

# MATH CURRICULUM ADVISORY PROGRAM RECOMMENDATION

Andover School Committee Presentation

# Review Participants

- Math Curriculum Advisory
  
- Elementary School Teachers
  - Beth Miner, Janet Bowen, Connie Barber, Marie Messina, Tamara MacAlliser, Katey Shockro, Frank McCall, Steve Hunt, Susan Whicher, Kate Gerry, Sarah Cooper, Renee Pierce, Eugenia Buba
  
- Middle School Teachers
  - Marjorie Andresen, Amy Brady, Tara Brink, Sandy Freiberg, Anne Ogden, Laura Stella
  
- High School Teachers
  - Scott Armstrong, Dorothy Ogrodowczyk
  
- Learning Specialist
  - Susan Farquhar, Kelly Doherty
  
- Administrators
  - Liz Roos, Lauren King, Katherine Richard, Nancy Duclos

# Curriculum Review 2012-2014

- Review current state of math in Andover
  - Strengths & Weaknesses
  - Survey Teachers at all levels
  - Survey Parents (random sample)
  - Recommendations
- Review math programs
  - District Comparison
  - Publishers Presentations
  - Pilot lessons & Site Visit
  - Recommendation



# Why *Math in Focus*?

- Focus and Depth
- Emphasis on Problem Solving
- Visual Approach
- Differentiation

# Focus and Depth

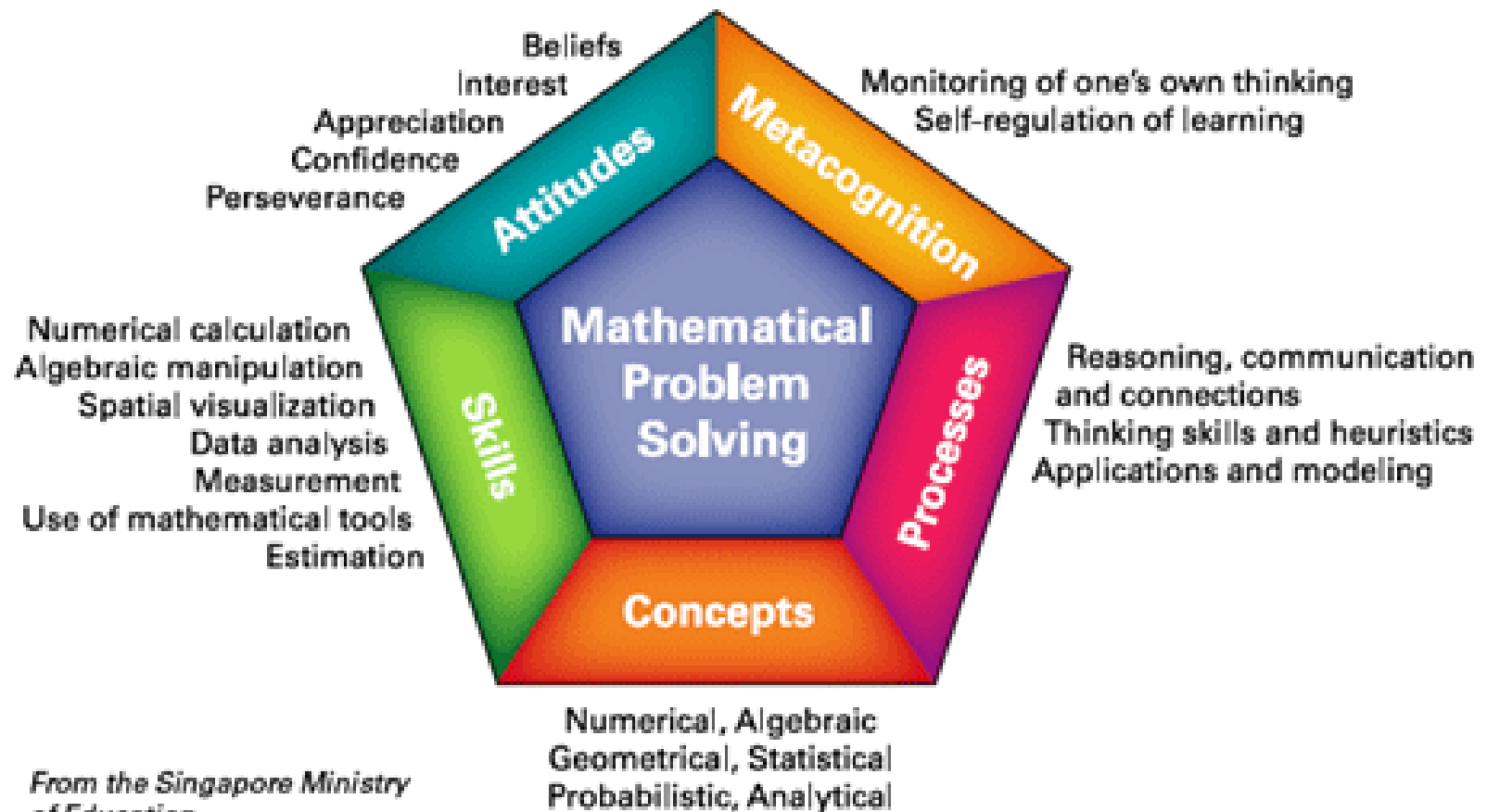
- *Math in Focus* introduces fewer topics in each grade but teaches them to greater depth and expects mastery.

A comparison from the  
American Institute for Research:

	NO. OF CHAPTERS	NO. OF LESSONS	AVG PAGES PER LESSON
Singapore Math	18	34	15
Typical American Program	29	157	4

# Problem Solving at the Heart

## Singapore's Mathematics Framework



*From the Singapore Ministry of Education*



# Standards for Mathematical Practice

## Habits of mind of a productive mathematical thinker

MP1: Make sense of problems and persevere in solving them

MP6: Attend to precision

## Reasoning and Explaining

MP2: reason abstractly and quantitatively

MP3: construct viable arguments and critique the reasoning of others

## Modeling Using Tools

MP4. Model with mathematics

MP5: Use appropriate tools strategically

## Seeing Structure and Generalizing

MP7: Look for and make sense of structure

MP8: Look for and express regularity in repeated reasoning

# Visual Approach

“This concrete to pictorial to abstract approach benefits all students but has shown to be particularly effective with students who have mathematical difficulties, mainly because it moves gradually from actual objects through pictures and then to symbols.”  
– Jordan, Miller, & Mercer, 1998





# Concrete – Pictorial - Abstract

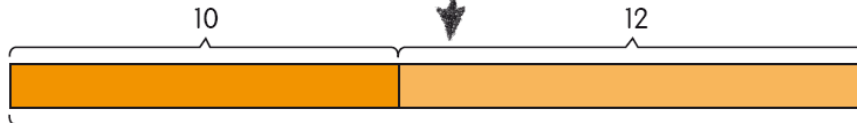
Learn

You can use bar models to help you add.

Mandy makes 10 granola bars.

Aida makes 12 granola bars.

How many granola bars do they make in all?



$$10 + 12 = 22$$

**Abstract**

They make 22 granola bars in all.

**Check!**

$$22 - 10 = 12$$

$$22 - 12 = 10$$

The answer is correct.



**Concrete**

**Pictorial**



# Differentiation

---

- **On Level Learners** have experiences that will solidify their learning.
- **Struggling Learners** spend more of their experience in the concrete phase, with manipulatives and visuals to aid their learning.
- **Advanced Learners** have experiences of varying complexity to extend their learning.

# Let's Do Some Math

---

The sum of two numbers is 36.

The smaller number is one-third of the larger number.

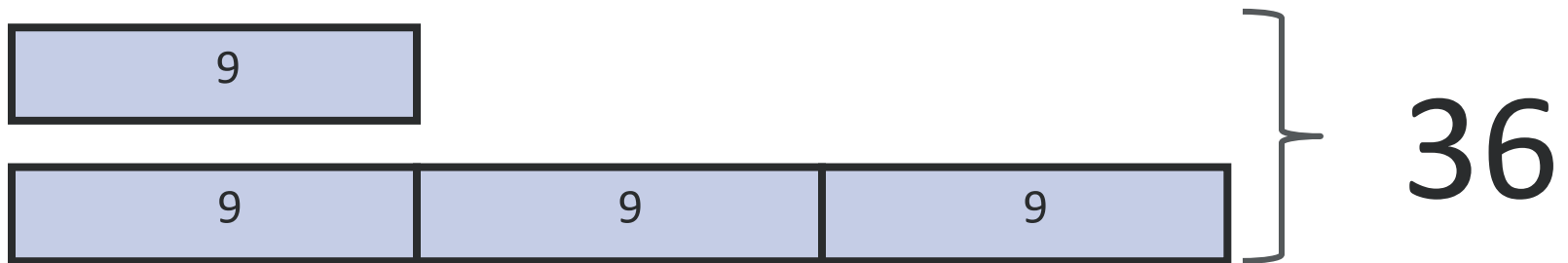
Find the two numbers.

# Grade 3

The sum of two numbers is 36.

The smaller number is one-third of the larger number.

Find the two numbers.



$$36 \div 4 = 9$$

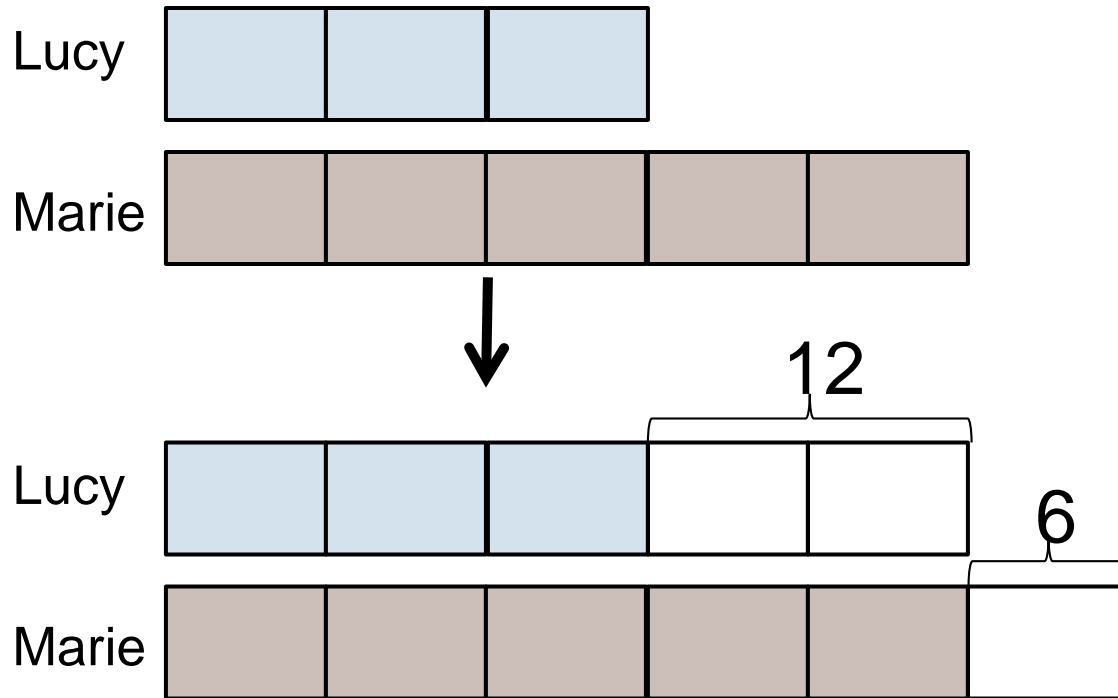
$$3 \times 9 = 27$$

The two numbers  
are 9 and 27.

# One more....

Last week, the ratio of Lucy's postcards to Marie's postcards was 3:5. This week, Lucy bought 12 more postcards and Marie bought 6. The ratio is now 5:6. How many postcards do Lucy and Marie have combined this week?

# Grade 6



1 unit  $\rightarrow$  6 postcards  
5 units  $\rightarrow$   $5 \times 6 =$   
30 postcards  
6 units  $\rightarrow$   $6 \times 6 =$   
36 postcards

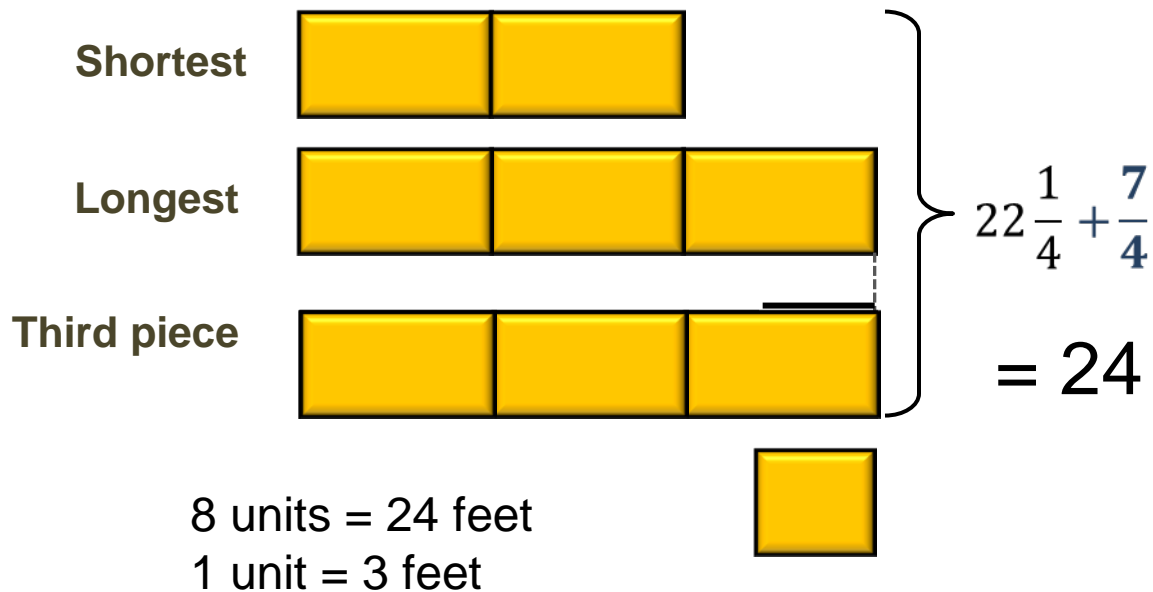
$$30 + 36 = 66$$

**66 postcards in all.**

# Extra Challenge

Margaret buys a roll of ribbon from a shop. She cuts the ribbon into three pieces. The ratio of the length of the shortest piece to the length of the longest piece is 2:3. The third piece is one and three-quarter feet shorter than the longest piece. If the total length of ribbon is twenty-two and one-quarter feet long, then find the length of each piece of ribbon.

# Grade 8



$$2x + 3x + (3x - 1\frac{3}{4}) = 22\frac{1}{4}$$

$$8x - 1\frac{3}{4} = 22\frac{1}{4}$$

$$8x - 1\frac{3}{4} + 1\frac{3}{4} = 22\frac{1}{4} + 1\frac{3}{4}$$

$$8x = 24$$

$$\frac{8x}{8} = \frac{24}{8}$$

$$x = 3$$

**Shortest** 2 units  $\times$  3 feet = **6 feet**

**Longest** 3 units  $\times$  3 feet = **9 feet**

**Third piece** 9 feet -  $\frac{7}{4}$  =  **$7\frac{1}{4}$  feet**



# Implementation Plan

---

- “Math Week”
- Administrator Training
- Parent University
- Updated website with resources for parents



# Important Considerations

- Vertical Articulation K to 8
- Thinking vs. Answer Getting
- Expects Mastery
- Multiple Representations
- Novel and Non-routine Problems
- Built-in Differentiation
- Exceeds MA Curriculum Framework
- Supports Strategic Plan