Connecting Mathematics and Literacy

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CCSS   Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.

--explain to themselves the *meaning* of a problem and looking for entry points to its solution.. . . They *monitor and evaluate* their progress and change course if necessary. They continually ask themselves, *"Does this make sense?"* They can understand the approaches of others to solving complex problems and identify *correspondences* between different approaches.

2. Reason abstractly and quantitatively.

--make sense of quantities and their relationships in problem situations. They decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols and contextualize, probe into the referents for the symbols involved.

3. Construct viable arguments and critique the reasoning of others.

--understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures.

4. Model with mathematics.

--apply the mathematics they know to solve problems arising in everyday life, society, and the workplace.

5. Use appropriate tools strategically.

--consider the available tools when solving a mathematical problem.

6. Attend to precision.

--communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose.
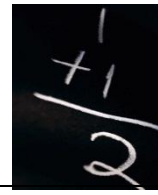
7. Look for and make use of structure.

--look closely to discern a pattern or structure.

8. Look for and express regularity in repeated reasoning.

--notice if calculations are repeated, and look both for general methods and for shortcuts. They continually evaluate the reasonableness of their intermediate results.

Connecting Literacy and Math

Monitor and Fix Up Do I understand what I am reading? Do I need to reread or restate the ideas in my own words? Do I understand the way the author uses certain words?	**Monitor and Fix Up** Does the problem make sense? Do I need to reread or restate the problem? Do I know all the math terms or vocabulary? Does my answer make sense?
Question I can ask questions to clarify meaning and to understand the text.	**Question** I can ask questions about the data or to determine what the problem is about, and to decide if answers and solutions make sense.
Determine Importance I can determine important words or events from the text. I can distinguish between important and unimportant information. I can prioritize and summarize the text.	**Determine Importance** I can determine what information is relevant and irrelevant in the problem. I can determine what I need to figure or find out to solve the problem and which strategy will help me the most.
Infer I can draw conclusions about characters, setting or solutions to the problem. I can infer the meaning of words used in context. I can infer the author's purpose or theme.	**Infer** I can infer what will come next using the data presented. I can make an informed guess about additional information needed. I can estimate a solution.
Visualize I can create pictures in my mind of the setting and the characters. I can picture the problem the characters are facing and I can use sensory images to immerse myself in the rich details as I read.	**Visualize** I can make pictures in my mind or I can represent what I think the problem is about by drawing or using objects.
Summarize and Synthesize What was this text mostly about? What were the key ideas and details? What conclusions can I draw?	**Summarize and Synthesize** How can I use this again? What conclusions can I draw?
Make Connections I can make connections to what I am reading by thinking about other books, my own experiences, and what I know about the world.	**Make Connections** I can make connections to this problem by thinking about others like it that I have solved before. I can make connections to the problem from what I have learned about everyday life.

Literacy Strategies in Mathematics

Monitoring and Fix Up

- Does it make sense? What else can I do?

Questioning

- Getting started: What do I know?
- Getting unstuck: Where did my pattern stop working? Did I read it right?
- Checking my work: Does it make sense? How do I know?
- Going Deeper: Will it always work?

Determine Importance

- What are the key pieces of information that will help me solve this? What do I NEED to know?

Making Connections

- Connect to physical and social world
- Make connections to past experiences
    - Math to self: can I link unfamiliar math material to a personal experience?
    - Math to math: what other math concept is this like?
    - Math to world: what referent will help me?

Inferring

- What conclusions can I draw? What information is unstated that I need to know? How is the information related?

Summarizing and Synthesizing

- How can I use this again?
- What conclusions can I draw?

Visualizing

- Manipulatives create visual images and vocabulary for math concepts. Once students have used real materials, the tools remain as mental images to draw on.
- Thinking about numbers and relationships
    - Number lines
    - Hundreds charts
    - Place value models
    - Ten frames
- Quantities: How much IS a million?
- Story Problems: What about that remainder?
- Magnitude
- Shapes
- Measurement

Contextualized Mathematics: Books about Math

Many of the following are from http://love2learn2day.blogspot.com/p/math-book-lists-tba.html

Number Sense and Place Value
A Million Dots, Andrew Clements
Hershey's Chocolate Math, Jerry Pallotta
How Much, How Many, How Far, How Heavy, How Long, How Tall is 1000?, Helen Nolan and Tracy Walker
How Much is a Million?, David Schwartz
Just Enough Carrots, Stuart Murphy
The King's Commissioners, Aileen Friedman
Places along the Way, Brian Sargent

Addition/Subtraction
The 329th Friend, Marjorie Weinman Sharmat
The Action of Subtraction, Brian Cleary
Bunches and Bunches of Bunnies, Louise Mathews
Centipede's 100 Shoes, Tony Ross
Candy Counting, Lisa McCourt
Domino Addition, Lynette Long
Each Orange Had 8 Slices, Paul Giganti
Elevator Magic, Stuart Murphy (subtracting)
The Grapes of Math, Greg Tang
Hershey's Chocolate Math, Jerry Pallotta
If you were a minus sign, Trisha Speed Shaskan
If you were a plus sign, Trisha Speed Shaskan
Math Appeal, Greg Tang
Math Fables, Greg Tang
Math For All Seasons, Greg Tang
Math-terpieces, Greg Tang
Monster Math, Anne Miranda
Moon to Sun, Sheila White Samtor
My Little Sister Ate One Hare, Bill Grossman
Panda Math; Learning About Subtraction from Hua Mei and Mei Sheng, Ann Whitehead Nagda
Pet Store Subtraction, Simone Ribke
Ready, Set, Hop!, Stuart Murphy (building equations)
The Real Princess: A Mathematical Tale, Brenda Williams (variety of problems)
Rocket to the Moon, David Clemson and Wendy Clemson
Rooster's Off to See the World, Eric Carle
Safari Park, Stuart Murphy (finding unknowns)
Shark Swimathon, Stuart Murphy (subtracting two-digit numbers)
Splash!, Ann Jonas
Subtraction Action, Loreen Leedy

Area/Perimeter
Spaghetti and Meatballs for All!, Marilyn Burns

Division

17 Kings and 42 Elephants, Margaret Mahy
A Remainder of One, Elinor J. Pinczes
Bean Thirteen, Matthew McElligot
Cheetah Math, Ann Whitehead Nagda
The Doorbell Rang, Pat Hutchins
Divide and Ride, Stuart Murphy
The Great Divide, Dayle Ann Dodds

Estimating

Betcha!, Stuart Murphy
The Candy Corn Contest, Patricia Reilly Giff (chapter bk)
Great Estimations, Bruce Goldstone

Fractions, Decimals, Percents

Apple Fractions, Jerry Pallotta
Eating Fractions, Bruce McMillan
Fabulous Fractions, Lynette Long
Fraction Action, Loreen Leedy
Fraction Fun, David Adler
Full House, Dayle Ann Dodds
The Hershey's Fraction Book, Jerry Pallotta
Jump, Kangaroo, Jump!, Stuart Murphy
The Lion's Share, Matthew McElligott
Little Numbers and Pictures That Show Just How Little They Are!, Edward Packard
Music Math, Kathleen Collins
Picture Pie, Ed Emberley
Piece=Part=Portion, Scott Gifford
Polar Bear Math, Ann Whitehead Nagda And Cindy Bickel
Twizzlers Percentages Book, Jerry Pallotta
The Wishing Club, Donna Jo Napoli

Geometry

A 3-D Birthday Party, Ellen Senisi
All About Where, Tana Hoban
Captain Invincible and the Space Shapes, Stuart J. Murphy
A Cloak for the Dreamer, Aileen Friedman (tessellations)
Cubes, Cones, Cylinders, and Spheres, Tana Hoban
Eight Hands Round: A Patchwork Alphabet, Ann Whitford Paul (Quilts)
Grandfather Tang's Story, Ann Tompert
The Greedy Triangle, Marilyn Burns
Hamster Champs, Stuart Murphy (angles)
Icky Bug Shapes, Jerry Pallotta
If You Were a Polygon, Marcie Aboff
A Light in the Attic (poem, "Shapes"), Shel Silverstein

The Seasons Sewn, Ann Whitford Paul (quilts)
Shape Up, David Adler
The Shape of Things, Dayle Ann Dodds
Shapes, Shapes, Shapes, Tana Hoban
The Silly Story of Goldie Locks and the Three Squares, Grace Maccarone (Hello Math)
Sir Cumference and the Dragon of Pi, Cindy Neuschwander
Sir Cumference and the First Round Table, Cindy Neuschwander
Sir Cumference and the Great Knight of Angleland, Cindy Neuschwander
Sir Cumference and the Isle of Immeter, Cindy Neuschwander
Sir Cumference and the Sword in the Cone, Cindy Neuschwander
So Many Circles, So Many Squares, Tana Hoban
I Spy Shapes in Art, Lucy Micklethwait
Square Cat, Elizabeth Schoonmaker
Three Pigs, One Wolf, and Seven Magic Shapes, Grace Maccarone
The Village of Round and Square Houses, Ann Grifalconi
When a Line Bends…A Shape Begins, Rhonda Greene
Zachary Zormer, Shape Transformer, Joanne Reisberg

Measurement
The 100-Pound Problem, Jennifer Dussling
Balancing Act, Ellen Stoll Walsh
Beanstalk; the Measure of a Giant, Ann McCallum
The Best Bug Parade, Stuart Murphy
Biggest, Strongest, Fastest, Steve Jenkins
Counting on Frank, Rod Clement
The Dragon's Scales Sarah Albee (weight)
Equal Shmequal, Virginia Kroll
Hottest, Coldest, Highest, Deepest, Steve Jenkins
How Big is a Foot?, Rolf Myller
How Tall, How Short, How Far Away?, David Adler
If You Hopped Like a Frog, David Schwartz (Ratio/Proportion)
Inch by Inch, Leo Lionni
The Librarian Who Measured the Earth, Kevin Hawkes
Millions to Measure, David Schwartz
Pastry School in Paris: An Adventure in Capacity, Cindy Neuschwander
Pezzettino, Leo Lionni (area)
Pigs in the Pantry, Amy Axelrod
Twenty-One Elephants, Phil Bildner
Who Sank the Boat?, Pamela Allen

Money
26 Letters and 99 Cents, Tana Hoban
Alexander Who Used to Be Rich Last Sunday, Judith Viorst
Arthur's Funny Money, Lilian Hoban
If You Made a Million, David Schwartz
Once Upon a Dime; A Math Adventure, Nancy Kelly Allen

The Penny Pot, Stuart Murphy
Pigs Will Be Pigs: Fun with Math and Money, Amy Axelrod
Tight Times, Barbara Shook Hazen
The Toothpaste Millionaire, Jean Merrill (chapter book)
Where the Sidewalk Ends (poem, "Smart"), Shel Silverstein

Multiplication, Skip Counting, Doubling, Square Numbers
A Grain of Rice, Helena Clare Pittman (doubling)
Amanda Bean's Amazing Dream, Cindy Neuschwander
Anno's Mysterious Multiplying Jar, Mitsumasa Anno
Bats on Parade, Kathi Appelt (mult, square #s)
Bunches and Bunches of Bunnies, Louise Mathews
Each Orange Had 8 Slices: A Counting Book, Paul Giganti, Jr.(multiply, add, count)
How Do You Count a Dozen Ducklings?, In Seon Chae
How Many Seeds in a Pumpkin?, Margaret McNamara
The King's Chessboard, David Birch (doubling)
The King's Commissioners, Aileen Friedman (addition, skip counting)
The Lion's Share, Matthew McElligott
The M&M's Counting Book, Barbara McGrath (counting, add/subtract/multiply)
One Grain of Rice, Demi (doubling)
One Hundred Ways to Get to 100, Jerry Pallotta
Two of Everything, Lily Toy Hong (doubling)

Contextualized Mathematics: Math About Books

Meet Wild Boars

by Meg Rosoff and Sophie Blackall

Solve problems involving measurement including conversion of units

Use place value understanding and properties to perform multi-digit operations

Solve problems involving the four operations

Work with time and money

- Horace soaked in your toilet for a long time. If he got in the water at 9:30 am and got out at 1:00 pm, how long was he hogging the toilet?

- When Horace was playing in the water, he splashed all over. There were 4 gallons in the bowl to start with. When he got out there were only 2 ½ gallons left. How much water did he spill all over?

- Morris ate all your chocolates! Each candy weighed 2 ounces. If he ate one whole pound of chocolate, how many candies did he eat?

- You had 3 packages of pencils before Boris got to them. Each pack had one dozen pencils in it. Boris broke all of them except 3. How many pencils did he break?
  If he broke every pencil into 2 pieces, how many pieces will you need to clean up?

- Boris also broke up your puzzle of the Titanic. It had 800 pieces, but you can only find 683. How many pieces are missing?

How to do Math about Books

Think about the text

Consider the mathematics you want to include in the math problem

Introduce the topic and lay the foundation with something from the text

Include the data the students need

Pose the question