
Finding Everyday Opportunities to Think Algebraically

Iowa Adult Education & Literacy Institute
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Presenter: Heidi Schuler



Today's presentation is based on a publication from the LINCS Math/Numeracy Collection

“Algebraic Thinking in Adult Education”

Myrna Manly & Lynda Ginsburg

September, 2010



LINC S: The **L**iteracy **I**nformation a**Nd** **C**ommunication System, is an online information and communications network for adult and family literacy. (<http://lincs.ed.gov>)

Math/Numeracy resources:

http://lincs.ed.gov/lincs/resourcecollections/RC_skills.html

Why Should I Visit LINCS Regularly?

LINCS provides you with the information, resources, professional development activities, and online network you need to enhance your practice and ensure your adult students receive high-quality learning opportunities.

The logo for LINCS (Literacy Information and Communication System) features the word "LINCS" in a bold, blue, sans-serif font. A red and white swoosh underline is positioned beneath the letters.

Literacy Information and Communication System

<http://lincs.ed.gov/>

LINCS is funded by the U.S. Department of Education, Office of Career, Technical, and Adult Education. It is comprised of the Resource Collection, managed by Kratos Learning, the Regional Professional Development Centers, and the Technical Contractor, Quotient, Inc.

LINCS Makes a Difference

How can LINCS help you with your work? It offers:

- **A Resource Collection** containing high-quality, evidence-based materials in 16 topic areas;
- An online **Community of Practice** where you can share and collaborate with your peers;
- **A Learning Portal** where you can engage in self-paced and facilitated professional development courses; and
- Four **Regional Professional Development Centers** (RPDCs) that deploy evidenced-based PD trainings to states.

For a video overview of LINCS, visit:

<http://www.youtube.com/watch?v=w3bq6Mdn2Qg>

Don't Miss a Beat; Connect with LINCS

- Join the **Community**: <https://community.lincs.ed.gov>
 - Access the **Learning Portal**:
<http://lincs.ed.gov/courses>
 - Search the **Resource Collection**:
<http://lincs.ed.gov/collections>
 - Follow the latest updates: @LINCS_ED 
 - Join our professional group: LINCS_ED 
 - Watch webinar archives and more: LincsEd 
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Algebraic Thinking in Adult Education

Recommendations:

- Integrate elements of algebra early into all levels of arithmetic instruction
 - Emphasize modeling in formal algebra instruction
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Algebraic Thinking

- Looking for structure to make sense of situations
 - Generalizing beyond the specific by using symbols for variable quantities
 - Representing relationships systematically with tables, graphs and equations
 - Reasoning logically to address/solve new problems
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Choosing a check-out line



Student Problem Ideas from Supermarket

- Think of some math problems that your students might create from the supermarket prices on the handouts. Record them on flip chart paper and post on the wall for discussion.
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Hershey Bars

- How many Hershey Bars (\$.75 each) could you buy with \$10.00? (Ignore tax for now)
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Mathematical Structure

- How does structure help to understand why a negative times a negative give an answer that is positive?



Senior Discount Tuesdays

55+

SENIOR APPRECIATION TUESDAYS

Seniors Save 5% on Purchases
over \$30. with coupon below!

MUST CLIP AND PRESENT AT CHECKOUT WITH YOUR CLUB CARD FOR DISCOUNT.

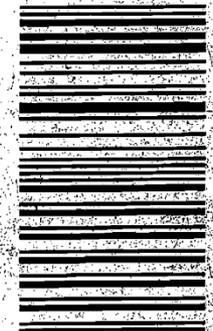
5% OFF
YOUR SHOPPING ORDER
(TOTAL ORDER MUST BE OVER \$30)

Must present coupon and Club Card at time of purchase.
Limit (1) coupon per person. Must be a Senior Citizen 55 and over.

COUPON VALID TUESDAY

ONLY

*Exclusions apply. See store's Customer Service Center or back of circular for details.



What do you think and why?

- Because of the storm, the market has instituted a 5% increase in the price of all produce items. If I use my coupon, would the price of broccoli be more, less, or the same as it was last Monday?
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The Price of Eggs

In Sept. of 2009, the price of a dozen eggs was \$1.00 at Walmart. This week, the price is \$1.50.

- a) Decide how to find the percent of increase in the price of eggs over the two years.
 - b) If the price goes down to \$1.00 again, what would the percent of decrease be?
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Teachers' Salaries

In 2009, teachers took a 25% decrease in salary to help the school district get past a fiscal crisis.

After the financial recovery, they voted to accept a 25% increase.

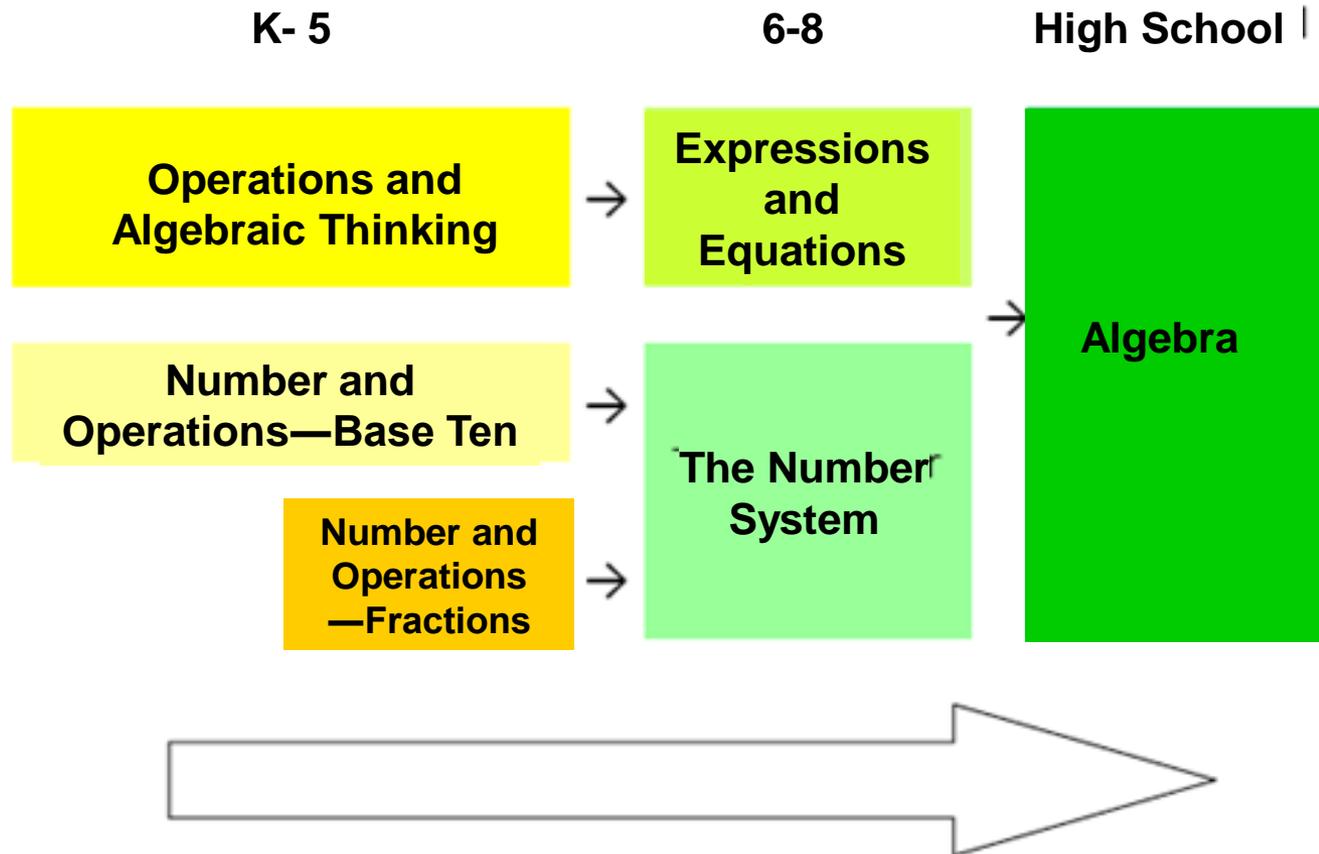
Compare the salaries now to what they were in 2009.

The Common Core State Standards: Getting Started

Suggested First Implementation Steps:

- Mathematical practices
 - Progressions within and among content clusters and domains
 - Key elements
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- Adapted from a presentation by Phil Daro, 2010
www.mathedleadership.org
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Progressions within and across Domains



Progressions: Operations and Algebraic Thinking (grade 4 example)

Solve multistep word problems posed using the four operations... Represent these problems using equations with a letter standing for the unknown quantity... Assess the reasonableness of answers using mental computation and estimation strategies.

Progressions: Expressions and Equations (grade 8 example)

Understand the connections between proportional relationships, lines, and linear equations.

- Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
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Progressions: Functions

(grade 8 example)

Use functions to model relationships between quantities.

- Construct a function to model a linear relationship between two quantities...

Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values

Some CCSS Key Elements

1. Standards for Mathematical Practice
2. Properties of operations: Their role in arithmetic and algebra
3. Mental math and “algebra” vs. algorithms
4. Operations and the problems they solve
5. Units and unitizing
 - a. Unit fractions
 - b. Unit rates
6. Quantities-variables-functions-modeling
7. Number-expression-equation-function
8. Modeling

Adapted from a presentation by Phil Daro, 2010 www.mathedleadership.org

Ounces and grams

- A recent immigrant has an old family recipe that requires 200 grams of freshly sliced provolone cheese. What should she ask for in ounces when she goes to the deli counter?
 - What resources do we have to figure this out?
 - How can we use algebraic thinking?
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Nesting Shopping Carts

- How long would a line of 50 carts be?



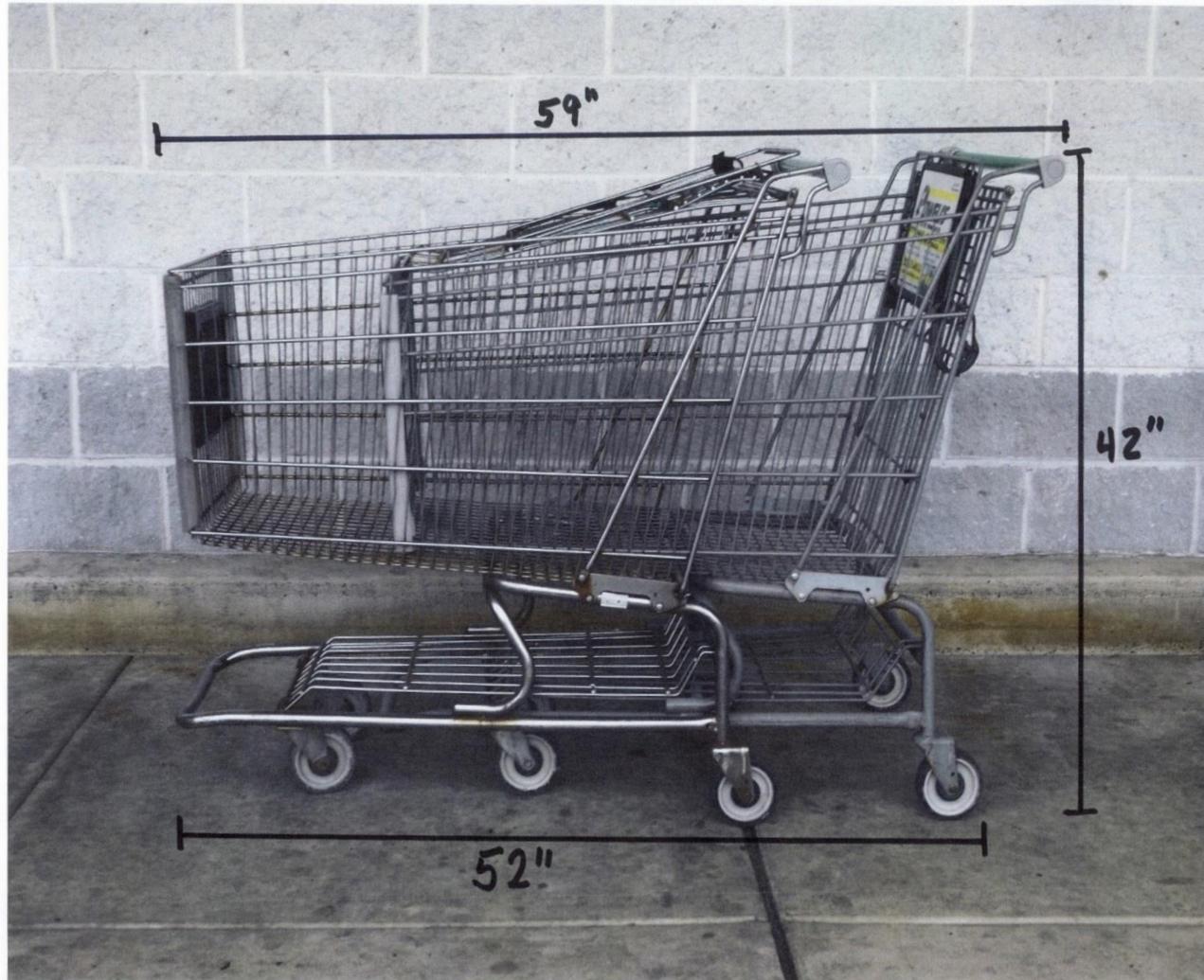
Here's a close up view...



Nesting Shopping Carts



Nesting Shopping Carts



Nesting Shopping Carts

- How long would a line of 50 carts be?



Nesting Shopping Carts

- How many carts would fit in the available space of 100 feet?
- How many in this Cart Return (22 feet long)?



Revisiting the Check-out Line

- What mathematical information would be helpful in order to choose the line with the shortest wait?



What did we do and why did we do it?

- Activities from real settings have instructional value because _____
 - Algebraic thinking introduces more _____ into the mathematics classroom.
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