*2011*

*FINANCIAL LITERACY EDUCATION IN ONTARIO SCHOOLS*

*Facilitator’s Guide*

*Grades 9 and 10 Mathematics*

*to accompany Professional Learning presentations and 4 Lessons prepared by the Ontario Association for Mathematics Education*



Table of Contents

1. General Notes about Using the Presentations 3
2. Summary of each Activity 4
3. Activity 1: What is Financial Literacy? 6
4. Activity 2: Frayer Model 9
5. Activity 3: Merge with TIPS4RM 11
6. Activity 4: Tips on TIPS 20
7. Activity 5: Processing the Processes 26
8. Activity 6: Open to Suggestions 27
9. Activity 7: Rising to Great Heights with Great Scaffolding 29
10. Activity 8: Running in Parallel 31
11. Activity 9: It’s All Up to You! 33
12. Activity 10: Interaction with the Lessons! 35
13. Activity 11: Click to Financial Independence! 36
14. Activity 12: Where’s the Math? 37
15. Appendix – BLM APP 1 (needed for several Activities) 38

General Notes about Using the Presentations

1. There are a total of 4 presentations in this series:
2. **A Sound Investment, Working Group on Financial Literacy, Ministry of Education document, 2010: Integration of Financial Literacy into grades 4 to 12** gives a summary of the report and its effect on Mathematics education
3. **Financial Literacy Education in Ontario Schools - Continuum through grades 4 to 10, Links to Curriculum Expectations and Placement of Lessons** describes the continuum of mathematics curriculum expectations that link to financial literacy
4. **Financial Literacy Education in Ontario Schools – Connections to Curriculum Expectations for MFM1P & MFM2P, Description and Placement of Lessons** describes the lessons that have been created for grade 9 and 10 Applied Mathematics
5. **Financial Literacy Education in Ontario Schools – Connections to Curriculum Expectations for MPM1D & MPM2D, Description and Placement of Lessons** describes the lessons that have been created for grade 9 and 10 Academic Mathematics
6. All presentations and activities are designed to be customized by the facilitator to meet the needs of the professional learning session participants. These were created to provide flexibility to meet different time constraints, a variety of learning goals, and diverse audience backgrounds.
7. The second presentation in the series (Continuum) has been created as a custom slide show. After selecting “Slide Show”, select “Custom Slide Show” (rather than selecting “From beginning”). Note that this 85 slide presentation is not intended to be shown in its entirety. Instead, it is suggested that you select only the slides relevant to your audience.
8. All presentations were designed to be deliverable as stand-alone, 15-25 minute professional learning presentations. For this reason, some overlap of concepts has been built into the 4 presentations. However, each presentation is also useable as part of a larger, multi-presentation professional learning session. When more than one presentation is being used in a single session, select which of the four presentations you are planning to deliver, then preview the flow from one presentation to another and eliminate redundancies.
9. All presentations include at least 1 opportunity to engage participants in an activity. The activities are not included in the slides. Rather, an activity prompt slide is included within the presentation. In the Notes below each slide, the suggested activity/activities are identified. The activities themselves are described in this document. The facilitator selects the activity/activities that are best suited to their session based on:
   * The available time for the session (Time for the activity must be added to the 15-25 minutes for the presentation.)
   * The professional learning goals of the session
   * The sequencing of the session (e.g., Is this 1 of 4 sessions? Have the participants already seen the first 2 presentations?)
   * The prior experience with financial literacy of the participants (e.g., Do the participants routinely incorporate financial topics into their lessons? Is financial literacy new to the participants? )
   * The outcomes preferred by the participants (e.g., Are participants hoping for an overview of Financial Literacy? Are participants eager to leave with adjusted lessons they can use in their classrooms?)

Summary of each Activity

Activities 1, 2 and 3 are introductory in nature. These three activities would be appropriate for any of the four presentations.

Activities 4 through 12 are designed to give participants an opportunity to explore the financial literacy lessons in greater detail, but each provides a different lens through which to approach this exploration. The facilitator selects the activity that aligns best with the goals of the session or the composition of the participant body.

Activity 1: What is Financial Literacy? has been designed as a Minds On for the introduction of the term *Financial Literacy.* It could also be used as a Consolidation, in place of Activity 2: Frayer Model, and placed after the definition of FL, developed by the Working Group, has been presented. It is suggested that the facilitator choose either Activity 1 or Activity 2.

Activity 2: Frayer Model has been designed as a Consolidation of the portion of the presentation that involving definitions of FL. It would be placed after teachers have been presented with the Working Group’s definition of FL. Alternatively it could be used as a Minds On before the definitions are given, and could be used in place of Activity 1: What is Financial Literacy?

The participants have been asked to develop their own descriptors for the four corners of the graphic. This is intended to generate discussion between the members of the groups and to allow participants to develop a more personal understanding what constitutes financial literacy. Alternately, the facilitator could save time by deciding on a set of descriptors in advance of the presentation.

Activity 3: Where’s the Math? provides participants with a passage from the Working Group Report that includes a list of specific financial literacy topics. They are then challenged to “find the math” in these topics.

Activity 4: Merge with TIPS4RM is designed for participants who use the TIPS4RM resources for Grade 9 Applied or Grade 10 Applied. Alternately, it could be used to *introduce* participants to these resources. In this activity, participants review the TIPS4RM planning schedules and decide where the newly developed FL lessons would best “fit” or what existing lessons could be replaced with these lessons.

Activity 5: Tips on TIPS gives participants an opportunity to align one lesson written in the financial literacy lesson template to the TIPS template. It would allow participants who are new to the three part lesson plan or the TIPS template to further explore these lesson structures.

Activity 6: Processing the Processes has a Mathematical Processes focus. In this activity, participants review a lesson to identify where and how the math processes are embedded. They also identify opportunities to assess the processes.

Activity 7: Open to Suggestions engages the participants in an exploration of open and closed questions. After selecting one of the financial literacy lessons, they are challenged to modify closed questions or tasks to open them up. This activity provides the facilitator with an opportunity to focus on differentiating instruction through more effective questioning.

Activity 8: Rising to Great Heights with Great Scaffolding has participants practicing the creation of scaffolding questions for one financial literacy lesson. Participants are challenged to realize that, since our financial system is uniquely Canadian, children of newly-arrived families, who are themselves unfamiliar with our system, might have limited home support.

Activity 9: Running in Parallel provides an opportunity for participants to build differentiated instruction into their lesson through the creation of a parallel task for an activity in one of the financial literacy lessons.

Activity 10: It’s All Up to You! asks participants to review the existing lessons and the related curriculum expectations, and locate questions from their own textbook/resource that have (or could easily be adjusted to have) a financial literacy focus.

Activity 11: Interaction with the Lessons! provides an opportunity for participants to create a Notebook presentation, and adjust the lesson for their own use with an Interactive Whiteboard. This activity would require a computer lab or personal computers.

Activity 12: Click to Financial Independence! has participants creating clicker/response unit questions to allow them to identify the readiness of students at the start of a financial literacy lesson (assessment for learning) or to assess student understanding after the Consolidation of the lesson (assessment of learning).

|  |  |  |
| --- | --- | --- |
| Activity 1: What is Financial Literacy? | | FL PL |
| 30 min | Professional Learning Goals   * Introduce the concept of Financial Literacy * Identify and clarify any misconceptions that may exist about what constitutes financial literacy * Identify the characteristics of a useful definition | Materials   * BLM 1.1 – 1.3 |
|  | Whole Group 🡪 Opposite sides: Identify existing concepts  State the following (put onto a slide) the following statement:  FINANCIAL LITERACY IS MORE IMPORTANT BUT LESS ACHIEVEABLE TODAY THAN EVER BEFORE (BLM 1.1)  Participants consider this statement and commit to their belief about this statement as: TRUE or FALSE by moving to opposite sides of the room.  If participant is UNSURE he/she stands in the middle of the room.  Each group discusses why they believe as they do, opposite sides “present” and those in the middle can then commit to one side or the other. | Note that there is no “right, wrong” answer to this Minds On Activity.  Identify which side of the room represents True and which represents False |
| Minds On… |
| 5 min |
|  | Groups of 3 or 4 🡪 Discussion  Possible introduction: “Professionals struggle with the definition of financial literacy, but most people have some idea of what it means.”  Distribute BLM 1.2. Participants discuss and identify the definition of financial literacy they believe to be the most and least informative and practical. |  |
| Action! |
| 10 min |
|  | Whole Group 🡪 Sharing  In round robin, groups state their choices for most and least informative definition of Financial Literacy, as well as their reasoning. Whole group discussion should be encouraged.  Participants should brainstorm the characteristics of a useful definition. |  |
| Consolidate Debrief |
| 10 min |
| 5 min | Home Activity or Further Classroom Consolidation  Participants are asked to create their own definition of Financial Literacy. If willing, they could to post/share. |  |

**BLM 1.1 Activity 1: What is Financial Literacy?**

FINANCIAL LITERACY IS MORE IMPORTANT, BUT LESS ACHIEVEABLE, TODAY

THAN EVER BEFORE

**BLM 1.2 Activity 1: What is Financial Literacy?**

The following definitions of financial literacy were found in assorted publications. Read and discuss each. Select the definitions that you think are the most informative and least informative and practical for Ontario residents. Be prepared to justify your choices.

|  |  |
| --- | --- |
| Financial literacy is the ability to make appropriate decisions in managing personal finances. | Financial literacy is the combination of consumers’/investors’ understanding of financial products and concepts and their ability and confidence to appreciate financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being. |
| Financial literacy is the ability to understand finance. | Financial literacy is knowing how to make investments. |
| Financial literacy is the possession of knowledge and understanding of financial matters. | Financial literacy is possessing the skills and knowledge on financial matters to confidently take effective action that best fulfills an individual's personal, family and global community goals. |
| Financial literacy is the ability to make informed judgments and to take effective actions regarding the current and future use and management of money. | Financial literacyis the ability to use knowledge and skills to manage one’s financial resources effectively for lifetime financial security. |
| Financial literacy is understanding how to manage money effectively. | Financial literacy is the knowledge and skills to make informed decisions regarding money matters. |

For more information on the task of defining financial literacy, we suggest reading http://onlinelibrary.wiley.com/doi/10.1111/j.1745-6606.2010.01169.x/full

|  |  |  |
| --- | --- | --- |
| Activity 2: Frayer Model | | FL PL |
| 15 min | Professional Learning Goals   * Consolidate understanding of Financial Literacy * Create a visual organizer as a take-away | Materials   * BLM 2.1 |
|  | Groups of 3 or 4 🡪 Creating the Frayer Model  Group participants into groups of 3 or 4. Distribute copies of BLM 2.1 to each participant. In groups of 3 or 4, participants will decide what descriptors to put in the four corners of the Frayer Model.  Possible discussion: A traditional Frayer Model might have these descriptors in the 4 corners:   * Definition * Characteristics * Examples * Non-Examples   Ask: Are these the descriptors you want to use? If not, what would be more appropriate? | Some teachers may not be familiar with this model. A discussion would quickly familiarize teachers with the framework of the model. |
| Minds On… |
| 10 min |
|  | Individual 🡪 Complete the Frayer Model  Having chosen the descriptors, participants complete their own model. Encourage participants to work without discussion for a few minutes before starting a dialogue with their group members. |  |
| Action! |
| 10 min |
|  | Whole Group 🡪 Discussion  Each group shares their descriptors. Elicit participant sharing of their models/struggles to the extent they are comfortable.  Participants brainstorm how an activity such as this could be used in their classrooms to heighten student awareness of financial literacy. |  |
| Consolidate Debrief |
|  |
|  | Home Activity or Further Classroom Consolidation |  |

**BLM 2.1 Activity 2: Frayer Model**

FINANCIAL LITERACY

|  |  |  |
| --- | --- | --- |
| Activity 3: Where’s the Math? | | FL PL |
| 75 min | Professional Learning Goals   * Connect Mathematics curriculum expectations to key financial literacy concepts | Materials   * Curriculum documents * BLM 3.1 – 3.2 * Cards made from BLM APP 1 (Appendix 1) * BLM 3.2 * Sticky notes, index card size |
|  | Individual 🡪 Read passage  Participants are given 5 minutes to read the report extract (BLM 3.1).  Whole Group 🡪 Brainstorm  Participants brainstorm for 10 minutes what topics in the mathematics curriculum might be connected to the specific topics in the list provided in the extract.  Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 20 min |
|  | Groups of 3 - 4 🡪 Connecting  Using the curriculum documents, participants connect the specific topics from the list to curriculum expectations. They write the course and expectation on a sticky note, one note for each expectation. On the back of the note, they record the specific topic from the list to the corresponding expectation. |  |
| Action! |
| 30 min |
|  | Whole Group 🡪 Consolidating lists  Post the cards made from BLM 3.2, which is the specific topics from the list. Participants place their notes at the corresponding specific topic.  Provide time for the participants to circulate and review the expectations. |  |
| Consolidate Debrief |
| 15 min |
| 10 min | Home Activity or Further Classroom Consolidation  Participants discuss why certain specific topics seem to have more connections to math expectations. They are challenged to build one or two more possible connections for specific topics that have fewer notes. |  |

**BLM 3.1 Activity 3: Where’s the Math?**

The following is an extract from *A Sound Investment* – Financial Literacy Education in Ontario Schools (the Report of the Working Group on Financial Literacy).

“It was also noted that a significant number of learning expectations now in the Ontario curriculum relate in some way to these financial topics. The Working Group heard that it would be important to build on these existing linkages.” ( page 13)

The Working Group found significant agreement as to the specific topics that need to be covered in financial education programs. They include understanding:

• the concepts of income, money, earning, saving, spending, investing, budgeting, credit and borrowing, risks and rewards, compound interest, pensions, insurance, taxes, and planning ahead;

• how the financial system works;

• the difference between wants and needs;

• consumer awareness and advertising;

• fraud and its consequences;

• future consequences of financial decisions;

• how to plan for life after high school.”

**BLM 3.2 Activity 3: Where’s the Math?**

**THE CONCEPTS OF INCOME, MONEY, EARNING, SAVING, SPENDING, INVESTING, BUDGETING, CREDIT AND BORROWING, RISKS AND REWARDS, COMPOUND INTEREST, PENSIONS, INSURANCE, TAXES, AND PLANNING AHEAD**

**HOW THE FINANCIAL SYSTEM WORKS**

**THE DIFFERENCE BEWEEN WANTS AND NEEDS**

**CONSUMER AWARENESS AND ADVERTISING**

**FRAUD AND ITS CONSEQUENCES**

**FUTURE CONSEQUENCES OF FINANCIAL DECISIONS**

**HOW TO PLAN FOR LIFE AFTER HIGH SCHOOL**

|  |  |  |  |
| --- | --- | --- | --- |
| Activity 4: Merge with TIPS4RM | | | FL PL |
| 35 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Determine opportunities to merge one (or more) Financial Literacy lessons into the TIPS4RM Planning Schedule | Materials   * Cards made from BLM APP 1 * BLM 4.1 – 4.2 * Copies of each of the 4 FL Lessons * Large copies of the TIPS4RM Planning Schedule for posting * Sticky notes |
|  | Whole Group 🡪 Identify Groupings    Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 5 min |
|  | Groups of 3 or 4 🡪 Merging  Distribute TIPS4RM documents BLM 4.1 for MFM1P or electronically at <http://www.edugains.ca/resources/LearningMaterials/TIPS/tips4rm/grade9applied/Overview.pdf>  and BLM 4.2 for MFM2P or electronically at <http://www.edugains.ca/resources/LearningMaterials/TIPS/tips4rm/grade10applied/CourseOverview.pdf>  Distribute FL lessons selected.  Participants identify opportunities to merge the FL lesson into the TIPS4RM year outline, considering where existing lessons can be replaced with the FL lesson. | To see specific lessons for grade 10 go to <http://www.edugains.ca/newsite/math2/tips4rmgrade10ap.html>  To see specific lessons for grade 9 go to <http://www.edugains.ca/newsite/math2/tips4rmgrade9ap.html> |
| Action! |
| 20 min |
|  | Whole Group 🡪 Sharing  Post large copies of TIPS4RM Planning Schedule. Participants place sticky notes where they have decided the FL lesson fits best. |  |
| Consolidate Debrief |
| 5 min |
| 5 min | Home Activity or Further Classroom Consolidation  Participants circulate to review findings of other groups. |  |

**BLM 4.1 Activity 4: Merge with TIPS4M**

# Grade 9 Applied: Content and Reporting Targets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Introductory Unit | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | \*Unit 8 |
| This 2-day unit activates students’ prior knowledge before Unit 1: Measurement | **Measurement**   * Perimeter and area of composite shapes * Pythagorean theorem * Volume of  3-D figures (developing formulas)   **Number Sense and Algebra**   * Simplifying numerical expressions * Exponents | **Measurement**   * Optimization of measurements of rectangles   **Linear Relations**   * Scatter plots * Lines of  best fit   **Number Sense and Algebra**   * Substituting into and solving equations | **Linear Relations**   * Investigating data (linear and non-linear) * Lines and curves of  best fit * First differences   **Number Sense and Algebra**   * Simplifying numerical expressions | **Number Sense and Algebra**   * Ratio, rate, proportion * Percents, decimals | **Linear Relations**   * Constant rate of change * Initial value * Direct and partial variation   **Number Sense and Algebra**   * Using fractions and decimals | **Linear Relations**   * Determining values * Story graphs * Comparing models * Changing the graph * Points of intersection   **Number Sense and Algebra**   * Solving equations | **Linear Relations**   * Connection and application  of algebraic models   **Number Sense and Algebra**   * Simplifying algebraic expressions | **Measurement**   * Plane geometry concepts   **Number Sense and Algebra**   * Solving equations in context   **\***This unit could stand alone and can be placed anywhere within the course. |
| Rationale | | | | | | | | |
| **Dividing the expectations into 8 units:**   * Working on smaller content targets will promote student success by focussing on fewer key concepts than might be included in larger units of study. * Facilitates staff communication about individual students learning goals in credit recovery situations.   **Number Sense and Algebra included in all units:**   * Expectations for the Number Sense and Algebra strand are addressed within the contexts of measurement and linear relations throughout the course as recommended in the curriculum policy document. * Students develop an increased understanding of how to apply Number Sense and Algebra skills in a wide variety of contexts.   **Positioning Measurement for Units 1–2:**   * Measurement activities are authentic tasks that appeal to kinesthetic learners, appropriate at the beginning of the Grade 9 Applied program, when students are making the transition to secondary school and before algebraic skills are well developed. * Teachers can observe students’ reasoning, representing, and problem-solving skills in contexts that can be illustrated with concrete materials and visual representations. * Students should feel comfortable with this material as an extension of Grade 8 math, and this may ease the transition into Grade 9 math. * Perimeter, area and volume provides the context for work with powers to degree 3. * Optimization problems provide meaningful contexts for using numerical and graphical models and for combining fractions with integers and equations. * Students develop, build on and extend inquiry skills.   **Positioning Number Sense and Algebra for Unit 4:**   * Students develop an understanding of the connections between proportional reasoning, rates, ratios, percents, and linear relationships in a wide variety of contexts. * Students prepare to apply the concepts of constant rates of change and initial value to direct and partial variation in Unit 5.   **Positioning Measurement for Unit 8:**   * Teachers have addressed appropriate behaviour and care in use of technology. * Visual and hands-on activities provide variety that appeal to students with different learning styles.   **Inclusion of instructional technology:**   * Depending on availability of technological resources, teachers may choose to use: * a full lab; * a limited number of computers; * teacher demonstration. | | | | | | | | |

# Grade 9 Applied Year Outline – Planning Tool

P Number of pre-planned lessons (including instruction, diagnostic and formative assessments, summative assessments other than summative performance tasks)

J Number of jazz days of time (instructional or assessment)

T Total number of days

SP Summative performance task (see Assessment – Grade 9 Applied)

| Unit | Cluster of Curriculum Expectations | Overall Expectations | P | J | T | SP | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | Volume of Cylinders |  | 2 | 0 | 2 |  |  |
| 1 | Solving Perimeter, Area, and Volume Problems  Understanding and Using Exponents | MGV.02 solve problems involving the measurements of two-dimensional shapes and the volumes of three-dimensional figures;  NAV.02 simplify numerical and polynomial expressions in one variable, and solve simple first-degree equations. | 7 | 2 | 9 |  |  |
| 2 | Optimization of Various Measurements of Rectangles, Using Scatter Plots | MGV.01 determine, through investigation, the optimal values of various measurements of rectangles;  LRV.01 apply data-management techniques to investigate relationships between two variables;  LRV.02 determine the characteristics of linear relations;  NAV.02 simplify numerical and polynomial expressions in one variable, and solve simple first-degree equations. | 7 | 2 | 9 |  |  |
| 3 | Looking for Relationships,  Lines and Curves of Best Fit | LRV.01 apply data-management techniques to investigate relationships between two variables;  LRV.02 determine the characteristics of linear relations;  LRV.04 connect various representations of a linear relation, and solve problems using the representations. | 8 | 2 | 10 |  |  |
| 4 | Ratio, Rate, and Proportion | NAV.01 solve problems involving proportional reasoning;  LRV.01 apply data-management techniques to investigate relationships between two variables;  LRV.02 determine the characteristics of linear relations. | 8 | 2 | 10 |  |  |
| 5 | Constant Rate of Change, Initial Condition, Direct and Partial Variation | LRV.02 determine the characteristics of linear relations;  LRV.03 demonstrate an understanding of constant rate of change and its connection to linear relations;  LRV.04 connect various representations of a linear relation, and solve problems using the representations;  NAV.01 solve problems involving proportional reasoning; | 10 | 1 | 11 |  |  |
| 6 | The Uses of Linear Relations and Their Multiple Representations, e.g., Words, Equations, Graphs, Tables | LRV.01 apply data-management techniques to investigate relationships between two variables;  LRV.02 determine the characteristics of linear relations;  LRV.03 demonstrate an understanding of constant rate of change and its connection to linear relations;  LRV.04 connect various representations of a linear relation, and solve problems using the representations;  NAV.02 simplify numerical and polynomial expressions in one variable, and solve simple first-degree equations. | 8 | 2 | 10 |  |  |
| 7 | Connecting Algebraic Models of Linear Relations  Simplifying Algebraic Expressions | LRV.04 connect various representations of a linear relation, and solve problems using the representations;  NAV.02 simplify numerical and polynomial expressions in one variable, and solve simple first-degree equations. | 8 | 2 | 10 |  |  |
| 8 | Plane Geometry  \*Note: this unit could stand alone and be placed anywhere in the course | MGV.03 determine, through investigation facilitated by dynamic geometry software, geometric properties and relationships involving two-dimensional shapes, and apply the results to solving problems;  LRV.01 apply data-management techniques to investigate relationships between two variables;  LRV.02 determine the characteristics of linear relations;  LRV.04 connect various representations of a linear relation, and solve problems using the representations;  NAV.02 simplify numerical and polynomial expressions in one variable, and solve simple first-degree equations. | 9 | 2 | 11 |  |  |
|  | EQAO Assessment and Preparation |  | 3 | 0 | 3 |  |  |
|  | Summative Performance Tasks |  |  |  |  |  |  |
|  | **Total Days** |  | **70** | **15** | **85** | **5** | |

**BLM 4.2 Activity 4: Merge with TIPS4M**

**Grade 10 Applied: Content and Reporting Targets**

|  |  |  |
| --- | --- | --- |
| Unit 1 – Similar Triangles | Unit 2 – Trigonometry | Unit 3 – Equations of Lines |
| Measurement and Trigonometry   * Similar Triangles | Measurement and Trigonometry   * Trigonometry of Right Triangles | Modelling Linear Relations   * Equations of Lines |
| Rationale | | |
| Positioning similar triangles first:   * Similar triangles activities provide the opportunity for authentic tasks that appeal to kinaesthetic learners, appropriate at the beginning of the Grade 10 Applied program. * This unit extends the ‘proportional relationships’ and ‘proportional reasoning’ sub-groupings from earlier grades. * Teachers can observe students’ reasoning, representing, and problem-solving skills in contexts that can be illustrated with concrete materials and visual representations. * Segue from constant ratios of corresponding sides in similar triangles to the primary trigonometric ratios. | Positioning trigonometry of right triangles after similar triangles:   * Students make and use clinometers in doing authentic tasks. * Students formalize trigonometric vocabulary. * Segue to Unit 3 – The tangent ratio for a triangle drawn on the plane is the slope of the line segment drawn on the plane. | Progression from Grade 9 and setting the stage for Unit 4:   * Students gather data that can be represented as a linear relation and data that can be represented as a quadratic relation. * Students contrast the tables of values and the constant differences for linear and quadratic relations. * Students briefly revisit Grade 9 models for linear relationships to see the need to compare and analyse lines using *m* and *b*. * Move from context-connected to abstract examples of a line, then go back to contexts when introducing systems of lines. * Graphing lines from their equations leads to graphical solutions for systems of linear equations in Unit 4. |

|  |  |  |  |
| --- | --- | --- | --- |
| Unit 4 – Linear Systems | Unit 5 –  Introduction to Quadratic Relations | Unit 6 – Quadratic Relations of the Form *y* = *ax2* + *bx* + *c* | Unit 7 – Surface Area  and Volume |
| Modelling Linear Relations   * Solving Systems of Linear Equations Algebraically | Quadratic Relations   * Graphical Models of Quadratic Relationships   Modelling Linear Relations   * Solving Systems of Linear Equations Graphically | Quadratic Relations   * Algebraic Models of Quadratic Relationships * Applications of Quadratics | Measurement and Trigonometry   * Surface Area and Volume |
| Rationale | | | |
| Positioning systems of linear equations here:   * Algebraic methods are introduced as a means of finding exact solutions to linear systems. * This is another opportunity for students to develop concepts and skills connected to linear functions. In sequencing two more units after this one, time is available for providing remediation for students who have not yet mastered essential linear concepts and skills. | Considering linear and quadratic relations together:   * Some experiments will result in linear relations; others quadratic. * Constant differences in tables of values can be contrasted.   Solving graphically before algebraically   * Graphical solutions appeal to visual learners. * Students will be able to return to graphical methods to verify algebraic work in Units 5 and 7. | Positioning quadratic relations here:   * Further work on quadratic functions and other non-linear functions will be done in  Grades 11 and 12. | Positioning surface area and volume here:   * Investigations and problem-solving activities in this unit provide the opportunity for authentic tasks that appeal to kinaesthetic learners. |

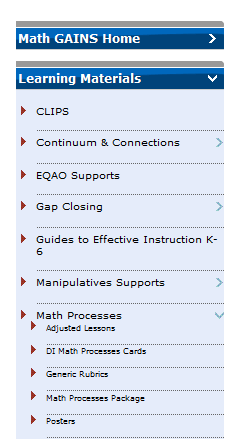
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Unit | Cluster of Curriculum Expectation | Overall Expectations | P | J | T | SP |
| 1 | Similar Triangles | MTV.01 • use their knowledge of ratio and proportion to investigate similar triangles and solve problems related to similarity;  LRV.01 • manipulate and solve algebraic equations, as needed to solve problems. | 9 | 1 | 10 |  |
| 2 | Trigonometry | MTV.02 • solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean theorem;  LRV.01 • manipulate and solve algebraic equations, as needed to solve problems. | 9 | 1 | 10 |  |
| 3 | Equations of Lines | LRV.02 • graph a line and write the equation of a line from given information;  LRV.01 • manipulate and solve algebraic equations, as needed to solve problems. | 12 | 1 | 13 |  |
| 4 | Linear Systems | LRV.03 • solve systems of two linear equations, and solve related problems that arise from realistic situations. | 10 | 1 | 11 |  |
| 5 | Introduction to Quadratic Relations | QRV.02 • identify characteristics of quadratic relations;  QRV.03 • solve problems by interpreting graphs of quadratic relations;  LRV.03 • solve systems of two linear equations, and solve related problems that arise from realistic situations. | 6 | 1 | 7 |  |
| 6 | Quadratic Relations of the Form  *y* = *ax*2 + *bx* + *c* | QRV.01 • manipulate algebraic expressions, as needed to understand quadratic relations;  QRV.02 • identify characteristics of quadratic relations;  QRV.03 • solve problems by interpreting graphs of quadratic relations. | 12 | 1 | 13 |  |
| 7 | Surface Area and Volume | MTV.03 • solve problems involving the surface areas and volumes of three-dimensional figures, and use the imperial and metric systems of measurement;  LRV.01 • manipulate and solve algebraic equations, as needed to solve problems. | 17 | 1 | 18 |  |
|  | Final Summative Task |  |  | 3 | 7 | 4 |
|  | Total Number of Days |  | **75** | **10** | **89** | **4** |

|  |  |  |
| --- | --- | --- |
| Activity 5: Tips on TIPS | | FL PL |
| 20 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Align a financial literacy lesson created in the Financial Literacy template to the TIPS template * Deepen awareness and understanding of the TIPS three-part lesson template | Materials   * Cards made from BLM APP 1 * Copies of TIPS Annotated Template   (http://www.edugains.ca/resources/LearningMaterials/TIPS/AnnotatedTemplate.pdf)   * Copies of each of the 4 FL Lessons * Large copies/slides of the TIPS template for posting |
|  | Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 5 min |
|  | Groups of 3 or 4 🡪 Merging  Distribute TIPS Template (available at <http://www.edugains.ca/resources/LearningMaterials/TIPS/AnnotatedTemplate.pdf>)  Distribute lessons selected.  Participants use an existing financial literacy lesson to find the connections between the FL template and the TIPS template. |  |
| Action! |
| 10 min |
|  | Whole Group 🡪 Sharing  Post large copies of TIPS template (or project slide of the template). Participants describe the similarities and differences they have found between the FL template and the TIPS template.  Lead a discussion of the pros and cons of each template. |  |
| Consolidate Debrief |
| 5 min |
|  | Home Activity or Further Classroom Consolidation |  |

|  |  |  |
| --- | --- | --- |
| Activity 6: Processing the Processes | | FL PL |
| 45 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Identify the Mathematical Processes in a financial literacy lesson * Connect the Mathematical Processes to a financial literacy lesson * Become more familiar with Math GAINS math processes resources | Materials   * Cards made from BLM APP 1 * Mathematical Process Posters * Math Process rubrics and any other resources desired (see BLM 6.1) * Copies of each of the 4 FL Lessons |
|  | Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 5 min |
|  | Groups of 3 or 4 🡪 Merging  In advance of the session, the facilitator selects from the resources available at <http://www.edugains.ca/newsite/math2/index.html> to have on hand for participants who are less familiar with the math processes.  Distribute Mathematical Processes documents, in particular the Math Process Package <http://www.edugains.ca/resources/LearningMaterials/MathProcesses/MathProcessessPackage.pdf>  Distribute lessons selected.  Participants identify where the mathematical processes are being utilized and where and how the processes could be assessed.  Encourage participants who are familiar with the math processes to edit a rubric to make it more specific to the process being assessed within the context of the lesson. | If possible, provide access to computers for this activity. |
| Action! |
| 30 min |
|  | Whole Group 🡪 Sharing  Teachers share their understandings of how to incorporate math process expectations into their lessons. |  |
| Consolidate Debrief |
| 10 min |
|  | Home Activity or Further Classroom Consolidation  . |  |

**BLM 6.1 Activity 6: Processing the Processes**

**Available at** [**http://www.edugains.ca/newsite/math2/index.html**](http://www.edugains.ca/newsite/math2/index.html) **are several different types of Math Processes supports and resources.**

****

|  |  |  |
| --- | --- | --- |
| Activity 7: Open to Suggestions | | FL PL |
| 45 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Create open questions or rewrite existing questions to make the questions more open | Materials   * Cards made from BLM APP 1 * BLM 7.1 * Copies of each of the 4 FL Lessons |
|  | Whole Group 🡪 Exploring Opening Up a Question  Project BLM 7.1. Participants discuss the questions as shown.  In round robin format, participants share their new, more open question as well as the strategy they used to open it up.  Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | It may be necessary to talk about/ review what is meant by “open questions”. Suggestions are on BLM 7.1 for reference  You might want to modify the course cards depending on your audience. |
| Minds On… |
| 15 min |
|  | Groups of 3 or 4 🡪 Opening Up a FL Lesson  Distribute lessons selected.  Participants work on writing open questions/tasks for the lesson they selected. They may open up existing questions/tasks or they may write original questions/tasks. |  |
| Action! |
| 25 min |
|  | Whole Group 🡪 Sharing  Participants share their work. |  |
| Consolidate Debrief |
| 5 min |
| 5 min | Home Activity or Further Classroom Consolidation  Participants reflect on their use of open questions in their classroom. |  |

**BLM 7.1 Activity 7: Open to Suggestions**

**QUESTION**

Using ***y = mx + b*** form,createan algebraic representation of the following scenario:

Tom’s cell phone plan charges a flat rate of $25 per month plus an additional fee of $0.10 per minute.

What makes this a closed question?

Take 2 minutes to create a question that opens this up.

Share your thinking with an elbow partner.

**Some Strategies for Opening a Question**

• Begin with the answer. Ask for the question.

Eg: You saved $6 on a pair of jeans. What could the original price and the percent off have been?

• Ask for similarities and differences.

Eg: How are 3% simple interest and 3% compound interest alike? How are they different?

• Leave certain information out of the problem, e.g., omit numbers.

Eg: \_\_\_\_% of \_\_\_\_\_ = 22

• Provide several numbers and math words; the student creates a sentence using all the numbers and words.

Eg: Create a sentence that uses the numbers and words: 40, 5, percent, and amount.

• Use “soft” language.

Eg: Two rates are “almost but not quite” equivalent. What might they be?

|  |  |  |
| --- | --- | --- |
| Activity 8: Rising to Great Heights with Great Scaffolding | | FL PL |
| 55 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Reflect on unique challenges presented by financial literacy * Develop strategies for supporting student success, including creating scaffolding questions | Materials   * Cards made from BLM APP 1 * BLM 8.1 * Copies of each of the 4 FL Lessons * Sticky flags * Sticky notes * Chart paper * Markers |
|  | Whole Group 🡪 Identifying special circumstances  Project the passage from the Ministry of Education Report of the Working Group on Financial Literacy (BLM 8.1). Participants consider how financial literacy may provide unique challenges for some students.  Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 8 - 9 others to work with, ideally creating groups of 10. In their group they share their reason for selecting this lesson/course. | You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 5 min |
|  | Pairs 🡪 Identify possible challenges  Distribute lessons selected. Within the lesson groupings, participants pair off. Each pair will review one section of the lesson plan (Curriculum Expectations, Learning Goals, Instructional Components and Context, Minds On, Action!). They will spend 5 minutes identifying potential areas of struggle for students within that section of the lesson plan.  Groups of 9 or 10 🡪 Develop scaffolding supports  After 5 minutes, the larger lesson group of 9 - 10 will reassemble and record identified struggles 1 at a time on chart paper, beginning with the Curriculum Expectations pair and continuing until all struggles have been identified. They will then brainstorm strategies that could be used to provide scaffolding for each of the struggles (eg. provide manipulatives, create a word wall, create questions/question stems). Each lesson group selects a member or a pair who will present a brief synopsis of the lesson and their lesson group’s findings to the larger group. | The Professional Learning Guide – Scaffolding package [http://www.edugains.ca/newsite/math2/prolearningguides.html](http://www.edugains.ca/newsite/math2/prolearningguides.html%20) provides support in developing scaffolding into your lessons. |
| Action! |
| 30 min |
|  | Whole Group 🡪 Presentation  Each lesson’s representative will present the lesson overview and group’s findings (areas of potential struggle and scaffolding that could remediate the struggle). |  |
| Consolidate Debrief |
| 20 min |
|  | Home Activity or Further Classroom Consolidation  The whole group identifies common areas of struggle from each of the four lessons and offer any additional suggestions for scaffolding that may be identified by a participant from a different lesson group. |  |

**BLM 8.1 Activity 8: Rising to Great Heights with Great Scaffolding**

“Some students with special education needs may require, as part of their Individual Education Plan (IEP), certain accommodations or assistive technology to support them in learning. Some students who are newcomers to Ontario may require additional support as they acquire English-language skills and as they learn about processes related to Canadian financial systems that may be unfamiliar to them.”

A Sound Investment – Financial Literacy Education in Ontario Schools, Report of the Working Group on Financial Literacy, 2010, page 12

In what ways might financial literacy be a particular challenge to students?

|  |  |  |
| --- | --- | --- |
| Activity 9: Running in Parallel | | FL PL |
| 35 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Create a parallel task for an activity in one lesson | Materials   * Cards made from BLM APP 1 * Slide of BLM 9.1 * Copies of each of the 4 FL Lessons * Chart paper |
|  | Whole Group 🡪 Identifying Characteristics of a Parallel Task  Project BLM 9.1. Lead a discussion about what is meant my “parallel tasks” using the slide to help guide the group.    Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | See bottom of BLM 9.1 for suggestions for developing parallel tasks.  You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 20 min |
|  | Groups of 3 or 4 🡪 Create parallel task  Distribute lessons selected.  Participants identify an opportunity to create a parallel tasks within the lesson selected. Participants create the parallel task, along with the common questions that can be asked.  They transfer the original question and the new parallel tasks onto the chart paper and post it. |  |
| Action! |
| 25 min |
|  | Whole Group 🡪 Sharing  Groups present their tasks to the whole group.  Whole group discuss similarities in the strategies used by the groups to create parallel tasks. |  |
| Consolidate Debrief |
| 15 min |
|  | Home Activity or Further Classroom Consolidation |  |

**BLM 9.1 Activity 9: Running in Parallel**

Looking at the following parallel tasks:



How do both tasks address the same expectations? What expectations?

How do the two tasks meet a DI objective?

What might these tasks be considered “parallel”?

What are some common questions that can be asked regardless of which task the student has selected?

**Description of Parallel Questions**

Another strategy that builds student confidence is to offer choice in two or three parallel tasks that are

mathematically equivalent in terms of the learning concept but not in terms of skill details. All students can

succeed relatively independently since obstacles are removed in the varied tasks to provide an entry

point for all students. The context of the tasks are relatively similar so that the same follow-up questions

can be asked and answered by students no matter which task they did. This differentiation technique

allows all students to be part of the discussions and encourages a math talk learning community.

**Steps for Creating Parallel Questions**

1. Select the initial task.

2. Anticipate student difficulties with the task (or anticipate what makes the task too simple for some

students).

3. Create the parallel task, ensuring that the Big Idea is not compromised, and that enough context

remains similar so that common consolidation questions can be asked.

4. Create at least three or four common questions that are pertinent to both tasks. These should provide

insight into the solution and not just extend the original tasks. You might use processes and Big Ideas

to help.

5. Call upon students from both groups to respond.

This is from page 24 of <http://www.edugains.ca/resources/LearningMaterials/ContinuumConnection/BigIdeasQuestioning_ProportionalReasoning.pdf> For further information and examples see pages 23 – 25 of this resource.

|  |  |  |
| --- | --- | --- |
| Activity 10: It’s All Up to You | | FL PL |
| 60 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Identify opportunities to incorporate a financial literacy focus into a lesson * Create questions having a financial literacy focus that align with existing expectations, using an existing resource as a starting point | Materials   * Textbook or other resource used by participant * Copies of Page 1 of FL lessons 1, 2 and 4, and Pages 1 and 2 of lesson 3 * Cards made from BLM APP 1 |
|  | Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 5 min |
|  | Groups of 2 or 3 🡪 Identify opportunity  Distribute Page 1 lesson 1, 2 and 4 and Pages 1 and 2 of lesson 3, as selected.  Looking at the expectation(s) from the lesson (which are identified on Page 1 of the FL lesson planning template), participants will locate questions in the book/resource that have, or could easily be changed to have, a financial literacy focus.  Participants create FL-focussed questions appropriate to this section of the resource. |  |
| Action! |
| 30 min |
|  | Course Pairs 🡪 Sharing  Regroup participants into pairs that worked on the same course, regardless of the resource used. Each member of the pair will share the questions their group wrote and describe the process they underwent to identify where a FL focus could be implemented. Emphasis should be placed on both the math expectation and the Financial Literacy connection. |  |
| Consolidate Debrief |
| 15 min |
| 10 min | Home Activity or Further Classroom Consolidation  Original groups are brought back together to review findings of other members. |  |

|  |  |  |
| --- | --- | --- |
| Activity 11: Interaction with the Lessons | | FL PL |
| 65 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Adjust a financial literacy lesson to an Interactive Whiteboard format | Materials   * Cards made from BLM APP 1 * Soft copies of each of the 4 FL Lessons * Optional – Interactive White Board (IWB) FL lessons * IWB * Computers with IWB software |
|  | Whole Group 🡪 Identify Groupings  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group they share their reason for selecting this lesson/course. | You might want to modify the  course cards depending on your audience.  Some lessons are available in Notebook format – participants may choose to personalize one of these. |
| Minds On… |
| 5 min |
|  | Pairs 🡪 IWB lesson writing  Distribute lessons selected.  Participants create an IWB lesson from the available FL lesson (in electronic form). |  |
| Action! |
| 40 min |
|  | Whole Group 🡪 Sharing  Participants present their lessons to the group and receive feedback. |  |
| Consolidate Debrief |
| 20 min |
|  | Home Activity or Further Classroom Consolidation  Participants modify their lesson using the feedback provided in the Consolidation. |  |

|  |  |  |
| --- | --- | --- |
| Activity 12: Click to Financial Independence | | FL PL |
| 75 min | Professional Learning Goals   * Become more familiar with a financial literacy lesson * Gain knowledge of some best practices in developing clicker questions * Create clicker/response unit questions that can be used during the Minds On, Action or Consolidation section of the lesson | Materials   * Cards made from BLM APP 1 * Copies of each of the 4 FL Lessons * Clickers/ response units and corresponding software and computers |
|  | Whole Group 🡪 Identify Groupings  Show the video that focuses on developing “good” clicker questions that is embedded in the following <http://derekbruff.com/teachingwithcrs/?p=450>  Post 4 cards BLM APP 1, Appendix 1, found at back of guide, in different locations in the room.  Participants select a course and lesson to use throughout this activity. They will go to the location where the corresponding course card is posted, and find 3 – 4 others to work with. In their small group discuss what they learned from the video about developing clicker questions. | You might want to modify the  course cards depending on your audience. |
| Minds On… |
| 5 min |
|  | Pairs 🡪 Writing response/clicker questions  Distribute lessons selected.  Pairs create questions appropriate for clickers/response units that could be used to identify student readiness (coming into the lesson i.e., assessment for learning) or to assess student understanding of the lesson (after the consolidation has taken place i.e., assessment of learning). | More about developing clicker questions: <http://www.teaching.utoronto.ca/Assets/CTSI+Digital+Assets/PDFs/lct-clickerquestions.pdf> |
| Action! |
| 40 min |
|  | Whole Group 🡪 Sharing  Pass out clickers/response units. Pairs will project their questions and participants will play the role of the students. Participants will provide constructive feedback about the questions. |  |
| Consolidate Debrief |
| 30 min |
|  | Home Activity or Further Classroom Consolidation  Participants modify their questions using the feedback provided in the Consolidation. |  |

**Appendix 1**

**BLM APP1: Cards for Creating Groups**

**Academic Cards**

**MFM1P**

Linear Relations – Lesson 1

**MFM1P**

Linear Relations – Lesson 2

**MFM1P**

Linear Relations – Lesson 3

**MFM2P**

Modelling Linear Relations – Lesson 3

**Academic Cards**

**MPM1D**

Linear Relations – Lesson 1

**MPM1D**

Linear Relations – Lesson 2

**MPM1D**

Analytic Geometry – Lesson 3

**MPM2D**

Analytic Geometry – Lesson 3

**MPM2D**

Analytic Geometry – Lesson 4