
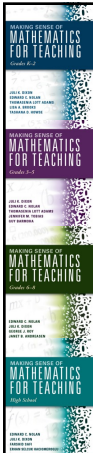


Making Sense of Mathematics for Teaching

Macon, GA Leaders!



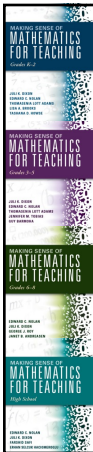
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Making Sense of Mathematics for Teaching

Dr. India White
@Indispeaknteach
www.DNAmath.com

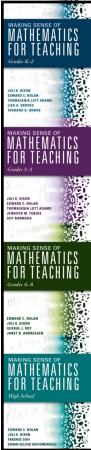
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Goals

- Experience mathematics as both a *learner* and a *teacher*.
- Make sense of the TQE Process to facilitate instruction.
- Create a shared image of mathematics instruction with the TQE Process in place.

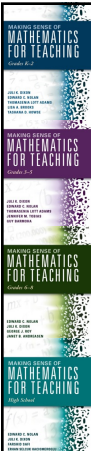
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The importance of a good task

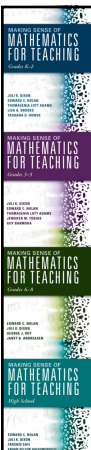
Douglas ordered 5 small pizzas during the great pizza sale. He ate $\frac{1}{6}$ of one pizza and wants to freeze the remaining $4\frac{5}{6}$ pizzas. Douglas decides to freeze the remaining pizza in serving-sized bags. A serving of pizza is $\frac{2}{3}$ of a pizza. How many servings can he make if he uses up all of the pizza?

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Tasks from the Learner's Perspective

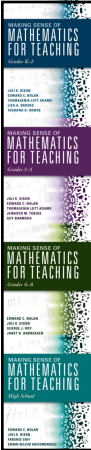
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The only way to learn mathematics is to do mathematics.

—Paul Halmos

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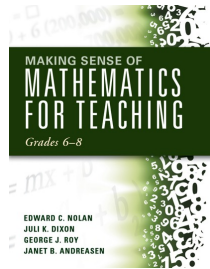
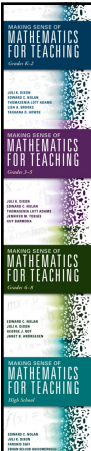


The importance of a good task

Consider this grade 6 class as they make sense of fraction division.

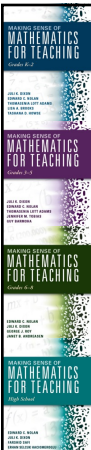
#MSMT68

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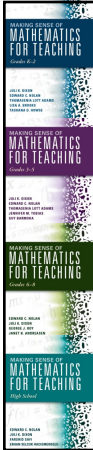
Making Sense of Mathematics for Teaching
Grades 6-8

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Tasks from the
Teacher's Perspective

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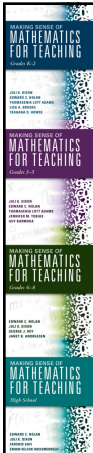


Plan with the TQE Process in Mind



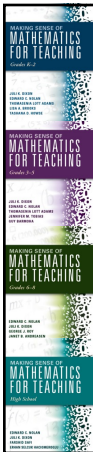
- Select appropriate **T**asks to support identified learning goals.
- Facilitate productive **Q**uestioning to engage students in mathematical practices.
- Collect and use student **E**vidence in the formative assessment process.

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What was the learning goal?

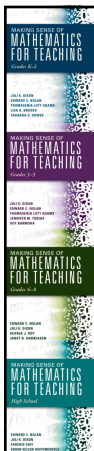
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Coherence of the task

- Work with equal groups to gain foundations for division
- Represent and solve problems involving division
- Develop understanding of fractions as numbers
- Apply and extend previous understandings to divide fractions
- Fluently divide fractions

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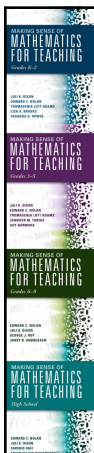
Plan with the TQE Process in Mind




Tasks

- Identify the learning goals.
- Select tasks to support the learning goals.
- Select tasks that will help uncover students' misconceptions.
- Show variation of cognitive demand among tasks.

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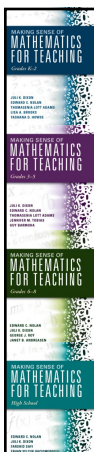
Consider your next unit. Select three important topics. Plan with the TQE process in mind.




Questions

- Identify mathematical practices addressed within each topic.
- Anticipate students' misconceptions. Prepare potential questions to be posed during instruction and anticipate students' responses.

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Consider your next unit. Select three important topics. Plan with the TQE process in mind.



Evidence

- List potential evidence (e.g., written work, demonstration, oral responses) of student learning.
- Consider how to adjust instruction for students who do or do not understand.

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MAKING SENSE OF MATHEMATICS FOR TEACHING
High School

EDWARD C. NOLAN
JULI N. DIXON
FARSHID SAFI
ERIHAN SELCUK HACIOMEROGLU

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Task: Father & Son Race

Write a story that matches the graph.

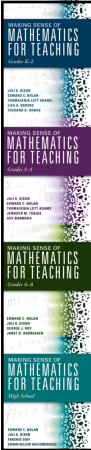
Be sure to include what is occurring at A, B, and C as well as the intervals in between.

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Making Sense of Graphs

- What questions would you ask to learn about how students are making sense of the graph?
- What do you anticipate will be challenges for the students?
- How will you address these challenges if they come up during the lesson?
- What will you do if they don't?

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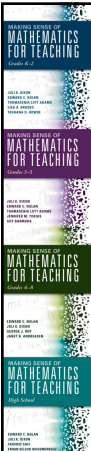


Making Sense of Graphs

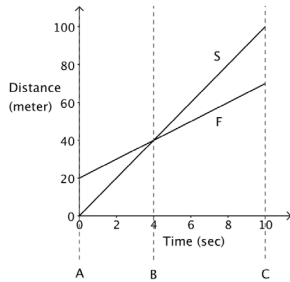
How does what you anticipate from your students and the questions you plan impact the evidence that you collect from students?

What would this task look like in the classroom?

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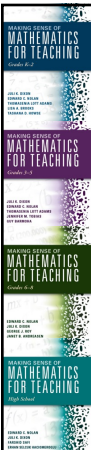


Father (F) & Son (S) Activity



What are the mathematical concepts involved and needed in solving this problem?

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Plan with the TQE Process in Mind



- Select appropriate **T**asks to support identified learning goals.
- Facilitate productive **Q**uestioning to engage students in mathematical practices.
- Collect and use student **E**vidence in the formative assessment process.

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Father (F) & Son (S) Activity

Distance from finish line (meters)

Time (sec)

How does this graph connect to the Father & Son Race?

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Representational Fluency

What representations can be used to show these situations?

What does each representation provide?

How do you know?

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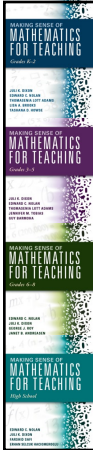
Using Data to Drive Decisions

How does this lesson use the formative assessment process?

What data is collected?

How is the data used?

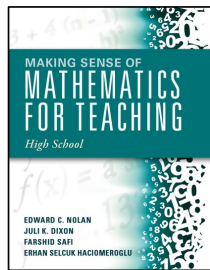
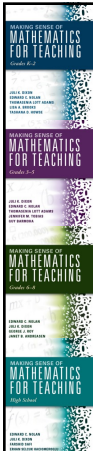
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Layers of Facilitation

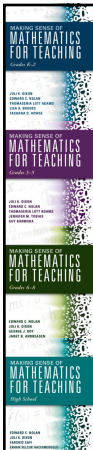
- I facilitate the *whole class* to engage in meaningful tasks through questioning.
- I facilitate *small groups* to extend the learning initiated in the whole-group setting, and
- I facilitate *individuals* to provide evidence of their understanding of the learning goal.

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Making Sense of Mathematics for Teaching High School

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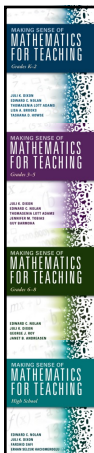
The importance of a good task

Consider this equation:

$$x^2 - 4x = 5$$


How can thinking of this as $f(x) = g(x)$ and sketching each function help to determine the number of solutions to this equation?

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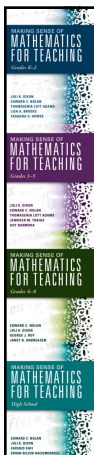


Good Tasks ...

1. Are interesting.
2. Involve meaningful mathematics.
3. Allow application and extension.
4. Are appropriately challenging.
5. Lead to the use of multiple strategies.
6. Inform the teacher of students' understanding.



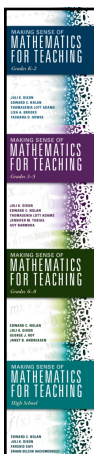
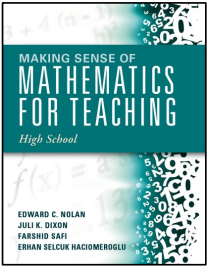
(Larson, Fennell, Adams, Dixon, Kobett, Wray, 2012, pp. 28–29)
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The importance of a good task

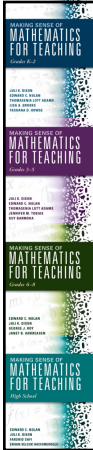
Consider this high school class as they make sense of the same task.

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Making Sense of Mathematics for Teaching High School

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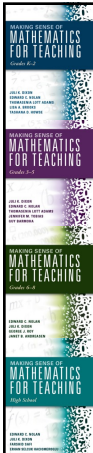
Plan with the TQE Process in mind




What did you notice?

What are the important features of the task and how does it support the learning goal?

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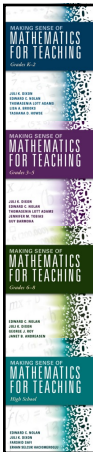


Plan with the TQE Process in Mind



- Select appropriate **T**asks to support identified learning goals.
- Facilitate productive **Q**uestioning to engage students in mathematical practices.
- Collect and use student **E**vidence in the formative assessment process.

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What Worked?

- What went well today?
- What are your takeaways?

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