Math Lesson - The Cell Phone

Outcomes or Learning Goals

The story *The Cell* provides an opportunity for students to think about how impulsive purchasing decisions can impact finances, and to consider the impact of having a cell phone contract. The story supports issues of money management as well as budgeting. The related math problems invite students to compare two cell phone plans through examples of different usage.

Grade Level

MAT1LZ – Locally Developed Math grade 9
MAT2LZ – Locally Developed Math grade 10

Context & Rationale

In the book *The Cell Phone* we meet Nabi, who buys a new cell phone from a friend and wants to cancel his current cell phone plan. The context helps students understand the benefits and negatives of having a cell phone contract, and the impact of the contract terms. Students learn that by comparing two or more cell phone plans to better understand the cost of usage supports their ability to make purchasing decisions and to manage their money.

Related Topics/Units

• solve problems involving money drawn from everyday situations (Gr. 9, 10)
• solve problems drawn from everyday situations involving ratio/rate (Gr. 9)
• solve problems involving the calculation of rates drawn from a variety of everyday contexts and from familiar social issues (Gr. 10)
• calculate rates in activities drawn from their experiences (Gr. 9, 10)
• read, interpret and explain orally and in writing data displayed in simple tables and graphs (Gr. 9, 10)
• communicate information about proportional reasoning (Gr. 9)
• verbalize their observations and reflections and reflections regarding proportional reasoning and ask questions to clarify their understanding (Gr. 9, 10)
• communicate, orally and in writing, the solutions to proportional reasoning problems and the results of investigations, using appropriate terminology, symbols and form (Gr. 9)
• explain their reasoning used in problem solving and in judging reasonableness (Gr. 9, 10)
• develop, select, and apply problem-solving strategies while posing and solving problems (Gr. 9)

Number Sense and Numeration Skills from the Ontario Mathematics Curriculum, Grades 1-8 (2005), that link well to this lesson and would support the needs of limited prior formal learning students are:

• demonstrate an understanding of simple multiplicative relationships involving whole-number rates, through investigation using concrete materials and drawings (Gr. 5)

• represent relationships using unit rates (Gr. 6)

For the extension problem:
Algebra concepts from the Ontario Mathematics Curriculum, Grades 1-8 (2005), that link well to this lesson and would support the needs of limited prior formal learning students are:

• use variables in simple algebraic expressions and equations to describe relationships. (Gr. 6)
• translate phrases describing simple mathematical relationships into algebraic expressions (Gr. 7)

Additional References:

Big Ideas and Questioning K-12: Proportional Reasoning
http://www.edugains.ca/resources/LearningMaterials/ContinuumConnection/BigIdeasQuestioning_ProportionalReasoning.pdf

Paying Attention to Proportional Reasoning, K-12
http://www.edu.gov.on.ca/eng/teachers/studentsuccess/ProportionReason.pdf

Paying Attention to Algebraic Reasoning, K-12
http://www.edu.gov.on.ca/eng/literacynumeracy/PayingAttentiontoAlgebra.pdf

NCTM Illuminations: Resources for Teaching Math
http://illuminations.nctm.org

Lesson Sequence

Part 1 Minds On/Prior Learning (15 minutes estimated for this section)	What to prepare
Activity 1. Remind students of the book they have read, *The Cell Phone*. 2. To set the context, ask students: Who has a cell phone? What kind of plan do you have (contract vs. pay-as-you-go)? 3. Present the problem: A student is getting his first cell phone. His parents said that they would contribute $25/month. The student researched two cell phone plans, and is trying to decide between the two. The two plans are compared in the following chart.	Copies of the book *The Cell Phone*

	VOICE Minutes	TEXT Messages
PLAN A	5¢/minute	15¢/message
PLAN B	10¢/minute	5¢/message

4. If you were asked to help this student, what questions would you ask him in order to help him select a plan? Have students turn and talk to a partner, and then have students share their questions with the class. (e.g., How often do you text? How often do you call? Is $25 your budget for the month, or can you go over that amount? Is there a charge for sending and receiving calls and texts?)	
### Assessment For the class in general, note whose questions show understanding of the information and calculations needed to know which is the more suitable plan.	
## Part 2 – Work On It (30 minutes estimated for this section)	
Work in small groups - 2 per group. You have a cell phone budget of $25/month. Thinking about the two cell phone plans (above), answer the following questions: 1. If you were only interested in texting, how many text messages will you be able to send with each plan? 2. If you were only interested in using the phone to make calls, how long will you be able to talk with each plan? 3. If you talk for a total of two hours each month, how many texts will you be able to send with each plan? 4. Create names for PLAN A and PLAN B that clearly describe the benefits of each plan. ### Extension Write an equation for each plan to represent the number of text messages (x) and the number of talk minutes (y) you will be able to use with $25. You should have a separate equation for each plan. ## Activities During Work Period • Students work with partners and record question, work/thinking, and answer on chart paper. • Teacher visits partners to clarify the question they are answering and to see if they have a strategy to start/continue working on the problem. • Teacher thinks about which solutions to share in the third part of the lesson, and the order in which they will be shared. Solutions selected should show a variety of strategies (and hopefully will include the ratio table).	Blank paper for students to record thinking and solution.

Assessment For each student, observe and document: - use of multiplicative reasoning - computational strategies and fluency - clear representation of the problem and communication of thinking	
Part 3 – Conclude & Share Solutions (20 minutes estimated for this section)	
Activity The solutions selected (2-4) are shared, starting with the simplest strategy and moving to the most complex. Consider which tools/models/algorithms would best support the learning of the class. Also, consider clarity of communication when selecting solutions and order in which to share. As students share their work, encourage them to discuss *how* they solved the problem. You may wish to question the students to focus attention on a particular aspect of their solution, rather than inviting the student to share their entire process/solution. Invite other students to ask questions of the presenters. At the end of the sharing, highlight key learning by recording it on the whiteboard or on chart paper. The key learning may be connected to a model or strategy used to solve the problem, or to the problem itself e.g., an explanation of how to know which cell phone plan is most suitable.	
Ticket Out the Door (Independent Formative Assessment Task) Students independently respond in their math journals or on a piece of paper: • Which plan would you choose? Why is this the best plan for you? Explain your thinking. • Under what circumstances would you choose the other plan? Collect and assess.	
Assessment For each student, continue to observe and document: - use of multiplicative reasoning - ability to apply and use a model/tool/algorithm - clear representation of the problem and communication of thinking Students who found the questions challenging would benefit from using a rate or ratio table to help them understand how to scale up knowing unit rate, and to help them organize their calculations. For more information, and instructional strategies to support students in understanding how to use a ratio table, refer to: *Minilessons for Early Multiplication and Division*, by Catherine Twomey Fosnot. *Minilessons for Extending Multiplication and Division*, by Catherine Twomey Fosnot.	

Follow up Problems 1. Ask students to solve a similar problem using two other cell phone plans. 2. Give students the average number of text messages sent and the average number of minutes used by a particular person. Which plan should that person choose? Why? How much money would they save?	