Math for All: Differentiating Math Instruction

Lu Ann Weynand

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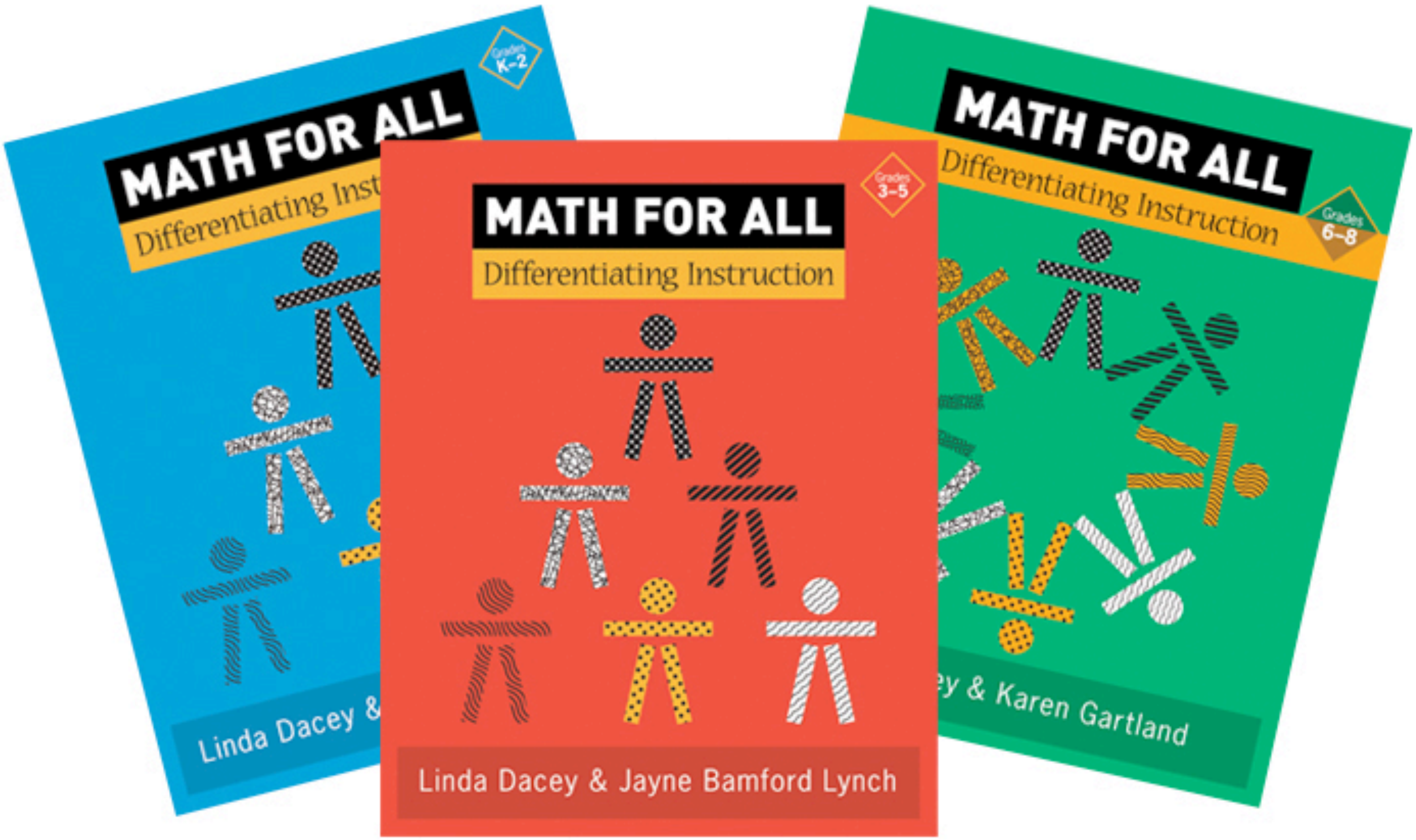
MATH FOR ALL
Differentiating Instruction
Grades 3–5
Linda Dacey & Jayne Bamford Lynch
Grades K–2
Linda Dacey &
Grades 6–8
& Karen Gartland

Differentiated Instruction —

Instruction designed to meet differing learners' needs

Instruction Can be Differentiated by Focusing on….

- Content
- Process
- Product

Which number does not belong? Why?

4, 16, 36, 48, 64, or 81

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<u>4</u>

- **"It's only one number. The rest are two."**
- **"It's the only number less than ten; the rest are between ten and one hundred."**
- **"It's only one digit; the rest are two-digit numbers."**
- **"It's the four!"**

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48

- **“It’s the only one that is not a square number.”**

81

- **“Eighty-one is an odd number. All the others are even numbers.”**

- **“Eighty-one is not divisible by four. All of the other numbers are multiples of 4.”**

- **“You can’t get to 81 with just these numbers.”**

$$64 \div 16 = 4$$

$$64 \div 4 = 16$$

$$48 - 16 + 4 = 36$$

$$64 - 16 = 48$$

$$16 \times 4 = 64$$

4	81
"It's only one number. The rest are two." "It's the only number less than ten; the rest are between ten and one hundred." "It's only one digit; the rest are two-digit numbers." "It's the four!"	"Eighty-one is an odd number. All the others are even numbers." "Eighty-one is not divisible by four. All of the other numbers are multiples of 4." "You can't get to 81 with just these numbers." $64 \div 16 = 4$ $64 \div 4 = 16$ $48 - 16 + 4 = 36$ $64 - 16 = 48$ $16 \times 4 = 64$
48 "It's the only one that is not a square number."	

- How is the task “Which Does Not Belong?” like what you already do to learn more about what your students know and how they solve problems? How is it different?

- What was the purpose of having you draw lines under your work as we moved through the processing of the problem? How did your thinking grow and change as you listened to your peers?

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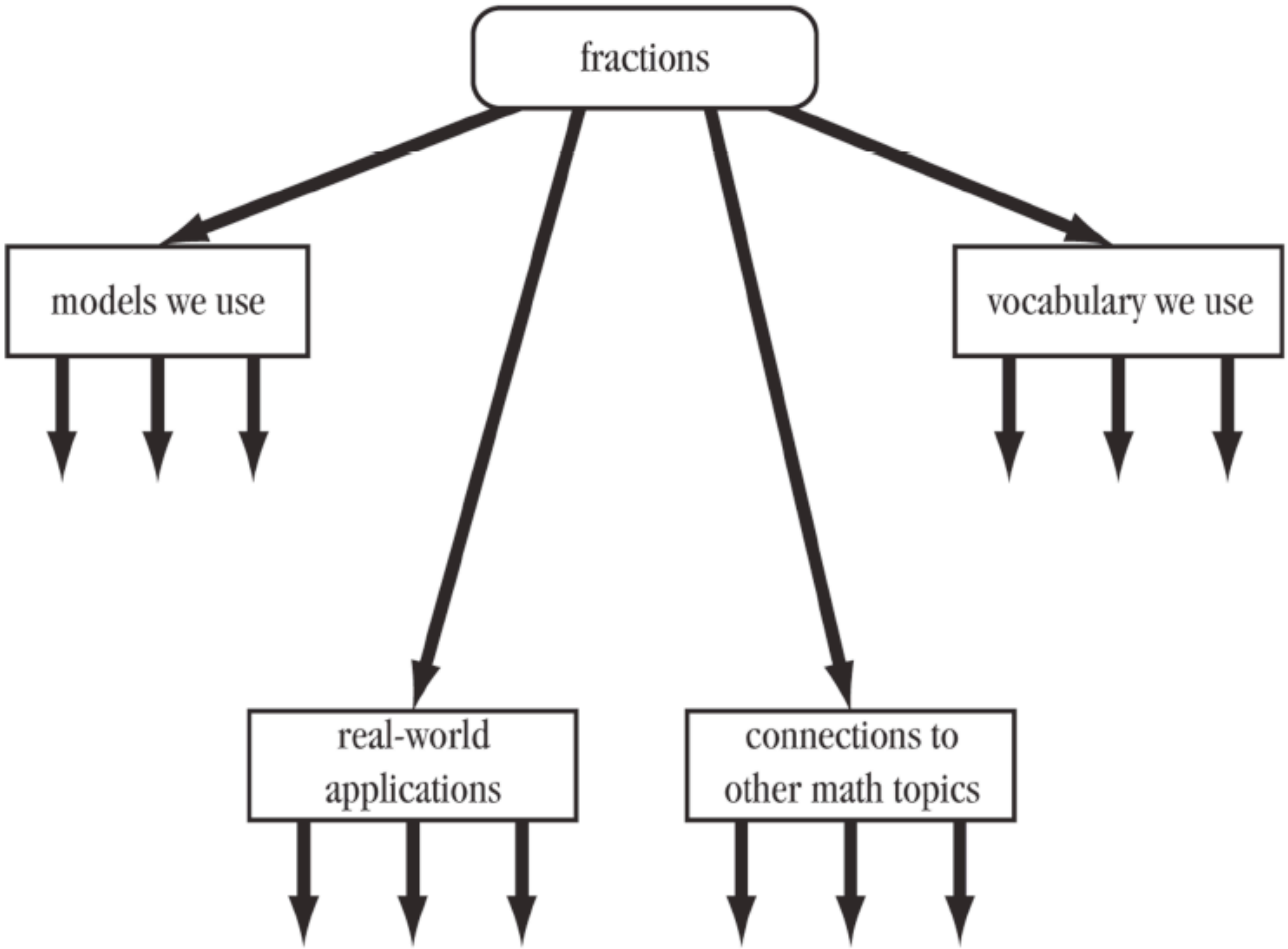
Scaffolding

Temporary supports that allow students to accomplish tasks that they otherwise would be unable to complete

Some ways learning can be scaffolded include:

- Teaching Strategies
- Questioning Strategies
- Student Collaboration
- Whole-group Discussions
- Making Connections Explicit
- Graphic Organizers



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How are a square and cube…..

Same	Different

Word Bank

Angle	face	three-dimensional
Cube	degrees	rectangular prism
Edge	side	two-dimensional
Square	vertices	vertex

There are some bicycles and tricycles.
There are 14 vehicles.
There are 34 wheels.
How many bicycles are there?
How many tricycles are there?

Facts:	Drawings:
Computation:	Answer:

Casting a Wider Net

Ways in Which Tasks Can Cast a Wider Net

- **Allow students control over difficulty level**

There were 48 children on the playground.
26 more came to join them.
How many children were on the playground then?

A) 48, 26

B) 138, 134

48 2 50 8 58 2 60 8 68 6 74

I started with 48 and added 2 then got 50 then I added 8 and I got 58 I added 2 and got 60 then I add 8 and I got 68 then I added 6 and got 74.

There were ________ children on the playground.
________ more came to join them.
How many children were on the playground then?

A) 48, 26 B) 138, 134

I added 138 to 20 and I got 158
then I added 100 and I 258, also
I added it to 10 and I got 268
Also I added it to 4 and got
the number I wanted it is 272.

Ways in Which Tasks Can Cast a Wider Net

- **Allow students control over difficulty level**
- **Provide open task**

Billie has won a $25.00 shopping spree to the museum and must spend it all. If he doesn't spend the $25.00 he does not receive change back. Use the list below, determine which items Billy can buy so that he spends all $25.00.

Find as many different solutions as you can.

$3.00	$4.00	$5.00
Origami Paper	Kaleidoscope	Dinosaur Kit
Gem Magnet	Magnifying Glass	Inflatable globe
Prism	Inflatable shark	Glow stars
Koosh ball	Sunprint Kit	Stuffed animal

Ways in Which Tasks Can Cast a Wider Net

- Allow students control over difficulty level
- Provide open tasks
- Provide students with "number story" and with "answers" -- then have students create the questions

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Number Story:

Sabina and Mike ran each day this week. Each day Sabina ran 3 miles in 30 minutes. Mike ran 6 miles in 72 minutes.

Here are the answers: 42, 2, 294, 3 1/2

What could be the questions?

Ways in Which Tasks Can Cast a Wider Net

- Allow students control over difficulty level
- Provide open tasks
- Provide students with “number story” and with “answers” -- then have students create the questions
- Use open-ended probes

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Open-Ended Probes

- How do you describe a cube to someone who has never seen one?
- The answer is 87. What could the question be?
- How is measurement used in your home?
- How might we write numbers if we didn't have zeroes?

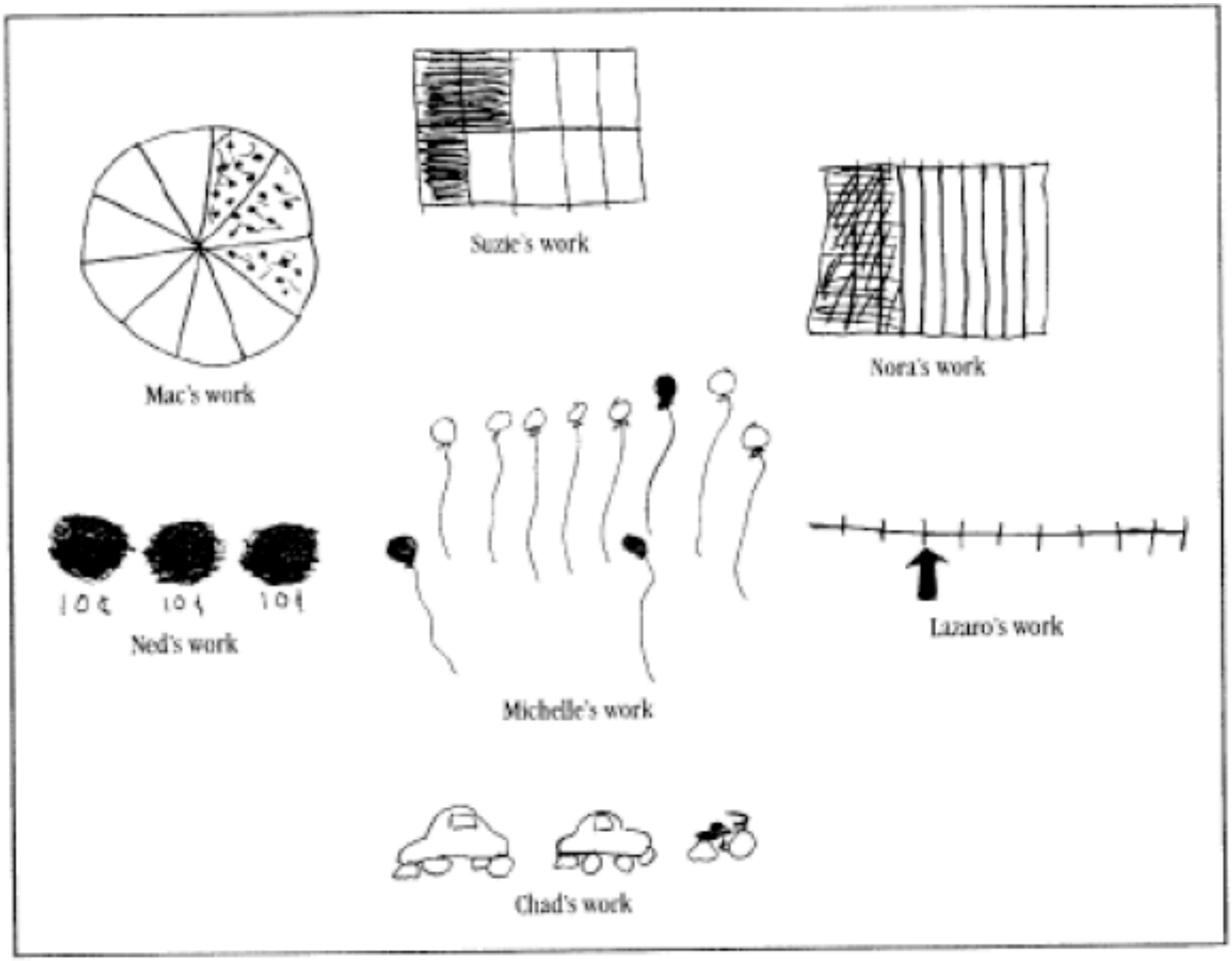
Ways in Which Tasks Can Cast a Wider Net

- **Allow students control over difficulty level**
- **Provide open tasks**
- **Provide students with "number story" and with "answers" -- then have students create the questions**
- **Use open-ended probes**
- **Allow students to show their understanding in different ways**

Imagine you are trying to help someone understand what three-tenths means.

What pictures could you draw to be helpful?

You can draw more than one picture. Let's see how many different pictures we can make.


Suzie's work
Mac's work
Nora's work
10¢ 10¢ 10¢
Ned's work
Michelle's work
Lazaro's work
Chad's work

Remember, in order to provide for a wider range of students, teachers can cast a wider net by:

- Allowing students some control over the difficulty level
- Transforming problems so they allow for more solutions or a wider range of responses
- Encouraging the use of multiple models

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It is important to remember that differentiated mathematics instruction is most successful when teachers:

- Believe that all students have the capacity to succeed at learning;
- Recognize that diverse thinking is an essential and valued resource;
- Know and understand mathematics and are confident in their ability to teach mathematical ideas;
- Are intentional about curricular choices
- Develop strong learning communities in their classrooms;
- Focus assessment; and
- Support each other in their efforts

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Planning for Differentiated Instruction — Questions to guide our Thinking

- What is the mathematics I want my students to learn?
- What do my students already know? How can I build on their thinking?
- How can I expand access to this task or idea? Have I thought about interests, learning styles, use of language, cultures, and readiness?

Planning for Differentiated Instruction — Questions to guide our Thinking

- How can I ensure that each student experiences challenges?
- How can I scaffold learning to increase the likelihood of success?
- In what different ways can my students demonstrate their new understanding?
- Are there choices students can make?

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“In the end, all learners need your energy, your heart, and your mind.

They have that in common because they are young humans.

How they need you, however, differs. Unless we understand and respond to those differences, we fail many learners.”

Carol Ann Tomlinson

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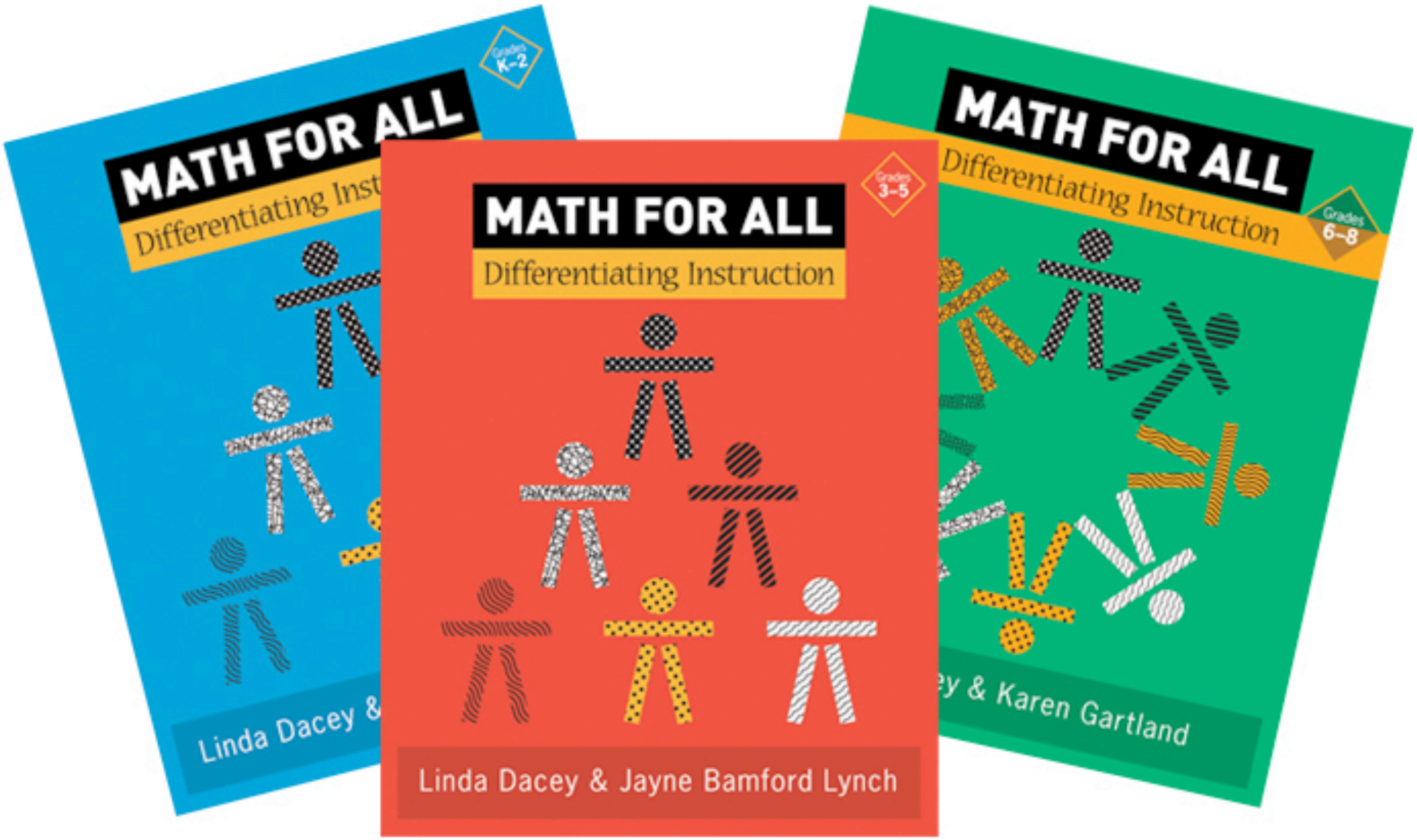
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