December

VOLUME 1 ISSUE 3

# MATH MOMENTS

*Learning the mathematical practices!*

# MATHEMATICAL PRACTICE #2

## REASON ABSTRACTLY AND QUANTITATIVELY

### 8 MATHEMATICAL PRACTICES

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

**VIDEO EXAMPLE:**

TEDxNYED

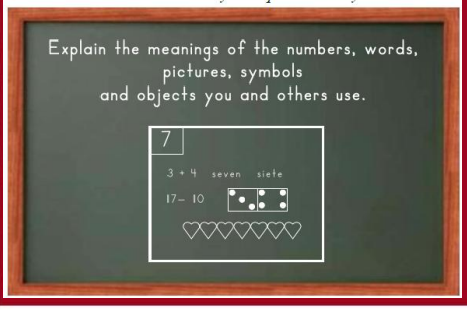
**https://goo.gl/JGmrtx**

Presents

DANMEYER

Standard for Mathematical Practice #2

*Reason abstractly and quantitatively.*




Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships:

--the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents.

--and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved.

Quantitative reasoning entails habits of:

--creating a coherent representation of the problem at hand;
--considering the units involved;
--attending to the meaning of quantities, (not just how to compute them);
--flexibly using different properties of operations and objects.

-Reference taken from the Common Core State Standards

**What it means:** Get ready for the words contextualize and decontextualize. If students have a problem, they should be able to break it apart and show it symbolically, with pictures, or in any way other than the standard algorithm. Conversely, if students are working a problem, they should be able to apply the "math work" to the situation.

**Own it:** Have students draw representations of problems. Break out the manipulatives. Let students figure out what to do with data themselves instead of boxing them into one type of organization. Ask questions that lead students to understanding. Have students draw their thinking, with and without traditional number sentences. Reference taken from: Scholastic (http://goo.gl/mv6nFi)

inside + × = ÷ mathematics **...invites you into the practices!**

**Visit: http://goo.gl/LUO1qV**

### WHAT DOES THIS MATH PRACTICE LOOK LIKE?

Sample problem: How many busses are needed for 99 children if each bus seats 44?

A child might write 99÷44. (Decontextualizing)

*But after calculating 2r11 or 2¼ or 2.25, the student must realize that this situation requires a whole number answer.*

The answer is 3 busses, not 3 children or just 3.(Successful recontextualization!)

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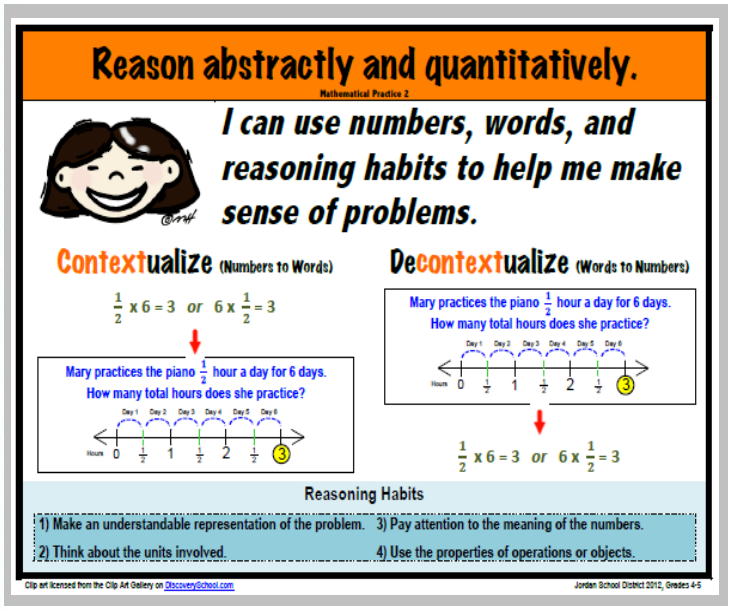



## WHAT DOES THE TASK LOOK LIKE?

**A student is practicing Mathematical Practice 2 every time he/she:**

- draws a *tape diagram, number bond, number line, array, or area model* to a problem and then reasons directly off the model itself to answer the question.
- refers, if necessary, back to the word problem to reestablish meaning.
- writes an equation or number sentence to express the thinking of his/her solution.
- writes a sentence containing the answer to a word problem that includes the unit (meters, inches, money, dogs, etc...) also known as the answer statement.

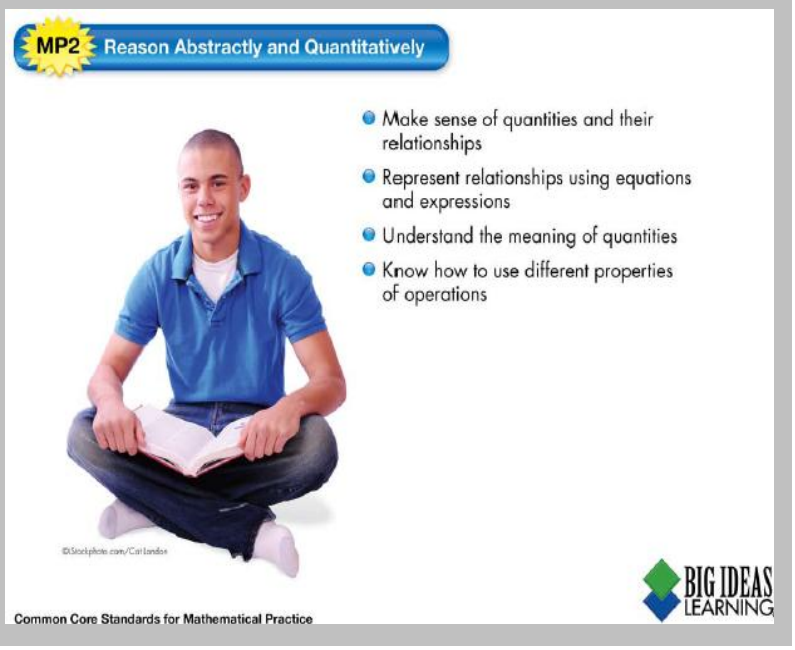
## WHAT DOES IT LOOK LIKE AT EACH LEVEL?

**Elementary:** Students explain to themselves the meaning of a problem and look for ways to solve it. They may use concrete objects or pictures to help them conceptualize and solve problems. They make conjectures about the solution and plan out a problem-solving approach.

**Middle School:** Students represent a wide variety of real world contexts through the use of real numbers and variables in mathematical expressions, equations, and inequalities. Students contextualize to understand the meaning of the number or variable as related to the problem and decontextualize to manipulate symbolic representations by applying properties of operations.

**High School:** Students abstract a given situation and represent it symbolically, manipulate the representing symbols, and pause as needed during the manipulation process in order to probe into the referents for the symbols involved.

-teresaemmert.weebly.com




## QUESTIONS TO ASK STUDENTS

--How do you know your answer is reasonable?
--What operation did you use and why does it represent the situation?
--Taking an equation, ask what type of situation can be represented?

-GO Math! Houghton Mifflin Harcourt (2012)

THESE STANDARDS STRESS NOT ONLY PROCEDURAL SKILL BUT ALSO CONCEPTUAL UNDERSTANDING, TO MAKE SURE STUDENTS ARE LEARNING AND ABSORBING THE CRITICAL INFORMATION THEY NEED TO SUCCEED AT HIGHER LEVELS. – COMMON CORE STATE STANDARDS

*"Mathematics instruction is not just a checklist of topics to cover, but a set of interrelated and powerful ideas."*

*-Allison Barr, Kate Blosveren, and Marie O'Hara*