MATHEMATICAL LITERACY
Objective: Deepen understanding of how reading and writing are involved in the CCSS, assessments, curriculum, and practice in mathematics.

• Explore standards, assessments, and curriculum:
  – What’s different in math texts?

• Video Study

• Consider planning for instruction and mentoring student teachers
WHAT DO YOUR STUDENTS READ AND WRITE IN MATH?

• Discuss in pairs:

What do we mean when we talk about Mathematical Literacy?
What do your students read and write in math? For what purpose?

• Share with the group:
MATHEMATICS TEXTS: ORGANIZATION AND REPRESENTATION

In groups, consider the standards/released test questions/mathematics curriculum & supplemental resources, considering the following questions

• How is the organization and representation of different information in mathematics texts compared to texts students encounter in other disciplines, and in everyday life?

• What is important for your students to know when reading mathematical texts?
MATHEMATICS TEXTS: ORGANIZATION AND REPRESENTATION

\[ 76 + 23 = 99 \]
What’s in a mathematical text?

- Numeric symbols
- Non-numeric symbols
- Graphs
- Sidebars
- *etc.*

How is it different?

- Minimal repetition
- Different page organization
- Different reading patterns
- Texts might be above grade level
- Main idea at the end in the form of a question
VIDEO: QUESTIONING DATA

https://www.learner.org/vod/vod_window.html?pid=900

• What do you see in the video?
• What kind of reading and writing is going on in this lesson?
• How might you adapt this lesson for your students?
# VIDEO OBSERVATION

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Summary

• Reading and Writing in Mathematics
  – Standards
  – Assessments
  – Curriculum
  – Instruction
• Video:
• Strategies for the Classroom

• Integrating Writing and Mathematics by Brad Wilcox, Eula Ewing Monroe

• 3 minute strategy for Monday
STRATEGIES FOR LITERACY-RICH MATHEMATICS INSTRUCTION

- Project Based Learning
- Interdisciplinary Lessons
- Explicit instruction in reading and writing mathematical texts
- Multimedia and multimodal
- Learning logs/Math Journals
- Shared writing on mathematical topics
- Bilingual class book with word problems
STRATEGY TO TRY MONDAY: TICKET OUT THE DOOR

Before you leave, pick one questions and take 3 minutes to write down your thoughts:

• What did you learn about reading and writing in math today that you didn’t already know?
• How/is it different for dual language settings?
• How will this change your classroom practice, or student-teacher mentoring?
Mathematical Process Standards

A) apply mathematics to problems arising in everyday life, society, and the workplace;

B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

(E) create and use representations to organize, record, and communicate mathematical ideas;

(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
Mathematical Practice Standards (the same at each grade level):

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reading 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.

Mathematical Content Standards (different at each grade level):

- skills and knowledge—what students need to know and be able to do.
- built on progressions of topics across grade levels,
- Eg: Number Operations 4.2: 2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
Examples in Each Strand:

*Grade 3 Number and operations*
   
   A: compose and decompose numbers up to 100,000 ...using objects, pictorial models, and numbers, including expanded notation as appropriate;

*Grade  Algebraic Reasoning*
   
   A: represent multi-step problems involving the four operations with whole numbers using strip diagrams and equations with a letter standing for the unknown quantity;

*Grade 5 Data Analysis Data Analysis*
   
   (A) represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots;
Fourth Grade Release Test Question 11.
It took Ian three years to collect 25,413 aluminum cans to recycle. In the first year he collected 8,917 cans, and in the second year he collected 7,639 cans. Which equation can be used to find x, the number of cans Ian collected in the third year?

A $x = 25,413 - 8,917 - 7,639$
B $x = 25,413 + 8,917 + 7,639$
C $x = 8,917 + 7,639$
D $x = 8,917 - 7,639 - 4$

Fourth Grade Released Test Question 25.
Angle Q is shown on this protractor.

What is the measure of angle Q to the nearest degree?
A 70°, because 50° plus 20° equals 70°
B 150°, because 130° plus 20° equals 150°
C 30°, because 160° minus 130° equals 30°
D 110°, because 160° minus 50° equals 110°
DUAL LANGUAGE SETTINGS

How is reading and writing math different in a dual language setting?

What are the specific challenges you notice for your students?

What are specific strategies you use to target mathematical biliteracy?