Step Back and Let Them Think:
Discovering Number Concepts Through Investigations and Math Talk

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What does it mean to be mathematically proficient?

A focus on:

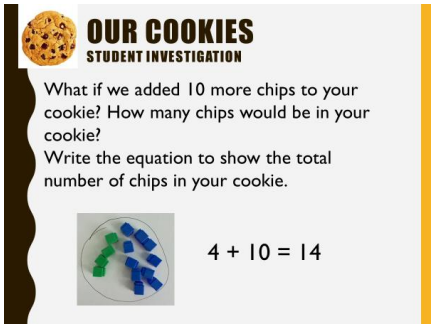
- Conceptual understanding
- Computational fluency
- Application (problem solving

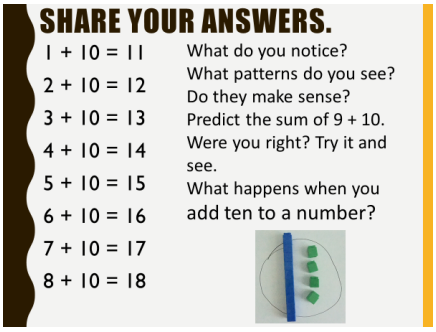
Standards for Mathematical Practice

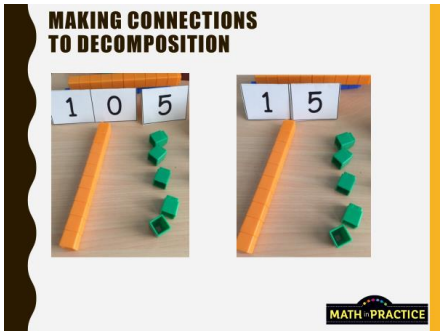
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

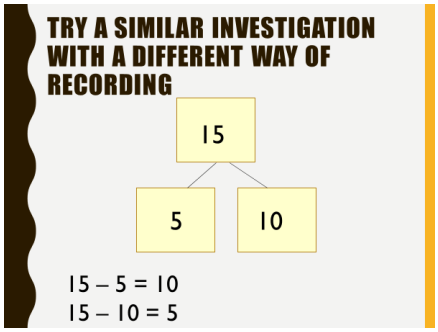
These standards view mathematicians as thinkers, communicators, reasoners, and problem solvers.

Adding 10 to a One-digit Number



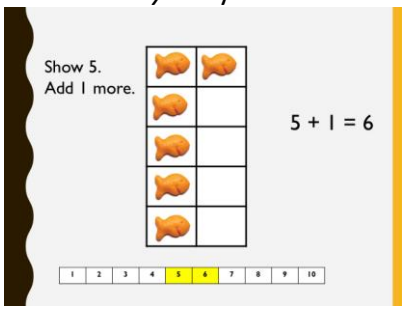


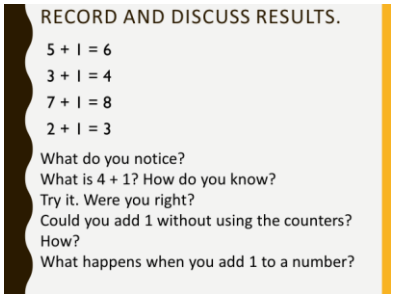




Adding 1 to a Number

Read *Fish Eyes* by Lois Ehlert





Place Value with 2-digit Numbers

1. Have partners count out 25 unifix cubes.
2. Have them put the cubes on ten frames and count the total.

How did you find the total each time? Count by ones? Count by tens and ones?
Do the different ways of counting give you the same answer? Why?
How many filled ten frames in 25? How many leftover ones?
Create a chart to record students' data.

Observe and Consider

Number of Counters	Filled Ten Frames	Leftover Ones
25	2	5
32	3	2
14	1	4
26	2	6
38		

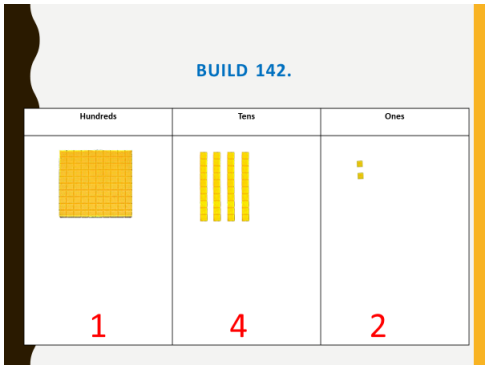
What do you notice?
What do you wonder?
Predict how many tens and ones are in 38.
Try it and see if you were right.
Can you figure out how many ten-frames will be filled without actually filling them? How?

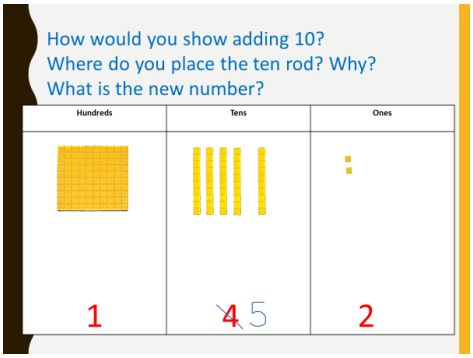
Mentally Adding 10 to a 3-digit Number

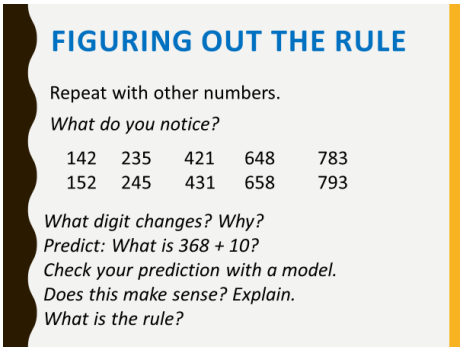
Brendan had 142 baseball cards in his collection.

His mom gave him a package with 10 more cards.

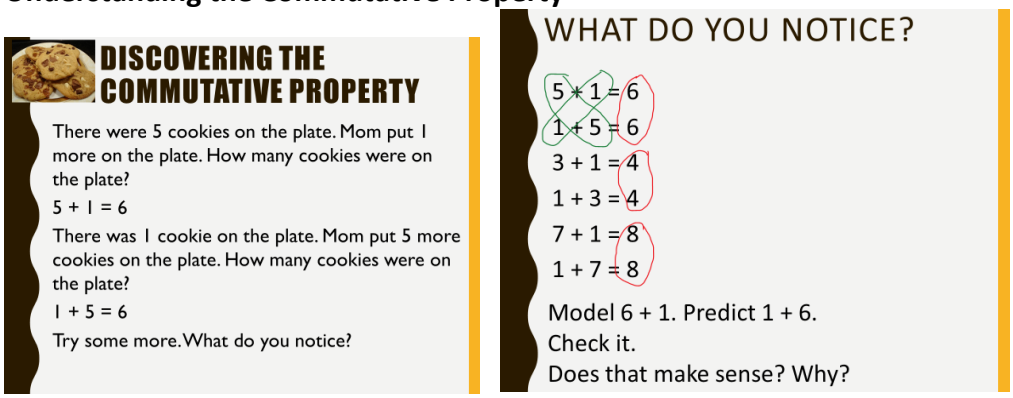
How many cards did he have in his collection then?



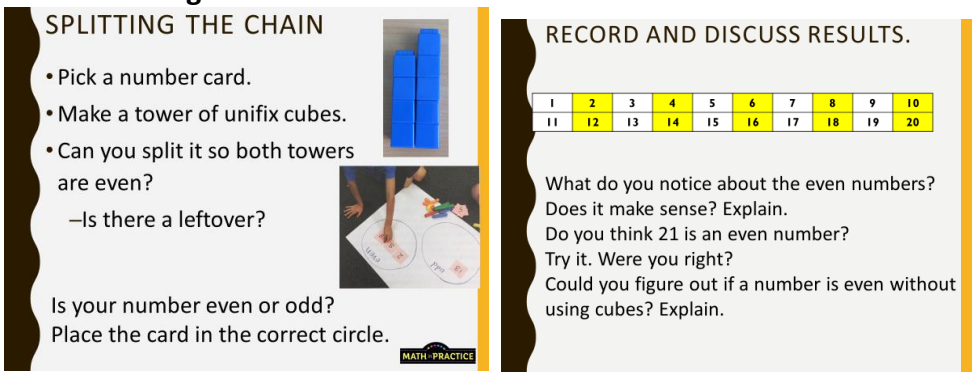




Understanding the Commutative Property



Understanding Odd and Even Numbers



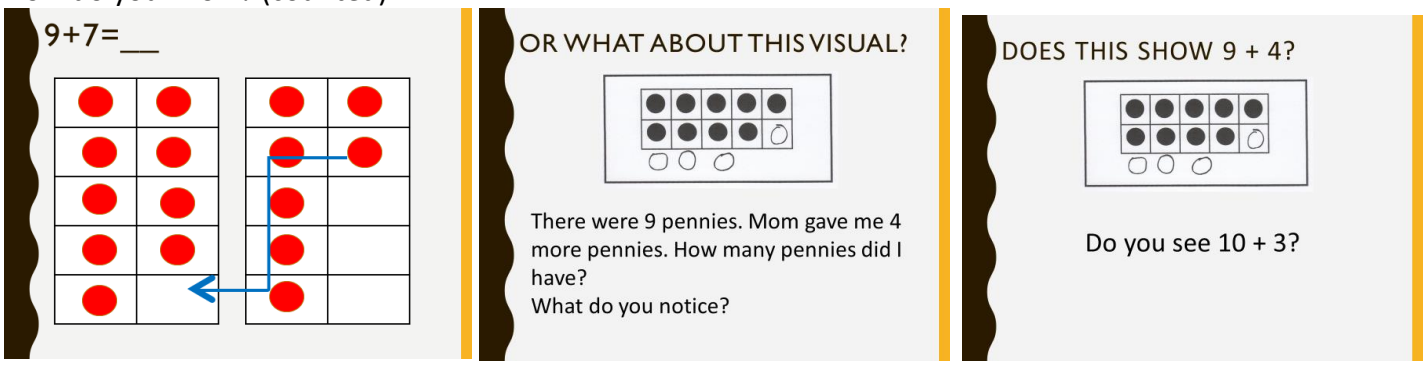
Using Mental Strategies to Add Single-digit Numbers

At the beach, Bailey found 9 shells and Molly found 7 shells. They put them all in a bucket. How many shells were in the bucket?

Use your double ten frames to show the shells.

How many did they find?

How do you know? (counted)



Discovery vs Telling

What are the advantages of letting students discover math rules?

Questions

- What do you notice?
- Why is it happening?
- Does it make sense?
- Can you predict…?
- What is the rule?

Observing Models and Data

- Do students create the models and generate the data? Why is this important?
- How is the data organized and displayed? Why does that matter?
- Can students predict and generate next data? What does that indicate?
- Can students verbalize a generalization or rule based on their observations?

Teacher Resource Books by Sue O'Connell

Published by Heinemann (www.heinemann.com)

Math in Practice **(www.mathinpractice.com)**
This series is filled with lesson ideas, instructional strategies, practice tasks, and many online printable resources to make teaching K-5 math more meaningful and more fun. There is a book for each grade level K-5 that contains a wealth of grade-specific activities, as well as a *Guide for Teachers* filled with instructional strategies and an *Administrator's Guide*. Visit the website or **www.mathinpractice** to view the materials.

Putting the Practices into Action - Implementing the Common Core Standards for Mathematical Practice K-8 **with John SanGiovanni**
The Standards for Math Practice are the heart and soul of the Common Core State Standards. This book explains each standard in teacher-friendly terms and highlights practical activities to make the standards come alive in classrooms. It contains PLC study group questions and online resources.

Mastering the Basic Math Facts for Addition and Subtraction
Mastering the Basic Math Facts for Multiplication and Division
with John SanGiovanni
Through investigations, discussions, visual models, children's literature, and hands-on explorations, students explore the math operations, and through engaging, interactive practice achieve fluency with basic facts. A teacher-friendly CD filled with customizable activities, templates, recording sheets, and teacher tools simplifies your planning and preparation. Over 450 pages of reproducible forms are included in English and Spanish translation.

The Math Process Standards Series
Each book in this series is a practical guide for helping students refine their skills in the highlighted math process (problem solving, communication, reasoning, representations, connections). You will find specific teaching strategies and tips to help all students strengthen their skills. Included with each book is a CD filled with teacher tools and customizable student activities to allow you to change names, data, or spacing for a quick way to differentiate instruction within your classroom.
Introduction to Problem Solving ***Introduction to Communication***
Introduction to Representation ***Introduction to Reasoning and Proof***
Introduction to Connections
All books in this series are available for Grades PK-2, Grades 3-5, and Grades 6-8.

Now I Get It: Strategies for Building Confident and Competent Mathematicians, K-6
Good teaching is the critical factor that helps students "get" math. This book is a practical handbook for the teaching of mathematics, with chapters addressing the teaching of problem solving, the use of manipulatives, differentiating instruction, effective teacher questioning, increasing math talk, and much more. The book includes a CD with over 100 pages of resources to support teachers including manipulative templates, math facts game templates, a bibliography of math-related literature, center ideas, math websites, problem-solving and writing tasks, and a variety of other practical resources.

For additional resources, visit Sue's website at www.qualityteacherdevelopment.com

Follow Sue on Twitter @SueOConnellMath

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More math resources: www.heinemann.com/authors/1415.aspx