LESSON 3

What Is It Worth?

Operations and Computations

Objectives . . . Students will be able to:

- *Model, explain, and use a variety of computational techniques to solve real-life problems.*
- *Select and use computation techniques appropriate to specific problems and determine whether the results are reasonable.*

NCTM Standards and NAEP Strand

Concepts learned and applied in Lesson 3 correlate to NCTM Standards 1, 2, 3, 4, 7, and 8; and NAEP Strand 1 (Number Sense, Properties, and Operations).

Materials List

The Class

- containers—small trays for counting candies and paper bags
- assortment of bags of wrapped candy (Tootsie Rolls, miniature candy bars, etc.)
- calculators

Each Student

- A copy of BLMs 3-A and 3-D for the "You Try It at Home" activities.

To Prepare Your Students

Introduce today's video topic and ask questions designed to discover if students are familiar with the Student Prerequisites and Key Words and Terms. Present some simple examples of the type of problem explored in the video—e.g., When we sell something for more than it cost us, what is the extra amount we earn called? We may also sell a *service*, such as mowing the lawn, not an actual item. What term do we use to describe the costs that go into providing the service (gas for the lawn mower, rent of the lawn mower, etc.)?

Video Overview

The program begins with a boy reading a TV schedule and checking his watch; a boy is comparing the library due date in a book with a calendar; a girl at an ice-cream parlor that is holding a sale—she mentally figures out what would be the best deal.

What's going on here? We use mental calculations all the time, and need to select the appropriate tools to check them.

Student Prerequisites

- Ability to apply computation to solve real-life problems.
- Good number sense.
- Ability to determine appropriate computation procedures, whether mentally, using paper and pencil, or with calculators.

Key Words and Terms

profit *expenses*

Video Lesson

Washing the Dog

A girl is happy to have made $2.00 washing the dog for a neighbor. She then knocks on another neighbor's door and offers to wash their dog for $2.00—but it's a big dog! What did she forget?

STOP **YOUR CLASS MAY WANT TO TALK ABOUT THIS NOW**

Have a discussion with your class about the dog-washing situation. What is the problem, and what are some solutions? The students need to understand that the size of the dog makes a difference in the time and work involved—what would their solution be?

Play

Selling Bags of Candy

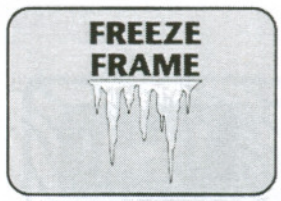
Rene Goepfrich of Frances E. Willard Elementary proposes a field trip to her students, but wonders how they can pay for it. She asks if they can sell bags of candy for a profit. She shows them several bags of candy, each of a different kind, different number of pieces inside, and costing a different amount. If they make up bags of candy with X number of pieces of this kind, and Y number of this kind, and Z number of this kind, what will their expenses be? How much should they charge to make a profit?

YOUR CLASS MAY WANT TO TRY THIS NOW

You may want to have a discussion about cost and expenses and profit with your class. Then organize them into small groups and ask each to take one bag of candy and determine how much each piece costs. Encourage them to develop multiple strategies for this activity. Explain that each group will need to appoint a representative to present their answer and the strategy they used at the end of the activity period. They will also need to determine a price for each piece that will produce a profit, and how much the profit will be.

After they have worked out the problem, but before they present their solutions, play the video showing how other kids solved the problem.

Watch the ways the children on the video solve the problem. The video then asks:



WERE THESE SOLUTIONS LIKE YOURS?

Note: Question is on-screen but there is no stop sign. Teachers should pause at this point and ask each group to present its solution. Encourage your class to think about all the solutions and remind them that there are many possible solutions.

Lemonade Stand

As the video continues, we see four kids at a lemonade stand. The sign reads, "Lemonade—6-oz., $.75; 32-oz., $3.00." Which should they buy to put in their bottles?

YOUR CLASS MAY WANT TO TALK ABOUT THIS NOW

How will we determine which is the best buy? Ask your students to solve this and encourage multiple strategies for arriving at an answer:

What size lemonade should the kids buy? Which would be the best "deal"?

How many 6 oz. lemonades could we buy to equal one 32 oz. in price?

Would the amount of lemonade be the same?

What do we mean by "the best buy for our money"?

As the video continues, we see the solution the video kids came up with. The next problem involves a boy who wants to try buying nuts by the large bag and dividing them into smaller bags to sell. How much should he sell his bags of nuts for to make a profit? The video suggests . . .

You Try It!

Extended Activities

These activities are designed to extend the mathematics learning introduced in this lesson.

1. All of the activities in the video are focused on real-life problems. Each of the activities in the show could be repeated using different prices or number of items.
2. Have your students use 100 as a benchmark (friendly number) in each of the following exercises. These exercises could be done at the blackboard, in groups, or as each individual writes down an answer.

99 + 26

357 + 102

834 – 99

654 – 101

50 x 6

25 x 8

For example: 99 + 26 is the same as 100 + 25 . . . take one from 26, give it to 99, which makes 100, then add 25. Or, 50 x 6 is the same as 100 x 3 . . . half of 6 is 3, and double 50 is 100, so multiply 100 times 3.

Cross-curricular Activity

Guest speaker: Invite a librarian or library worker to give a talk about how they budget and make decisions in their work. How do they decide whether to buy more books, hire a new employee, etc.?

Writing Activity

Have your students write about real-life situations that correspond to written computation exercises. For example:

John wants to buy a new mountain bike that costs $140. He has saved $97. How much more does he need to buy the bike?

Sara has 16 puppets in her collection. If she has three friends coming over to play, how many puppets can each girl play with if they share them evenly?

You Try It At Home

Two handout masters, numbered 3-A and 3-B, are provided in a booklet accompanying the Teacher's Guide; reproduce as many of these as you need. Reduced examples are also provided at the end of this lesson. These activities are designed to

extend and reinforce concepts taught in the lesson, and to enable parents or other caregivers to become more involved with students' mathematics learning.

Assessment and Criteria for Scoring

The following four proficiency categories may be used to evaluate student performance in response to Lesson 3. You may use these evaluation categories to assess student classroom performance and extended activity performance.

Advanced Response: The response provides evidence of appropriate and correct mathematical computation, and the mathematical reasoning is communicated clearly and completely. In addition, the response provides evidence of the reasonableness of the decisions made in determining the costs and the selling prices of each kind of candy.

Proficient Response: The response provides evidence of appropriate and correct mathematical computation, and the mathematical reasoning is adequate to explain the process used.

Nearly Proficient Response: The response provides evidence of mathematical computation that is flawed in a minor way or mathematical reasoning that is incomplete or somewhat unclear.

Minimal Response: The response provides evidence of mathematical computation that is flawed in a major way and/or the mathematical reasoning is missing or confusing.

References and Resources

National Council of Teachers of Mathematics (1989) Curriculum and Evaluation Standards for School Mathematics. Reston, VA: The Council.
Standard 1 : Mathematics as Problem Solving.
Standard 2 : Mathematics as Communication.
Standard 3 : Mathematics as Reasoning.
Standard 4 : Mathematical Connections.
Standard 7 : Concepts of Whole Number Operations.
Standard 8 : Whole Number Computation.
NAEP Strand 1 (Number Sense, Properties, and Operations).

Suggested Children's Literature

Amy Schwartz, *Annabelle Swift, Kindergartner*
Rod Clement, *Counting On Frank*
Lillian Hoban, *Arthur's Funny Money*
Judith Viorst, *Alexander, Who Used to Be Rich Last Tuesday*

You Try It At Home 1 and 2

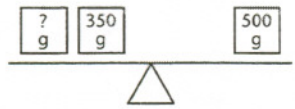
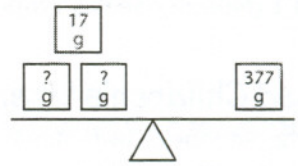
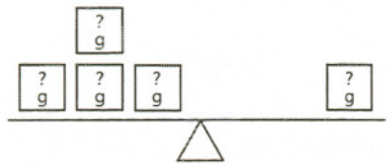
Computing Choices

When and how do members of your family compute? To find out, ask them the following questions.

1. When do you estimate and when do you compute an exact answer?
2. How do you determine the number? With paper and pencil? Mentally? Or with a computer or calculator?

Record their responses in the space below.

Mystery Box Game

With a parent at home or other adult care-giver, try playing the "mystery box" balance game. Imagine a balance scale with one box on one side weighing 500 grams and two boxes on the other side; if one weighs 350 grams—what does the other weigh?

Solve the examples below and make up some of your own!