

Math Lesson – Fundraising: The Bake Sale

Outcomes or Learning Goals

The story *The Bake Sale* provides an opportunity for students to learn about the problem-solving skills needed when working to accomplish a goal – fundraising in this case. The story also supports issues of project management, collaboration and planning. The related math problems address proportional reasoning involving decimals, and supports students in using a ratio table as a tool to find the solutions.

Grade Level

MAT1LZ – Locally Developed Math grade 9

MAT2LZ – Locally Developed Math grade 10

Context & Rationale

In the book *The Bake Sale*, we read about a group of students who are members of a group called the Water Ambassadors. The Water Ambassadors have a goal of raising money to help build a well for clean water in an African country. Malyoun and her friends decide to hold a bake sale as their fundraising project. Students learn about the planning involved in a fundraising project, as well as the mathematical skills and financial concepts needed to realize such a plan.

Related Topics/Units

- solve problems involving money drawn from everyday situations (Gr. 9, 10)
- write money values, using correct units (Gr. 9)
- 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)
- determine the relationships among decimals by constructing diagrams and building models (Gr. 10)
- communicate information about proportional reasoning (Gr. 9)
- solve problems involving the accomplishment of a particular goal, including investigating, planning, gathering, and organizing data and making relevant calculations (Gr. 10)
- 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)


Additional References:

Big Ideas and Questioning K-12: Proportional Reasoning

http://www.edugains.ca/resources/LearningMaterials/ContinuumConnection/BigIdeasQuestioning_ProportionalReasoning.pdf

This Ministry resource identifies the key concepts in proportional reasoning across each division. Questions connected to each big idea are provided in the resource as a means for differentiating instruction while provoking and clarifying thinking.

Lesson Sequence

Part 1 Minds On/Prior Learning (15 minutes estimated for this section)	What to prepare
<p>Activity</p> <p>1. “Juice Boxes and Six-Packs” Number String This number string mini-lesson is based on a number string in <i>Minilessons for Early Multiplication and Division</i>, p. 37, by Catherine Twomey Fosnot. This number string potentially introduces students to a new model/tool for doing calculations involving multiplication and division: the ratio table. It encourages students to use multiplication facts they know as partial products to find the answers for more challenging problems (the distributive property). Present one fact at a time, and record answers and thinking in a T-chart.</p> <p>“The Water Ambassador Club also decided to sell juice boxes at lunch as a fundraiser for Ryan’s Well. We know that 1 pack of juice has 6 boxes. We can record it as 1 X 6. (Record on T-chart) How many juice boxes are in 2 packs? How do you know? (Try to draw out the term “double”. Record on T-chart) How many juice boxes are in 10 packs? How do you know? (Try to draw out that ten times facts are “friendly facts”. Record on T-chart) How many juice boxes are in 5 packs? How do you know? (Try to draw out the term “half”, as in the 5 times fact is half of the 10 times fact. Record on T-chart) How many juice boxes are in 7 packs? Let’s pretend you didn’t know this fact. How can you use what is already on the table to find the answer? (Try to draw out that you can use the 5 times fact plus the 2 times fact. Record on T-chart)</p>	<p>Copies of the book <i>The Bake Sale</i></p> <p>OPTIONAL: Photo of juice boxes in a six-pack</p>  <p>(“Juices” by wannet.50megs.com is licensed under CC by 2.0)</p>

How many juice boxes are in 20 packs? 100 packs? 50 packs? 57 packs?"
 (Continue questioning in the same way and recording on T-chart)

The completed T-chart should look something like this when finished:

# of packs	# of juice boxes	
1	6	1×6
2	12	2×6
10	60	10×6
5	30	5×6
7	42	$(2 \times 6) + (5 \times 6)$
20	120	20×6
100	600	100×6
50	300	50×6
57	?	$(50 \times 6) + (7 \times 6)$

State: "This T-chart or table is called a ratio table (also may be referred to as a rate table). This might be a tool you use when solving today's problem."

If you have a class anchor chart of strategies/tools, add ratio table to your list.

2. Remind students of the book they have read, *The Bake Sale*.

Assessment

For the class in general, assess fluency of multiplication facts, and ability to use strategies such as doubling, halving, 10 x facts, 100 x facts, and partial products.

You may be able to assess the computational fluency of a number of individual students are they share the answers to facts and explain their thinking.

Part 2 - Work On It

(30 minutes estimated for this section)

Work in small groups - 2 per group.

After the success of their Bake Sale, Malyoun and her friends have decided on their next fundraising project. They want to host a cake sale. They are hoping to raise additional money for the Ryan's Well Foundation.

Each cake will sell for \$17.

- 1) Malyoun's goal is to bake 15 cakes. How much money will she raise selling her cakes?

Recording sheet (see attached) for students to record thinking and solution.

<p>2) Malyoun’s team has set a goal of selling 145 cakes. How much money will the entire team raise if they meet this goal?</p> <p>Hopefully one or more groups of students will chose to use the model introduced in the Minds On, the ratio table, to solve this problem.</p> <p>To differentiate: You may consider offering a parallel task, and inviting students to choose one of the two problems to solve. This problem can be made more difficult by setting a price with dollars and cents, e.g., \$14.75. In this case you may consider changing the total number of cakes sold to 75.</p> <p>Activities During Work Period</p> <ul style="list-style-type: none"> • 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). 	
<p>Assessment</p> <p>For each student, observe and document:</p> <ul style="list-style-type: none"> - use of multiplicative reasoning - computational strategies and fluency - clear representation of the problem and communication of thinking 	
<p>Part 3 – Conclude & Share Solutions (20 minutes estimated for this section)</p>	
<p>Activity</p> <p>The solutions selected (2-4) are shared, starting with the simplest strategy and moving to the most complex. Also, consider clarity of communication when selecting solutions and order in which to share.</p> <p>As students share their work, encourage them to discuss <i>how</i> 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.</p> <p>An interesting way to share solutions is to post a piece of student work,</p>	

<p>and then have students turn and talk to a partner about what strategy they think the students used to solve the problem. Students then share their hypothesis/thinking with the whole group, and the creators of the solution can explain their thinking at the end.</p> <p>At the end of the sharing, highlight key learning by recording it on the whiteboard or on chart paper.</p>	
<p>Follow up</p> <p>If Malyoun and her friends decide to sell cupcakes. If the cost of a dozen cupcakes is \$11.50, how much money will they raise if they sell 36 dozen?</p> <p>Use a ratio table to find the solution.</p> <p>These numbers can be changed to meet the abilities and needs of your class. Again, the follow-up problem can be differentiated if you offer choice of two problems.</p>	
<p>Assessment</p> <p>For each student, continue to observe and document:</p> <ul style="list-style-type: none"> - use of multiplicative reasoning - ability to apply use of a (new) model/tool - clear representation of the problem and communication of thinking <p>Based on your assessment for learning data, do students need additional opportunities to:</p> <ul style="list-style-type: none"> - acquire basic multiplication facts - develop mental computational skills - use a variety of strategies and tools to solve problems involving rate - communicate thinking and reasoning <p>Select problems for future exploration based on student learning needs.</p> <p>Consider teaching ten-minute mini-lessons involving number strings as frequently as possible. The mini-lessons support students in learning basic facts and mental math computational skills through conceptual understanding and thinking.</p> <p>For additional mini-lessons involving number strings refer to: <i>Minilessons for Early Multiplication and Division</i>, by Catherine Twomey Fosnot. <i>Minilessons for Extending Multiplication and Division</i>, by Catherine Twomey Fosnot.</p>	



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