

Math Lesson – Pay The Fine

Outcomes or Learning Goals

- Solve problems involving money drawn from everyday situations
- Write money values, using correct units
- Demonstrate the effective use of a calculator in operations with decimals
- Communicate information about money sense
- Read and interpret data displayed in tables and graphs
- Verbalize their observations and reflections regarding money sense and ask questions to clarify their understanding
- Make the correct change for an offered amount
- Explain their reasoning used in problem solving and in judging reasonableness
- Develop, select, and apply problem-solving strategies while posing and solving problems

Grade Levels

MAT1LZ – Locally Developed Math grade 9

MAT2LZ – Locally Developed Math grade 10

Context & Rationale

In the book *Pay the Fine*, students read about Adam, a student who accumulates a library fine. This true story presents a relevant scenario for students who are beginning to acquire key financial literacy concepts and vocabulary related to their present lives, as well as their future financial endeavours. Creating and solving problems in real-life contexts, such as those provided in this lesson, helps newcomer English Language Learners, especially those with limited prior formal schooling, to acquire necessary mathematical skills and financial concepts in meaningful and useful ways.

Related Topics /Units

The story *Pay the Fine* provides various opportunities to pursue mathematical skills and financial concepts. Representation of combinations of money, use of decimals on the calculator, the relationship of repeated addition and multiplication, acquisition and use of information from a calendar and table, making change, and the formulation of multi-step problems are all concepts likely to emerge from the questions students create based on the picture prompts. These problems adapt well to differentiation needs and can be used to introduce, practise, review, or consolidate concepts.

Number Sense and Numeration Skills from the *Ontario Elementary Mathematics Curriculum* that link well to this lesson and support the needs of limited prior formal learning students are:

- Estimate, count, and represent (using the \$ symbol) the value of a collection of coins and bills with a maximum value of \$10 (Gr. 3) and \$100 (Gr. 4)
- Count forward by 1's, 2's, 5's, 10's, 25's, and 100's from various starting points (Gr. 3)

- Add and subtract money amounts by making simulated purchases and providing amount for change up to \$100 (Gr. 4)
- Relate multiplication of one-digit numbers to real-life situations (Gr. 3)
- Demonstrate an understanding of simple multiplicative relationships involving unit rates (Gr. 4)
- Add and subtract decimal numbers to hundredths, including money amounts, using concrete materials, estimation, and algorithms (Gr. 5)
- Multiply decimal numbers by 10, 100, 1000 (Gr. 5)

Process Expectations:

- Problem solving: develop, select and apply problem-solving strategies as students pose and solve problems and conduct investigations to help deepen mathematical understanding learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems
- Selecting Tools and Computational Strategies: select and use a variety of concrete, visuals and electronic

Concepts such as the merits of fines in various circumstances and the acceptance of inherent responsibilities as part of an agreement, as well as the possible consequences for noncompliance, could be explored further through research and debate activities.

Resources:

Ministry of Education Ontario: Guides to Effective Instruction in Mathematics, Grade 4-6:

Volume1: **Big Ideas** for an explanation of the key concepts in number sense and numeration across the junior grades, as well as appropriate models and tools that support students in understanding these concepts

Volume 2: **Addition and Subtraction** – addresses key concepts, computational strategies, estimation and addition and subtraction of decimals. It also contains sample lessons.

Volume 3: **Multiplication** – addresses understanding of multiplicative situations, learning basic facts, multiplying by multiples of 10, computational strategies, strategies for multiplying decimals. It also includes instructional strategies and sample learning activities.

Minilessons for Early Multiplication and Division; by W. Uittenbogaard, C. Fosnet---This resource provides short 10-15 minute lessons which support students acquiring basic facts and mental computational skills.

Lesson Sequence


Part 1 Minds on/Prior Learning (15 - 20 minutes)

Activity

Remind students of the book they read, *Pay the Fine*. Tell them they will be making and solving math problems by using some ideas from the story. Begin the “*Pay the Fine Math Prompts*” Powerpoint to activate prior knowledge and to facilitate the creation of the math problems for the lesson. If desired, the teacher may use the following prompts with the slides:

Slide #2 - Ask the students what they remember about Adam, the boy in the *Pay the Fine* story. (*He liked to read, borrowed books, lost them, had to pay a fine, his mother loaned him money to pay, and his consequence was to recycle.*)

Slide #3 - Adam has started to calculate the fine.
 What was his thinking in Step 1? (*calculated fine for 1 book over the 7 days*)
 What does he need to find out next? (*Find out how much for 8 books*)
 Give students the opportunity to discuss with an elbow partner:
 How might he do this in Step 2? (*add \$1.40 eight times OR multiply 1.40 X 8*)
 What is the total fine? (*\$11.20*)
 Ratio Table

double 

Fine for each book	# of days
\$1.40	1
\$2.80	2
\$5.60	3
\$11.20	4

Slide #4 - Ask a student to describe how to count the money he is holding to pay for the fine. (*Why did you start with the \$10 bill first? Did anyone else start with a different money amount?*) **KEY CONCEPT:** *Usually it helps to start with the biggest money amounts and move to adding smaller amounts. Sometimes it helps to add coins that help you “land” on a friendly number e.g. 25¢, 50¢*

Slide #5 - Introduce a student’s personal calendar. What do students notice? (*special days – party, pizza day, due date for books*) *In how many days will it be pizza day? How do you know?*

What do they think the X’s mean? (*Days that have passed*)

What day is today? (*18th*)

What to Prepare

- Accompanying Powerpoint “**Pay the Fine Math Prompts**”
- Display board and/or chart paper and marker
- Manipulatives: play money, calendar, graph paper, base tens, hundreds charts, calculator, tiles
- Students seated with an elbow partner

Prior Knowledge Needed:

- values of coins and bills
- writing money with \$ and decimal points
- understanding of addition and subtraction
- understanding of the relationship of repeated addition and multiplication
- adding and multiplying decimals on a calculator

Part 1 Minds on/Prior Learning (15 - 20 minutes)	What to Prepare
<p>Slide #6 - Why might we need this information about fines? (<i>the person did not return the books yet</i>) What information does the table show us? (<i>fines for different materials and ages of library users</i>)</p> <p>Can anyone think of a question? Would you like more information?</p> <p>Slide #7 - Do any possible math problems come to mind?</p> <p>Slide #8 - Are there any other questions we might think of?</p> <p>Slides #9, 10 - What math problems might we create and try to solve? (Record possible questions on Slide #10 or on chart paper. If the class is large, divide into groups of three and groups to work for a few minutes to create a question, then share with the large group.)</p> <p>Possible questions to anticipate:</p> <p><i>Does the student have enough money to pay the fine for overdue books?</i></p> <p><i>What is the change after paying the fine for overdue books?</i></p> <p><i>How much is the fine for 3 overdue books?</i></p> <p>As a class, co-create the question to be solved and post in an accessible location or as the teacher, generate a few questions ahead of time that target key skills the students need more practice with.</p> <p>Differentiation needs: For students who are struggling to create a question, the teacher can have the students use Slide #6 or #7 to promote ideas or ask them to think about 1 book instead of 3 books. Consider choosing an alternate, easier parallel question for some students to explore.</p>	
<p style="text-align: center;">Assessment For Learning</p> <p>Observe student remarks and questions during the discussion of the slides and creation of questions:</p> <ul style="list-style-type: none"> • Which students could discuss, with some understanding, what the second step of calculations might be for Slide #3? • Which students can acquire information from the calendar and table of fines? <p>Ask students to share their questions:</p> <ul style="list-style-type: none"> • Which students created an easy question or more challenging question? What might have been the factors influencing the students who created the easy questions? • What vocabulary strengths/needs are evident during class discussion and partner talk? 	<p>Make a note of any students who will need additional support or would benefit from a more challenging problem.</p>

Part 1 Minds on/Prior Learning (15 - 20 minutes)

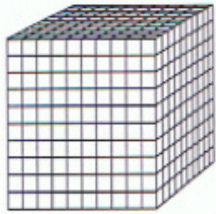
What to Prepare

Part 2 – Work on it (25 – 30 minutes)

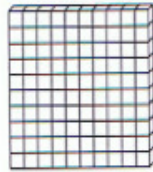
Students work with partners and record their question, work, and final answer on chart paper.

Grid chart paper works well when working with decimals and money.

Base ten blocks: \$



\$10.00



\$1.00



\$0.10

Before beginning work:

- Read/ review /co-create appropriate terms for the math word wall. (*fine, amount, coin, bill, dollars, cents, total, change, calendar, table, etc.*)
- Show the class various materials they might choose to use when solving their problem: *calculator, play money quarters, calendar sheets, tiles to represent the books, base tens*

Keep final Slide #9 displayed for student reference during the work period and for the Exit Ticket activity.

Activities During Work Period

- Discuss with partners what information they might use from the calendar. (Can they determine the number of overdue days?)
- Support, when necessary, the use of the table for fines. Which amount will they use? Why?
- For students who are not ready to use an algorithm or steps, encourage use of manipulatives. (Place quarters on a tile to show meaning of the fine, place 3 quarters on each overdue day on the calendar, model repeated addition for each overdue day, ask about a short way to add the same number as a reminder of the meaning of multiplication)
- Challenge students who solve their problem quickly to think of more information they could add to the slide – DVDs, etc. How can they make a more complicated overdue notice?
- The teacher may choose to have the students work with a partner or in small groups, depending upon the composition of the class.

Part 1 Minds on/Prior Learning (15 - 20 minutes)	What to Prepare
<p style="text-align: center;">Assessment</p> <p>Allow students time to get started and then move around the room to observe each group. Listen to the discussions.</p> <ul style="list-style-type: none"> • Are they using math vocabulary? (<i>dollars, amount, total, change, fine, table/chart, etc.</i>) • Are students writing the money amounts correctly? • Note which students require support to clarify the meaning of the question, organize their work, or choose a strategy. • Note which students solve using manipulatives and which students use algorithms. • For those students using an algorithm, probe their understanding by asking for reasons why they chose to use the particular operations and numbers. • Observe which groups used similar approaches and organization. Select varying examples to be shared in Part 3. 	
Part 3 – Conclude and Share Solutions (15 - 20 minutes)	
<p style="text-align: center;">Activity</p> <p>Bring the class back together.</p> <ul style="list-style-type: none"> • Choose different groups to share their questions and answers, beginning with the easier questions. • Discuss with groups what their final answer is. How do they know it is right? Does it seem reasonable? • Ask students to help create a list of different ways the problem was solved. (Picture, table, repeated addition, multiplication, etc.) • If students discuss change as part of their question/answer, ask if they can model the change using the play money. 	

Part 1 Minds on/Prior Learning (15 - 20 minutes)	What to Prepare
<p style="text-align: center;">Follow up</p> <p>Exit Ticket – Refer students to Slide #9 from the Powerpoint on display. Choose a fine from the <i>Fine for Overdue Materials</i> table on the slide: Choose # days overdue. Choose a bill to use to pay. Find the change.</p>	<p>Exit Ticket: BLM #1</p>
<p style="text-align: center;">Assessment</p> <p>Check student results for Exit Ticket.</p> <ul style="list-style-type: none"> • Did students know how to use the table to select a fine? • Did students know to add or multiply to find the fine? Did students use the correct notation for money amounts? • Did students know to subtract in order to find the change? 	

Resources

Accompanying Powerpoint “*Pay the Fine* Math Prompts”

BLM #1 Exit Ticket - *Pay the Fine*

Name _____

Date _____

Use the table from Slide #9 *Fines For Overdue Materials*

Choose a fine	
Choose # days overdue	
Choose a bill to pay with 	

Work Space

My change is _____.