

Math in Practice: Strategies for Building Math Understanding

Grades K-5
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Step Back and Let Them Think

As a math student, were you asked to memorize math rules and algorithms?

How might discovering rules help students better understand and retain them?

How might you have students gather and observe data to spur insights?

What questions might you ask to push students to conjecture, predict, and figure out rules?

Multiply a Single-digit Whole Number by a Multiple of 10

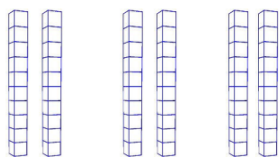
Molly had 3 boxes of granola bars. There were 20 bars in each box. How many boxes of granola bars did she have?

What operation could you use to solve this problem?

What equation works with this problem? Explain.

Base-Ten Block Multiplication

- Show me 20 with base-ten rods.
- What would 3×20 be?
- Show it and record the equation.



$$3 \times 20 = 60$$

Base-Ten Block Multiplication

Repeat for several more examples.

$$3 \times 20 = 60$$

$$3 \times 40 = 120$$

$$4 \times 20 = 80$$

$$3 \times 50 = 150$$

- What do you notice?
- Why is that happening?
- Predict $2 \times 50 = \underline{\quad}$.
- Model it. Were you correct?
- What is the rule? Why does it work?

Key Questions

What do you notice?

Why is this happening?

Does it make sense? Explain.

Based on what you see, can you predict...?

What is the rule?

What You Will Notice in *Math in Practice*

- Tips for investigations and teacher questioning in the *Guide for Teachers*
- Investigations throughout the grade-level books
- Ongoing examples of teacher questioning in lessons throughout the grade-level books

Build Bridges

Make Connections Among Math Concepts and Connect Math to the Real World

Do your students understand what the numbers and symbols of math represent?

Problems as a Context

What is the focus of this task? What will be the focus of discussions?

$$7 + 5 + 3 = \underline{\quad}$$

What are the advantages of posing this?

Bailey collected 7 black shells, 5 tan shells, and 3 white shells.

She put them in her bucket.

How many shells did she put in her bucket?

What is the focus of this task? What will be the focus of discussions?

$$\frac{3}{4} - \frac{1}{2} = \underline{\quad}$$

What are the advantages of posing this?

Liam ran $\frac{1}{2}$ mile and Colin ran $\frac{3}{4}$ mile.

How much farther did Colin run?

Math in Context through Literature

Quack and Count by Keith Baker (decomposition)

 ducklings

Some were swimming and some were sunning. How many of each?

Some were quacking and some were quiet. How many of each?

Some were waddling and some were sleeping. How many of each?

Some were flying and some were swimming. How many of each?

Full House by Dayle Ann Dodds (fractions)

Create a fraction story with a partner. Illustrate your story.

Focus on the Question: Carnival Rides

Tickets Needed for Each Ride

Scrambler – 4 tickets

Carousel – 2 tickets

Bumper cars – 5 tickets

Roller coaster – 6 tickets

Day 1: Bailey loves the roller coaster and went on it 4 times. How many tickets did she use?

Day 2: Kellen had 20 tickets. He rode the scrambler three times. How many tickets did he have left?

Day 3: Blake rode the carousel, scrambler, and roller coaster. How many tickets did she use?

Day 4: Colin rode the roller coaster 3 times and Molly rode the carousel 6 times. Who used more tickets? How many more?

Day 5: Tickets cost 50¢ each. Liam rode the roller coaster 3 times. How much money did it cost?

What You Will Notice in *Math in Practice*

- Problems throughout the grade-level books to set a context for math skills (including *Focus on the Question* tasks)

- Tips for teaching problem solving in the *Guide for Teachers*.
- Lessons related to children's literature in the grade-level books.
- Resource list of children's literature connected to K-5 math content in the online resources for the *Guide for Teachers*

See It, Touch It, Move It: The Value of Representations

Varied representations help students gain deeper understanding of a math concept.

Understanding Equivalent Fractions Through Paper Folding

Begin with a piece of 8 ½ x 11 paper.

- Fold your paper in half. How would you describe one half of your paper? (1/2)
- Fold it in half again. How would you describe that same half of your paper? (2/4)
- Fold it in half again. How would you describe that same half of your paper? (4/8)

Has the size of ½ of your paper changed?

What do you notice about each fraction?

What is the relationship between the numerator and denominator in each fraction?

Name another fraction equal to ½. Justify.

What You Will Notice in *Math in Practice*

- Hands-on, pictorial, and number representations used throughout the grade-level books
- Use of varied models to allow students to see beyond the materials and recognize the math ideas
- Use of models to solve math problems

Get Them Talking

The Power of Language in the Math Classroom

Agree or Disagree?

6 tens and 3 ones is the same as 5 tens and 13 ones.

9 is an even number.

$$\frac{1}{2} > \frac{5}{6}$$

5.25 is greater than 5.4

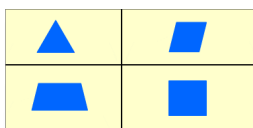
15 is a prime number.

$$4.05 = 4 \frac{1}{2}$$

Eliminate It

Present 4 math words/numbers/concepts. Students discuss with partners and decide which word/number/concept does not belong and then justify their answers.

Eliminate It!



Eliminate It!

10	2
5	8

Eliminate It!

6×5	3×10
3×5	5×6

Eliminate It!

H	E
X	L

©Quality Teacher Development

Helping Students Speak the Language of Math

Math Talk Charts

During math instruction, record new words as they are introduced. Include visuals, examples, and phrases to explain them.

Math Word Wall Activities

Word walls provide the content for many quick activities that give students repeated exposure to important math words. Try some of these quick and easy word activities with the words on your classroom word wall:

1. Ask students to find 2 words on the wall that go together and to share their 2 words and explain the connection.
2. Ask students to define a word or use illustrations to show their understanding of the word.
3. Ask students to record words in a math vocabulary log or journal as each word is introduced and placed on the wall. Have them include the meaning (in their own words) and include an example or illustration.

Create Folded Math Books

Fold a paper in half and have students describe prime and composite, fold a paper in thirds and have students describe acute, obtuse, and right angles, or fold a paper in fourths and have them describe square, triangle, circle, rectangle. Remind them that words, pictures, numbers, and examples can all be used to help show what they know.

What You Will Notice in *Math in Practice*

- Deep questioning throughout the grade-level books in order to spark math conversations
- *Write About It/Talk About It* prompts in each module (including *Agree or Disagree* and *Eliminate It*)
- Vocabulary lists in each module (with many ideas for vocabulary activities in the *Guide for Teachers*)

Watch, Listen, Adjust: Letting Our Students Guide Us

How do we know what our students know?

- Observations of students at work
- Exit tickets/Quick checks
- Student interviews
- Analyzing student work samples

Supporting Learners

- Flexible grouping
- Use of tools
- Teacher or partner support
- Task modification

What You Will Notice in *Math in Practice*

- Tips for formative assessment and differentiation in the *Guide for Teachers*
- Formative assessment tasks throughout the grade-level books
- *Differentiation Notes* throughout the grade-level books
- Online resources in Microsoft word to allow you to modify them

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 to support greater understanding of math concepts. A *Guide for Administrators* offers tips and strategies for math coaches/administrators. Visit the website at www.mathinpractice.com to view samplers, see videos, and learn more about the series.

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

To stay in touch:

Follow Sue on Twitter @SueOConnellMath

Like the Quality Teacher Development Facebook page

Join our Math in Practice Facebook group!