to solve problems in various strands

- Examples: Demonstrating geometric proofs using solids, plane shapes.

CROSS-CURRICULAR STRATEGIES**Clear Mathematical Goals**

- Setting and monitoring the achievement of numeracy goals. For example, in Social Studies, students reading a map and finding distances and locations.

Mathematical Connections

- Connecting numeracy to specific content area to enhance relevance and interest.

Shared Learning

- Encouraging guided group work to tackle complex problems, develop perseverance and teamwork skills.

Intentional Questionings

- Promoting a mindset of exploration and asking questions to deepen understanding.

Building Fluency

- Fostering a learning environment where students have a space to demonstrate and explain strategies for solving problems.

Confidence Building

- Providing opportunities for continuous problem solving among peer engagement.

Students Understanding

- Regularly assessing problem-solving skills and encouraging students to reflect on their learning processes.

MATHEMATICAL CONNECTIONS

RATIONALE

Mathematical Connections involve recognizing and applying the relationships among mathematical concepts and between mathematics and other disciplines or real-world phenomena. It's about seeing math as an integrated part of the world around us.

This outline provides a comprehensive framework for teaching Mathematical Connections at each educational stage, emphasizing the relevance and practical application of mathematics in a variety of contexts.

GRADES K-3: BUILDING FOUNDATIONS IN MATHEMATICAL CONNECTIONS

Mathematical Communications

Using language to describe mathematical concepts in simple terms.

- Examples: Discussing math connections during storytime, using vocabulary in daily math talk conversations.

Fostering Engagement

Starting to identify, using and creating patterns, and understanding sequences in daily routines.

- Examples: Using pattern-making with blocks or beads; sequencing story events.

Real-World Applications

Understanding and recognizing how mathematical concepts, such as numbers and shapes relate to daily life.

- Examples: Counting everyday objects; Identifying shapes in the environment.

GRADES 4-6: ENHANCING UNDERSTANDING OF MATHEMATICAL CONNECTIONS

Mathematical Communications

Explaining, reading and interpreting basic graphs and charts.

- Examples: Creating simple graphs; analyzing class survey data.

Fostering Engagement

Beginning to understand how different math concepts interconnect (e.g., area and multiplication).

- Examples: Exploring area and perimeter; applying basic algebraic thinking with unknowns to finding measurement within plane shapes.

Real-World Applications

Exploring how math relates to other subjects such as science and social studies.

- Examples: Graphing weather data; calculating distances on maps; exploring patterns in art and music

Connecting math concepts to real-world situations like shopping or cooking.

- Examples: Budgeting exercises to determine best buy; scaling recipes and cooking with them.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING AND APPLYING MATHEMATICAL CONNECTIONS****Mathematical Communications**

Working together to solve problems in teams' projects

- Examples: Explaining how to find the volume of a cone; demonstrate a mathematical proof using a concept map.

Fostering Engagement

Using math to solve problems and make informed decisions.

- Examples: Evaluating statistical claims; problem-solving in group projects.

Real-World Applications

Applying math to more complex real-world situations like budgeting, planning, constructing, and coding.

- Examples: Designing a school event with a budget; interpreting statistical data.

Integrating math with advanced topics in science, technology, and humanities.

- Examples: Applying mathematics in scientific experiments; analyzing statistical data in social studies.

GRADES 10-12: MASTERY IN MATHEMATICAL CONNECTIONS**Mathematical Communications**

Identifying and relating how mathematics are connected in other math and other subject areas.

- Example: Examining math used in construction and relating to peers; explaining how statistics is used in social studies; unpacking a movie by identifying and relating the math embedded

Fostering Engagement

Understanding the role of mathematics in global and contemporary issues.

- Examples: Researching on how math is used in global challenges; math in current technological trends, algorithms for searching.

Real-World Applications

Making connections between curricula learning and future, college trade/ career path.

- Examples: Building cross-curricula connections- statistics and social studies.

Exploring high-level concepts and their real-world

applications.

- Examples: Applying trigonometry and construction for examples bridges; analyzing statistical data in economics

Using mathematics to create models and simulations for real-world experiences.

- Examples: Developing mathematical models for predicting exponential growth; computer simulations and coding.

CROSS-CURRICULAR STRATEGIES**Clear Mathematical Goals**

- Fostering students' accountability in setting attainable numeracy goals.

Reasoning and Problem Solving

- Using real-world problems to apply numeracy skills.

Shared Learning

- Encouraging projects that integrate numeracy with other subjects.
- Collaborative Learning: Promoting group work and discussion to explore numeracy ideas.
- Engaging parents and community in numeracy.

Intentional Questionings

- Encouraging students to reflect on their learning and explore numeracy beyond the classroom (example CALM).

Building Fluency

- Providing students with opportunities to explore, make connections and come to a conclusion as they connect their conceptual learning of numeracy.

Confidence Building

- Building and fostering mathematical engagement where students have the opportunity to collaborate with their peers.

Students Understanding

- Encouraging students to demonstrate and apply their learning and explore numeracy beyond the classroom.

SHARED LEARNING

RATIONALE

Shared Learning in numeracy focuses on collaborative approaches to understanding and applying mathematical concepts, enhancing learning through group interaction and discussion.

GRADES K-3: BUILDING FOUNDATIONS OF COLLABORATIVE LEARNING

Mathematical Communications

Using stories and group discussions to explore math concepts.

- Examples: Using storytelling that incorporates math problems; discussing math stories as a class; inviting Indigenous storytellers to share winter counts; Métis star blankets; bead storytelling.

Fostering Engagement

Engaging in group activities that require working together.

- Examples: Incorporating partner puzzles, shared problem-solving exercises and stories.

Real-World Applications

Pairing students to solve basic math problems or play math-related games.

- Examples: Baking project where students plan and execute baking/selling cookies; group counting games; collaborative shape sorting; math circle time calendar.

GRADES 4-6: ENHANCING TEAMWORK AND MATHEMATICAL DISCUSSION

Mathematical Communications

Students explaining math concepts to each other.

- Examples: Incorporating peer-led math workshops; explaining a math concept to a partner; using guided math discussions.

Fostering Engagement

Participating in math-related activities that promote teamwork.

- Examples: Allowing students to participate in math quiz bowls; group math contests with other classes; puzzle sharing.

Real-World Applications

Collaborative projects that integrate math with real-world applications.

- Examples: Designing a shared space (garden, library, playground, sports complex); creating a class survey and analyzing data.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING COLLABORATIVE LEARNING****Mathematical Communications**

Engaging in group discussions to deepen understanding of complex topics.

- Examples: Using guided math discussions; debate-style problem-solving sessions.

Fostering Engagement

Conducting mathematical investigations or research in teams.

- Examples: Using group research projects; collaborative math challenges.

Real-World Applications

Applying math concepts to solve real-world problems collaboratively.

- Examples: Planning and finding the quickest routes for delivery trucks in their community.

GRADES 10-12: MASTERY IN COLLABORATIVE MATHEMATICS**Mathematical Communications**

Fostering collaboration communication among students in the math class.

- Example: Using vertical surface problem solving with gallery walk so students can explain their own process in solving; allowing students to articulate and share mathematical thinking or misconceptions with each other.

Fostering Engagement

Providing opportunities for math leadership through projects and activities.

- Example: Participating in off-site math/science competitions; incorporating math-related activity days/competitions; organizing peer tutoring sessions; leading study groups for advanced topics.

Real-World Applications

Tackling real-world issues using advanced mathematical concepts in groups.

- Examples: Analyzing real-world data sets; developing solutions for community issues such as crime, high school dropout.

CROSS-CURRICULAR STRATEGIES**Clear Mathematical Goals**

- Collaborating with other students to clarify their understanding of numeracy.

Reasoning and Problem Solving

- Incorporating technology to facilitate collaborative learning, especially for complex or distance projects.

Mathematical Connections

- Involving community members in numeracy projects.
- Integrating examples of numeracy skills outside of the classroom for example: going to a construction site to measure angles with the contractors.

Intentional Questionings

- Using open-ended questioning to evaluate students' numeracy procedures; Identifying misconceptions and errors in students' thinking about math.

Build Fluency

- Assigning specific roles within group tasks to foster active participation and responsibility.
- Allowing students to develop a recognition of the value of mastering specific skills (such as the purpose of being a timekeeper is to recognize tasks that need to be completed, estimate time needed to complete each task, ensure teammates are using time efficiently and effectively).

Confidence Building

- Allowing time for students to reflect on group work and share insights or feedback with a focus on recognizing growth in students' understanding/fluency.

Students Understanding

- Providing opportunities to reflect on the thinking/understanding of other classmates in regards to the concepts and problems.
- Guiding student metacognition in identifying and correcting misconceptions and recognizing growth in conceptual understanding.

INTENTIONAL QUESTIONING

RATIONALE

Intentional Questioning involves using carefully crafted questions to stimulate student thinking, uncover understanding, and guide the learning process in mathematics. It aims to provoke deep thinking and active engagement with mathematical concepts.

GRADES K-3: BUILDING FOUNDATIONS OF INQUIRY SKILLS

Mathematical Communications

Using questioning to model use of mathematical vocabulary.

- Examples: Describing and sorting math objects such as shapes used in K- 3 grades; stating reasons for grouping or classifications of shapes and objects.

Fostering Engagement

Encouraging curiosity with basic 'Why' and 'How' questions.

- Examples: Asking questions about numbers and shapes, exploring 'what happens if' scenarios.

Real-World Applications

Using questions that build on students' current knowledge to guide them through real-life problem-solving processes.

- Example: Providing problem-solving stories that connect to their life; allowing students to participate in community field trips to identify shapes and objects in their environment; building and using classroom economy making real-life comparisons.

GRADES 4-6: ENHANCING INQUIRY SKILLS

Mathematical Communications

Encouraging students to ask questions that reflect deeper thinking about math concepts.

- Examples: Using math journaling with a focus on questioning such as justifying their answer; reflecting on how and why certain math strategies work; using reflective prompts.

Fostering Engagement

Encouraging students to ask and answer each other's questions.

- Examples: Using partner or small-group problem solving where students question each other's methods and understanding.

Real-World Applications

Using questions to drive exploration in math projects.

- Examples: Using research projects or presentations starting from key questions such as number of seniors in their communities vs teenagers.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING QUESTIONING TECHNIQUES****Mathematical Communications**

Encouraging students to question their understanding and processes.

- Examples: Using self-assessment prompts such as explain how you arrive at your answer; using reflective writing on problem-solving strategies.

Fostering Engagement

Integrating questioning into group work and discussions.

- Examples: Show your work - using self-assessment prompts such as explain how you arrive at your answer.

Real-World Applications

Using questioning to relate math concepts to real-world scenarios.

- Examples: Exploring the use of case studies; real-world problem solving with a focus on the 'why' behind solutions.

GRADES 10-12: MASTERY OF INQUIRY IN MATHEMATICS**Mathematical Communications**

Developing research questions for in-depth exploration of mathematical topics.

- Examples: Collecting and presenting data; incorporating thought-provoking discussion questions to foster students thinking deeply and reflection.

Fostering Engagement

Building engagement and interaction among students to share mathematical thinking.

- Example: Facilitating discussions among peers- justify and prove their mathematical understanding.

Real-World Applications

Fostering a classroom of math thinkers.

- Examples: Encouraging students to collaborate and build, construct, or create models or pictures for mathematical representation.
- Connecting with community representatives to practice asking and responding to intentional questions.

CROSS-CURRICULAR STRATEGIES**Clear Mathematical Goals**

- Encouraging students to reflect on the questions they have asked and how these have impacted their learning.

Reasoning and Problem Solving

- Incorporating a range of questioning techniques, including open-ended, closed, reflective, and hypothetical questions.

Mathematical Connections

- Fostering a learning environment where students pose questions showing the relationship between numeracy and other content areas.

Shared Learning

- Encouraging a classroom culture where questions are valued and seen as a key part of learning.

Build Fluency

- Providing question stems or prompts to help students formulate their inquiries.

Confidence Building

- Supporting students in pursuing their own questions through research or exploration.

Students Understanding

- Providing constructive feedback on the types of questions students ask and their questioning strategies.

BUILDING FLUENCY

RATIONALE

Building Fluency is multi-dimensional, involving developing speed and accuracy in mathematical calculations and procedures, as well as flexibility and efficiency in moving between different mathematical strategies and concepts (Kilpatrick, et al., 2001). The NCTM (2014) emphasizes that procedural fluency follows and builds on a foundation of conceptual understanding, strategic reasoning, and problem-solving.

GRADES K-3: BUILDING BASIC FLUENCY

Mathematical Communications

Providing communicative opportunities to practice basic arithmetic.

- Examples: Using flashcards, interactive games, daily practice with a partner; oral counting and computations; manipulatives.

Fostering Engagement

Incorporating rhythm and timing to reinforce basic math skills

- Examples: Using math songs, clapping games that involve counting and simple math patterns; math games - cards and dice.

Real-World Applications

Using hands-on tools to aid understanding of mathematical concepts.

- Examples: Using building blocks for counting; bead strings for addition and subtraction; money.

GRADES 4-6: ENHANCING FLUENCY SKILLS

Mathematical Communications

Focusing on quick recall of math facts.

- Examples: Using flashcard challenges; online math fact games; challenging math games; dice games.

Fostering Engagement

Building fluency in multiplication and division through repeated practice.

- Examples: Using multiplication tables exercises; division puzzles; hundred chart patterns; skip counting

Real-World Applications

Applying arithmetic skills in various problem-solving contexts.

- Examples: Collaborating with peers, i.e. group projects; using word problems involving real-life calculations; financial literacy; classroom economy.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING ADVANCED FLUENCY****Mathematical Communications**

Focusing on increasing speed and efficiency in mathematical computations.

- Examples: Exercises; using mental math challenges.

Fostering Engagement

Strengthening understanding of operations involving fractions, decimals, and percents.

- Examples: Converting between fractions, decimals, and percentages; complex calculations.

Real-World Applications

Applying fluent computation skills in complex problems.

- Examples: Multi-step problem-solving; real-world math challenges.

GRADES 10-12: MASTERY AND APPLICATION OF FLUENCY SKILLS**Mathematical Communications**

- Example: Achieving fluency in grade-level algebraic and geometric concepts.
- Examples: Demonstrating and explaining geometric proof.

Fostering Engagement

Developing fluency through the application of math concepts at grade level.

- Example: Students working together to provide the trigonometric identities.

Real-World Applications

Building proficiency in interpreting and manipulating statistical data.

- Examples: Incorporating statistical analysis projects; probability exercises; class surveys; games/sports statistics.

CROSS-CURRICULAR STRATEGIES**Clear Mathematical Goals**

- Regularly assessing fluency and providing feedback on progress.

Reasoning and Problem Solving

- Promoting mental calculation strategies to enhance number sense and speed, where applicable.

Mathematical Connections

- Connecting fluency skills to real-world scenarios to enhance relevance and applicability.

Shared Learning

- Using peer instruction and tutoring for reinforcing fluency.

Intentional Questionings

- Facilitating numeracy discourse and communication.

Confidence Building

- Using regular spiralled practice to build and maintain fluency, where applicable. For example, analyzing data and making predictions in Science and Social Studies.
- Encouraging a positive mindset and persistence in developing fluency.

Students Understanding

- Incorporating a variety of activities and methods to engage different learning styles.

CONFIDENCE BUILDING

RATIONALE

Confidence Building in numeracy is about fostering a positive attitude and self-assurance with their ability to understand and apply mathematical concepts. It involves creating a supportive environment that celebrates progress and encourages risk-taking.

GRADES K-3: BUILDING AND FOSTERING A POSITIVE MATH MINDSET

Mathematical Communications

Ensuring that students feel comfortable making mistakes and asking questions.

- Examples: Discussing and correcting math mistakes; using math talks.

Fostering Engagement

Using math games and interactive activities to build authentic learning experiences.

- Examples: Using math-based games; using interactive counting and shape activities; math games (Yahtzee, crib, dice games etc.).

Real-World Applications

Exploring the use of math outside the classroom.

- Examples: Incorporating math infused stations in gymnasium, arts, and music; take students outside on math scavenger hunts; incorporating STEAM activities to strengthen connections to the outside world.

GRADES 4-6: ENHANCING AND DEVELOPING SELF-EFFICACY IN MATH

Mathematical Communications

Fostering an environment for active exploration and discussion.

- Examples: Having students talk about their favourite number; incorporating math books about mathematicians or math stories; math talk.

Fostering Engagement

Promoting collaborative work where students can support each other or solve problems together, acknowledging mathematical thinking.

- Examples: Using rich open-ended math questions to problem-solve in multiple ways; using group math projects; peer tutoring.

Real-World Applications

Providing students with opportunities to solve real-life problems on their own.

- Examples: Individuals problem-solving tasks; math puzzles.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING CONFIDENCE THROUGH APPLICATION****Mathematical Communications**

Providing opportunities for students to present their math knowledge.

- Examples: Incorporating math presentations; justifying answers; math fairs; STEAM challenges; math journals.

Fostering Engagement

Supporting students as they tackle more complex math problems.

- Examples: Using guided problem-solving sessions; math clubs; scaffolding with visual aids, collaborative problem-solving, technology integration.

Real-World Applications

Encourage students to think critically and to apply their knowledge.

- Examples: Applying mathematical concepts to budgeting, designing a floor plan, planning a trip, exploring population growth.

GRADES 10-12: CEMENTING CONFIDENCE FOR MASTERY**Mathematical Communications**

Empowering students to engage in feedback conversations and to take responsibility for their engagement.

- Examples: Offering multiple communication formats (in person, journals); use reflective prompts; provide peer feedback opportunities; encourage goal setting ways to share.

Fostering Engagement

Encouraging students to lead math-related initiatives or clubs.

- Example: Facilitating student-led math tutoring programs; math club leadership.

Real-World Applications

Connecting math skills for future careers and real-world applications

- Examples: Demonstrating how a particular math concept is applied in a specific career; invite community members to describe their careers and real-world applications of mathematics in their jobs.

CROSS-CURRICULAR STRATEGIES**Clear Mathematical Goals**

- Giving students voice and choices in their learning to build a sense of control and ownership.

Reasoning and Problem Solving

- Challenging learners with diverse ways of understanding and doing numeracy.

Mathematical Connections

- Creating an inclusive learning environment that fosters student's application of their knowledge.

Shared Learning

- Consistently providing positive feedback and encouragement.
- Fostering an environment where it's safe to take risks and make mistakes.

Intentional Questionings

- Encouraging students to take responsibility for their learning by expressing their ideas and engaging in discussions.
- Using purposeful, well-planned questions to promote student thinking, foster engagement, and deepen understanding.

Building Fluency

- Motivating students to persist in the face of challenges.

Students Understanding

- Emphasizing the importance of the learning process and not just the final answer.

STUDENT UNDERSTANDING

RATIONALE

Student Understanding in numeracy refers to a deep and meaningful grasp of mathematical concepts, as opposed to mere rote learning or procedural proficiency. It implies that students can explain, relate, apply, transfer, reason, justify, and extend their mathematical knowledge.

GRADES K-3: BUILDING THE GROUNDWORK FOR UNDERSTANDING

Mathematical Communications

Encouraging students to talk and write about how and why math works.

- Examples: Incorporating think-talk-write activities; using math journals.

Fostering Engagement

Gradually moving from concrete manipulatives to more abstract concepts.

- Examples: Using blocks or counters, then transitioning to drawing or mental math; using visual aids to understand basic operations.

Real-World Applications

Relating math concepts to everyday life to enhance understanding.

- Examples: Connecting counting to daily life scenarios; simple measurements in cooking or building.

GRADES 4-6: ENHANCING MATHEMATICAL COMPREHENSION

Mathematical Communications

Engaging students in class discussion that investigates and compares students' thinking and reasoning.

- Examples: Using the ping pong discussion protocol to compare and contrast the properties of a square and a rhombus; math talks.

Fostering Engagement

Using visual aids and interactive teaching to investigate understanding.

- Examples: Solving decimal and percentage problems using fraction tiles; using a balance scale to model and demonstrate an inequality statement.

Real-World Applications

Relating math concepts to everyday life to enhance understanding.

- Examples: Using classroom economy for budgeting, spending, and determining best buy; using money to demonstrate addition, subtraction, multiplication and division.

BUILDING**ENHANCING****REFINING****MASTERING****GRADES 7-9: REFINING AND APPLYING UNDERSTANDING****Mathematical Communications**

Facilitating discussions that encourage deeper understanding and reflection.

- Examples: Critiquing mathematical arguments; math journals; math debates.

Fostering Engagement

Building and constructing models to represent Mathematics.

- Example: Students working together to create scale drawings of a room or a building; proving Pythagorean Theorem by using the concept of the area of a square to find the length of the sides of a right-angle triangle.

Real-World Applications

Applying mathematical understanding to different contexts and problems.

- Examples: Identifying a composite shaped object in their community, measuring it and creating a scaled replica of it, then finding its surface area to determine the quantity of paint required to repaint the object and finding the cost to do the project.

GRADES 10-12: MASTERY OF CONCEPTS AND APPLICATION**Mathematical Communications**

Modeling and facilitating problem-solving using a variety of discussion protocols.

- Examples: Facilitating fishbowl or jigsaw discussions to encourage deeper understanding and reflection; the focus should be on why and how, rather than the result; student reflection can be verbal or written format.

Fostering Engagement

Encouraging students to conduct peer/group research or projects in areas of interest.

- Examples: Conducting projects on community-based issues such as senior scams, dietary needs, food recalls.

Real-World Applications

Exploring how mathematical concepts apply to various careers and real-world situations. Research projects on mathematics in different professions.

- Examples: Researching mathematics in different

professions; investigating and classifying the math that is used in a pulp mill or on a farm.

CROSS-CURRICULAR STRATEGIES**Clear Mathematical Goals**

- Regularly assessing not just what students know but how well they understand the concepts
- Engaging students in self-assessment.

Reasoning and Problem Solving

- Allowing students to explore and discover mathematical concepts in different areas, fostering a deeper understanding.

Mathematical Connections

- Encouraging students to see challenges as opportunities to increase understanding.

Shared Learning

- Using peer teaching methods where students explain concepts to each other

Intentional Questionings

- Ensuring that teaching goes beyond rote procedures to include the 'why' behind mathematical concepts

Building Fluency

- Providing multiple and diverse strategies.

Confidence Building

- Encouraging students to see challenges as opportunities to increase understanding.

NUMERACY SCREENS/ASSESSMENTS

PROCEDURES AND EXPECTATIONS FOR NUMERACY ASSESSMENT TOOLS

EYE (Early Years Evaluation) (Pre K and K)

EYE examines Kindergarten readiness skills and informs educators' decisions on targeted classroom instruction and intervention.

- Assesses five domains: Awareness of self and environment, social skills and approaches to learning, cognitive skills, language and communication, and physical development.

PNSA (Provincial Numeracy Screening Assessment) Mandatory for (Grades 1, 2, 3)

- The Provincial Numeracy Screening Assessments identify students' knowledge of the number system, number operations, and proportional reasoning skills. It helps teachers identify and address gaps in their students' foundational understanding of numbers.

EICS Math Assessment (Grades 1-10)

- Elk Island Catholic Schools has developed a math assessment that is based on the Mathematics Learning Progression Strands (McGarvey, 2018) and the Alberta Curriculum (2022) Organizing Ideas of Number, Algebra, and Patterns. It is important to note that other strands and organizing ideas are important for teachers to continue to assess during their instructional practices through triangulation of assessment.
- The three main goals of the assessment are:
 - to provide timely information identifying student needs early in the school year to implement interventions,
 - to support teacher instruction to be strategic and flexible (responsive), and
 - to continue to develop teachers' mathematical understanding.
- **Design of the EICS Math Assessment**
 - The assessment is designed to be administered at the beginning of the school year and utilizes the previous year's organizing ideas. E.g. In grade 4 the assessment is based on grade 3 curriculum aligned to the progressions. The assessment contains multiple choice and numerical response questions.

- For grades one and two exclusively, an interview component is also added. While it is ideal that all grades contain an interview component, we encourage teachers to embed that into their daily classroom practice.

- **IXL can be purchased by individual schools.**

DIVISION		PROVINCIAL
Kindergarten	EYE (Early Years Evaluation) PNSA (Provincial Numeracy Screening Assessment)	
Grade One	PNSA (Provincial Numeracy Screening Assessment)	
Grade Two	PNSA (Provincial Numeracy Screening Assessment)	
Grade Three	PNSA (Provincial Numeracy Screening Assessment)	
Grade Four		
Grade Five		
Grade Six		Provincial Achievement Test
Grade Seven		
Grade Eight		
Grade Nine		Provincial Achievement Test
Grade Ten		
Grade Eleven		
Grade Twelve		Diploma Exam

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