Orange Public Schools

Office of Curriculum & Instruction
2019-2020 Mathematics Curriculum Guide

Kindergarten Mathematics

Eureka - Module 1: Numbers to 10
September 9, 2019 – November 6, 2019

Board Approved: 1.14.2020

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Yearlong Pacing Guide: Kindergarten

Eureka Math	***Eureka Module Standards***
Module 1: Sums and Differences to 10 **Sept 9- Nov 6**	KCC3,KCC4, KCC5 KOA3, KMD3
Module 2: 2-3D Shapes **Nov 11- Nov 26**	KMD3, KG1,G2,G3, G4
Module 3: Comparison of Length, Weight, Capacity, and Numbers to 10 **Dec 2 - Feb 7**	KCC6, KCC7, KMDA1, KMD2
Module 4: Number Pairs, Addition and Subtraction to 10 **Feb 10- May 1**	KOA1, KOA2, KOA3, KOA4, KOA5
Module 5: Numbers 10-20 Counting to 100 **May 4- June 12**	KCC1, KCC2, KCC3, KCC4, KCC5, K.NBT.1
Module 6: Analyzing, Comparing, and Composing Shapes **June 15- EOSY**	KCC4, KG5, G6

References

"Eureka Math" *Gt Minds*. 2018 < https://greatminds.org/account/product

Table of Contents

Module 1

Essential Questions	Enduring Understandings
• How do we count? • Why are numbers necessary? • What is the value of a number? • How can quantities be represented? • How do we count? • If we move objects into a scattered configuration, does the amount change? • Why should we count from left to right?	• Numbers have names and we use them to count. • Quantities can be counted and compared using numbers, words and numerals. • Numbers are symbols used to represent quantities. • We start at 1 and count up to 10 • No, the last number counted represents the number of counted objects in the set • We count from left to right to prepare for reading left to right. It shows us how the numbers are seen in an ascending order.

Performance Overview

- In Topics A and B, classification activities allow students to analyze and observe their world and articulate their observations. Reasoning and dialogue begin immediately. As Topic B closes, students recognize cardinalities as yet one more lens for classification.

- In Topics C, D, E, and F, students order, count, and write up to ten objects to answer "how many?" questions from linear, to array, to circular, and finally to scattered configurations wherein they must devise a path through the objects as they count. Students use their understanding of numbers and matching numbers with objects to answer "how many?" questions about a variety of objects, pictures, and drawings.

- In Topics G and H, students use their understanding of relationships between numbers and know that each successive number name refers to a quantity that is one greater and that the number before is one less. They learn that the last number said tells the number of objects counted.

- Very basic expressions and equations are introduced early in order to endure students' familiarity with numbers throughout the entire year.

- Daily Fluency activities with concentration and emphasis on counting are integrated throughout the concept development.

Module 1: Numbers to 10

Pacing: September 9, 2019- November 6, 2019 Suggested Instructional Days: 42		
Topic	**Lesson**	**Lesson Objective:**
Topic A: Attributes of Two Related Objects	Lesson 1 & 2	Analyze to find two objects that are *exactly the same or not exactly the same.* Analyze to find two similar objects—these are the same but….
	Lesson 3	Classify to find two objects that share a visual pattern, color, and use.
Topic B: Classify to Make Categories and Count	Lesson 4	Classify items into two pre-determined categories.
	Lesson 5	Classify items into three categories, determine the count in each, and reason about how the last number named determines the total.
	Lesson 6	Sort categories by count. Identify categories with 2, 3, and 4 within a given scenario.
Topic C: Numbers to 5 in Different Configurations, Math Drawings, and Expressions	Lesson 7	Sort by count in vertical columns and horizontal rows (linear configurations to 5). Match to numerals on cards.
	Lesson 8	Answer how many questions to 5 in linear configurations (5- group), with 4 in an array configuration. Compare ways to count five fingers.
	Lesson 9	Within linear and array dot configurations of numbers 3, 4, and 5, find hidden partners.
	Lesson 10	Within circular and scattered dot configurations of numbers 3, 4, and 5, find hidden partners.
	Lesson 11	Model decompositions of 3 with materials, drawings, and expressions. Represent the decomposition as 1 + 2 and 2 + 1.
Topic D: The Concept of Zero and Working with Numbers 0–5	Lesson 12	Understand the meaning of zero. Write the numeral 0.
	Lesson 13	Order and write numerals 0–3 to answer how many questions.
	Lesson 14	Write numerals 1–3. Represent decompositions with materials, drawings, and equations, 3 = 2 + 1 and 3 = 1 + 2.
	Lesson 15	Order and write numerals 4 and 5 to answer how many questions in categories; sort by count.
	Lesson 16	Write numerals 1–5 in order. Answer and make drawings of decompositions with totals of 4 and 5 without equations.
Mid- Module Assessment (Interview Style)		

Topic E: Working with Numbers 6–8 in Different Configurations	Lesson 17	Count 4–6 objects in vertical and horizontal linear configurations and array configurations. Match 6 objects to the numeral 6.
	Lesson 18	Count 4–6 objects in circular and scattered configurations. Count 6 items out of a larger set. Write numerals 1–6 in order
	Lesson 19	Count 5–7 linking cubes in linear configurations. Match with numeral 7. Count on fingers from 1 to 7, and connect to 5- group images.
	Lesson 20	Reason about sets of 7 varied objects in circular and scattered configurations. Find a path through the scattered configuration. Write numeral 7. Ask, "How is your seven different than mine?"
	Lesson 21	Compare counts of 8. Match with numeral 8
	Lesson 22	Arrange and strategize to count 8 beans in circular (around a cup) and scattered configurations. Write numeral 8. Find a path through the scattered set, and compare paths with a partner
Topic F: Working with Numbers 9–10 in Different Configurations	Lesson 23	Organize and count 9 varied geometric objects in linear and array (3 threes) configurations. Place objects on 5-group mat. Match with numeral 9.
	Lesson 24	Strategize to count 9 objects in circular (around a paper plate) and scattered configurations printed on paper. Write numeral 9. Represent a path through the scatter count with a pencil. Number each object.
	Lesson 25 & 26	Count 10 objects in linear and array configurations (2 fives). Match with numeral 10. Place on the 5-group mat. Dialogue about 9 and 10. Write numeral 10
	Lesson 27	Count 10 objects, and move between all configurations
	Lesson 28	Act out result unknown story problems without equations.
Topic G: One More with Numbers 0–10	Lesson 29	Order and match numeral and dot cards from 1 to 10. State 1 more than a given number.
	Lesson 30	Make math stairs from 1 to 10 in cooperative groups.
	Lesson 31	Arrange, analyze, and draw 1 more up to 10 in configurations other than towers.
	Lesson 32	Arrange, analyze, and draw sequences of quantities of 1 more, beginning with numbers other than 1.
Topic H: One Less with Numbers 0–10	Lesson 33	Order quantities from 10 to 1, and match numerals
	Lesson 34	Count down from 10 to 1, and state 1 less than a given number.
	Lesson 35	Arrange number towers in order from 10 to 1, and describe the pattern.
	Lesson 36	Arrange, analyze, and draw sequences of quantities that are 1 less in configurations other than towers.
	Lesson 37	Culminating task
End-of-Module Assessment (Interview Style)		

Modifications

Special Education/ 504:	English Language Learners:
-Adhere to all modifications and health concerns stated in each IEP. -Give students a Menu, allowing students to pick assignments from different levels based on difficulty. -Accommodate Instructional Strategies: reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time -Allow students to demonstrate understanding of a problem by drawing the picture of the answer and then explaining the reasoning orally and/or in writing , such as Read-Draw-Write -Provide breaks between tasks, use positive reinforcement, use proximity -Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum by using manipulatives -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 17-18) -Strategies for Students with 504 Plans	- Use manipulatives to promote conceptual understanding and enhance vocabulary usage - Provide graphic representations, gestures, drawings, equations, realia, and pictures during all segments of instruction - During i-Ready lessons, click on "Español" to hear specific words in Spanish - Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information - Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve word problems - Utilize program translations (if available) for L1/ L2 students - Reword questions in simpler language - Make use of the ELL Mathematical Language Routines (click here for additional information) -Scaffolding instruction for ELL Learners -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 16-17)
Gifted and Talented:	**Students at Risk for Failure:**
- Elevated contextual complexity - Inquiry based or open ended assignments and projects - More time to study concepts with greater depth - Promote the synthesis of concepts and making real world connections - Provide students with enrichment practice that are imbedded in the curriculum such as: ● Application / Conceptual Development ● Are you ready for more? - Common Core Approach to Differentiate Instruction: Students with Disabilities (pg. 20) - Provide opportunities for math competitions - Alternative instruction pathways available	- Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum - Modify Instructional Strategies, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Field Trips, Google Expeditions, Peer Support, one on one instruction - Assure constant parental/ guardian contact throughout the year with successes/ challenges - Provide academic contracts to students and guardians - Create an interactive notebook with samples, key vocabulary words, student goals/ objectives. - Always plan to address students at risk in your learning tasks, instructions, and directions. Try to anticipate where the needs will be and then address them prior to lessons. -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 19)

21st Century Life and Career Skills:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

https://www.state.nj.us/education/cccs/2014/career/9.pdf

- **CRP1**. Act as a responsible and contributing citizen and employee.
- **CRP2**. Apply appropriate academic and technical skills.
- **CRP3**. Attend to personal health and financial well-being.
- **CRP4**. Communicate clearly and effectively and with reason.
- **CRP5**. Consider the environmental, social and economic impacts of decisions.
- **CRP6**. Demonstrate creativity and innovation.
- **CRP7**. Employ valid and reliable research strategies.
- **CRP8**. Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9**. Model integrity, ethical leadership and effective management.
- **CRP10**. Plan education and career paths aligned to personal goals.
- **CRP11**. Use technology to enhance productivity.
- **CRP12**. Work productively in teams while using cultural global competence.

Students are given an opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are encouraged to reason through experiences that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, calculators, and educational websites.

Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.
https://www.state.nj.us/education/cccs/2014/tech/

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
C. **Design:** The design process is a systematic approach to solving problems.
D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Interdisciplinary Connections:	
English Language Arts:	
RF.K.4	Read emergent-reader texts with purpose and understanding.
W.K.2	Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
SL.K.1	Participate in collaborative conversations with diverse partners about *kindergarten topics and texts* with peers and adults in small and larger groups.

<table>
<tr><th colspan="2">NJSLS Unpacked Standards:</th></tr>
<tr><td>K.CC.3</td><td>Write numbers from 0-20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects)</td></tr>
<tr><td colspan="2">

Write the numerals 0-20
Use the written numerals 0-20 to represent the amount within a set.
<u>Example:</u> if the student has counted 9 objects, then the written numeral “9” is recorded.
Students can record the quantity of a set by selecting a number card/tile (numeral recognition) or writing the numeral.
Students can also create a set of objects based on the numeral presented.
<u>Example:</u> if a student picks up the number card “13”, the student then creates a pile of 13 counters. While children may experiment with writing numbers beyond 20, this standard places emphasis on numbers 0-20.
Students should practice writing numerals with different kinesthetic modalities, such as sand or rice before they begin to write numbers on paper.

</td></tr>
<tr><td>K.CC.4a

K.CC.4b

K.CC.4c</td><td>When counting objects, say the number of names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.

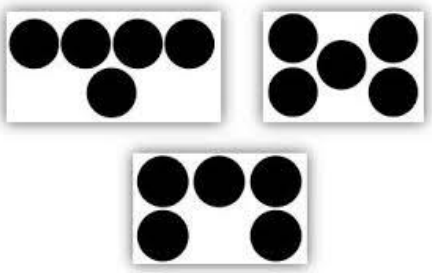
Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.

Understand that each successive number name refers to a quantity that is one larger.</td></tr>
<tr><td colspan="2">

Implement correct counting procedures by pointing to one object at a time (one-to-one correspondence)
Use one counting word for every object (synchrony/ one-to-one tagging)
Keep track of objects that have and have not been counted. This is the foundation of counting.

</td></tr>
</table>

- Answer the question "How many are there?" by counting objects in a set and understanding that the last number stated when counting a set (...8, 9, 10) represents the total amount of objects:
  Example: "There are 10 bears in this pile." (Cardinality)
- Understanding that numbers build by exactly one each time and that they nest within each other by this amount.
  Example: A set of three objects is nested within a set of 4 objects; within this same set of 4 objects is also a set of two objects and a set of one. Using this understanding, if a student has four objects and wants to have 5 objects, the student is able to add one more- knowing that four is within, or a sub-part of 5 (rather than removing all 4 objects and starting over to make a new set of 5).
- Students are asked to understand this concept with and without (0-20) objects.
  Example: After counting a set of 8 objects, students answer the question, "How many would there be if we added one more object?"; and answer a similar question when not using objects, by asking hypothetically, "What if we have 5 cubes and added one more. How many cubes would there be then?"
- Use five frames/ number paths to model linear representations of objects to help students begin to see patterns that make 5 with a variety of objects, such as buttons, counters, shells, coins, and dot cards. As students are ready, extend this work to 10 using the ten frame.

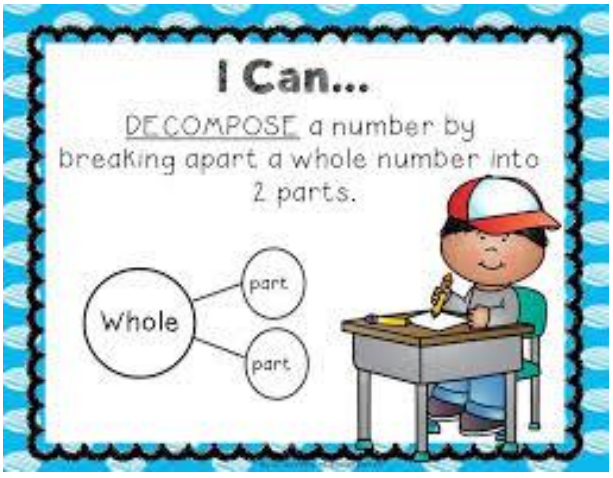
K.CC.5	Count to tell the number of objects. count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects. 

- In order to answer "how many?" students need to keep track of objects when counting
- After numerous experiences with counting objects, along with the developmental understanding that a group of objects counted multiple times will remain the same amount, students recognize the need for keeping track in order to accurately determine "how many?"
- Depending on the amount of objects to be counted, and the students' confidence with counting a set of objects, students may move the objects as they count each, point to each object as counted, look without touching when counting, or use a combination of these strategies. It is important that children develop a strategy that makes sense to them based on the realization that keeping track is important in order to get an accurate count, as opposed to following a rule, such as "Line them all up before you count", in order to get the right answer.
- Some arrangements, such as a line or rectangular array, are easier for them to get the correct answer but may limit their flexibility with developing meaningful tracking strategies.
- Providing multiple arrangements help children learn how to keep track. Since scattered arrangements are the most challenging for students, this standard specifies that students only count up to 10 objects in a scattered arrangement and count up to 20 objects in a line, rectangular array, or circle.

- Provide a variety of concrete experiences before students draw pictures.
- Students should count out a number of items using a variety of concrete objects, match numeral card with the number of items in a set, and count the number of items from a collection of items when given a written numeral.

K.MD.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

- Students identify similarities and differences between objects (e.g., size, color, shape) and use the identified attributes to sort a collection of objects. Once the objects are sorted, the student counts the amount in each set. Once each set is counted, then the student is asked to sort (or group) each of the sets by the amount in each set. Thus, like amounts are grouped together, but not necessarily ordered.
- When exploring a collection of buttons:
  * First, the student separates the buttons into different piles based on color (all the blue buttons are in one pile, all the orange buttons are in a different pile, etc.).
  *Then the student counts the number of buttons in each pile: blue (5), green (4), orange (3), and purple (4).
  *Finally, the student organizes the groups by the quantity. "I put the purple buttons next to the green buttons because purple also had (4). Blue has 5 and orange has 3. There aren't any other colors that have 5 or 3. So they are sitting by themselves."
- Ensure students have opportunities to explain how the objects are sorted into groups and how they categorized or labeled each set.
- This objective helps to build a foundation for data collection in future grades as they create and analyze various graphical representations.

K.OA.A 3	Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equations. 

- Use concrete objects to show different ways that a given number can be broken into two sets in multiple ways. Provide a variety of materials for students to use in showing their thinking such as linking cubes, square tiles, five and ten frames, and two-color counters.
- Students develop an understanding of part-whole relationships as they recognize that a set of ob-

jects (5) can be broken into smaller sub-sets (3 and 2) and still remain the total amount (5). In addition, this objective asks students to realize that a set of objects (5) can be broken in multiple ways (3 and 2; 4 and 1). Thus, when breaking apart a set (decompose), students use the understanding that a smaller set of objects exists within that larger set (inclusion).

Example: "Bobby Bear is missing 5 buttons on his jacket. How many ways can you use blue and red buttons to finish his jacket? Draw a picture of all your ideas.

Students could draw pictures of: 4 blue and 1 red button 3 blue and 2 red buttons 2 blue and 3 red buttons 1 blue and 4 red buttons

- In Kindergarten, students need ample experiences breaking apart numbers and using the vocabulary "and" & "same amount as" before symbols (+, =) and equations (5= 3 + 2) are introduced. If equations are used, a mathematical representation (picture, objects) needs to be present as well

M : Major Content S: Supporting Content A : Additional Content

Module 1 Assessment Framework			
Assessment	**NJSLS**	**Estimated Time**	**Format**
Diagnostic Assessment 1 (iReady)		1-2 blocks	Individual
Optional Mid –Module Assessment (Interview Style)	K.CC.3-5 KOA3 KMD3	1 Block	Individual or Small Group with Teacher
Optional End-of- Module Assessment (Interview Style)	K.CC.3-5 KOA3 KMD3	1 Block	Individual or Small Group with Teacher
K Interim Assessment 1 *(Early November)*	K.CC.3-5 K.OA.3	½ block	Individual or Small Group with Teacher

Module 1 Performance Assessment/ PBL Framework			
Assessment	**NJSLS**	**Estimated Time**	**Format**
Module 1 Performance Task 1 *Finding Equal Groups*	K.CC.5	Up to 30 minutes	Individual or Small Group
Extended Constructed Response (ECR)* (click here for access)	Dependent on unit of study & month of administration	Up to 30 Minutes	Individual

*Use the following links to access ECR protocol and district assessment scoring documents:

- Assessment and Data in Mathematics Bulletin
- ECR Protocol

Kindergarten Ideal Math Block

Fluency: Whole Group
Sprints, Counting, Whiteboard Exchange

Application Problem: Whole Group
Provides HANDS-ON work to allow children to ACT OUT or ENGAGE ACTIVELY with the new MATH IDEA
Technology Integration: https://embarc.online/
*Website provides Goggle slides, additional activities, and student videos per lesson

Concept Development: Individual/partner/whole
Instruction & Strategic Problem Set Questions
Technology Integration: https://embarc.online/
Website provides Goggle slides, additional activities, and student videos. per lesson

Student Debrief: Whole Group
Exit Ticket: Independent

50-60 min.

CENTERS/STATIONS:
Pairs / Small Group/ Individual
DIFFERENTIATED activities designed to **RETEACH, REMEDIATE, ENRICH** student's understanding of concepts.

M:	A:	T:	H:
Meet with the teacher https://teacher-toolbox.com/	**Application/ Problem Solving**	**Technology Resources I-ready Zearn**	**Hands on Activities**

20-30 min.

Eureka Lesson Structure:

Fluency:

- Sprints
- Whiteboard Exchange

Technology Integration:

Splat Sequences

Which one doesn't belong?

Would you rather?

Esti- Mysteries

Application Problem/ Anchor Task:

- Engage students in using the RDW Process
- Sequence problems from simple to complex and adjust based on students' responses
- Facilitate share and critique of various explanations, representations, and/or examples.

Concept Development: (largest chunk of time)

Instruction:

- Maintain overall alignment with the objectives and suggested pacing and structure.
- Use of tools, precise mathematical language, and/or models
- Balance teacher talk with opportunities for peer share and/or collaboration
- Generate next steps by watching and listening for understanding

Problem Set: (Individual, partner, or group)

- Allow for independent practice and productive struggle
- Assign problems strategically to differentiate practice as needed
- Create and assign remedial sequences as needed

Technology Integration:

https://embarc.online/

- A collaborative community of Eureka Math users
- Common website to support all users of the Eureka Math curriculum that provides games, slides, fluency activities, student videos, and templates for students and teachers

Virtual Manipulatives for lessons

http://nlvm.usu.edu/en/nav/vlibrary.html

For videos that students can watch and interact with independently click here

Student Debrief:

- Elicit students thinking, prompt reflection, and promote metacognition through student centered discussion
- Culminate with students' verbal articulation of their learning for the day
- Close with completion of the daily Exit Ticket (opportunity for informal assessment that guides effective preparation of subsequent lessons) as needed.

Centers:

- I-Ready: https://login.i-ready.com/ *i-Ready* makes the promise of differentiated instruction a practical reality for teachers and students. It was designed to get students excited about learning and to support teachers in the challenge of meeting the needs of all learners. Through the power of one intuitive system whose pieces were built from the ground up to work together, teachers have the tools they need to ensure students are on the road to proficiency.
- Zearn: https://www.zearn.org/ **Zearn** Math is a K-5 math curriculum based on Eureka Math with top-rated materials for teacher-led and digital instruction.
- Teacher Toolbox; https://teacher-toolbox.com/ A digital collection of K-8 resources to help you differentiate instruction to students performing on, below, and above grade level.

NJSLA Assessment Evidence/Clarification Statements			
NJSLS	**Evidence Statement**	**Clarification**	**Math Practices**
K.CC.B.5	Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.	i) Tasks may have a context. ii) Tasks should include a range of counting exercises to answer "how many" objects in different arrangements progressing to the more difficult action of counting out a given number of objects. iii) Interviews (individual or small group) should target students' abilities to meet this evidence statement.	MP.7

Number Talks

What does Number Talks look like?

- Students are near each other so they can communicate with each other (central meeting place)
- Students are mentally solving problems
- Students are given thinking time
- Thumbs up show when they are ready
- Teacher is recording students' thinking

Communication

- Having to talk out loud about a problem helps students clarify their own thinking
- Allow students to listen to other's strategies and value other's thinking
- Gives the teacher the opportunity to hear student's thinking

Mental Math

- When you are solving a problem mentally you must rely on what you know and understand about the numbers instead of memorized procedures
- You must be efficient when computing mentally because you can hold a lot of quantities in your head

Thumbs Up

- This is just a signal to let you know that you have given your students enough time to think about the problem
- If will give you a picture of who is able to compute mentally and who is struggling
- It isn't as distracting as a waving hand

Teacher as Recorder

- Allows you to record students' thinking in the correct notation
- Provides a visual to look at and refer back to
- Allows you to keep a record of the problems posed and which students offered specific strategies

Purposeful Problems

- Start with small numbers so the students can learn to focus on the strategies instead of getting lost in the numbers
- Use a number string (a string of problems that are related to and scaffold each other)

Starting Number Talks in your Classroom

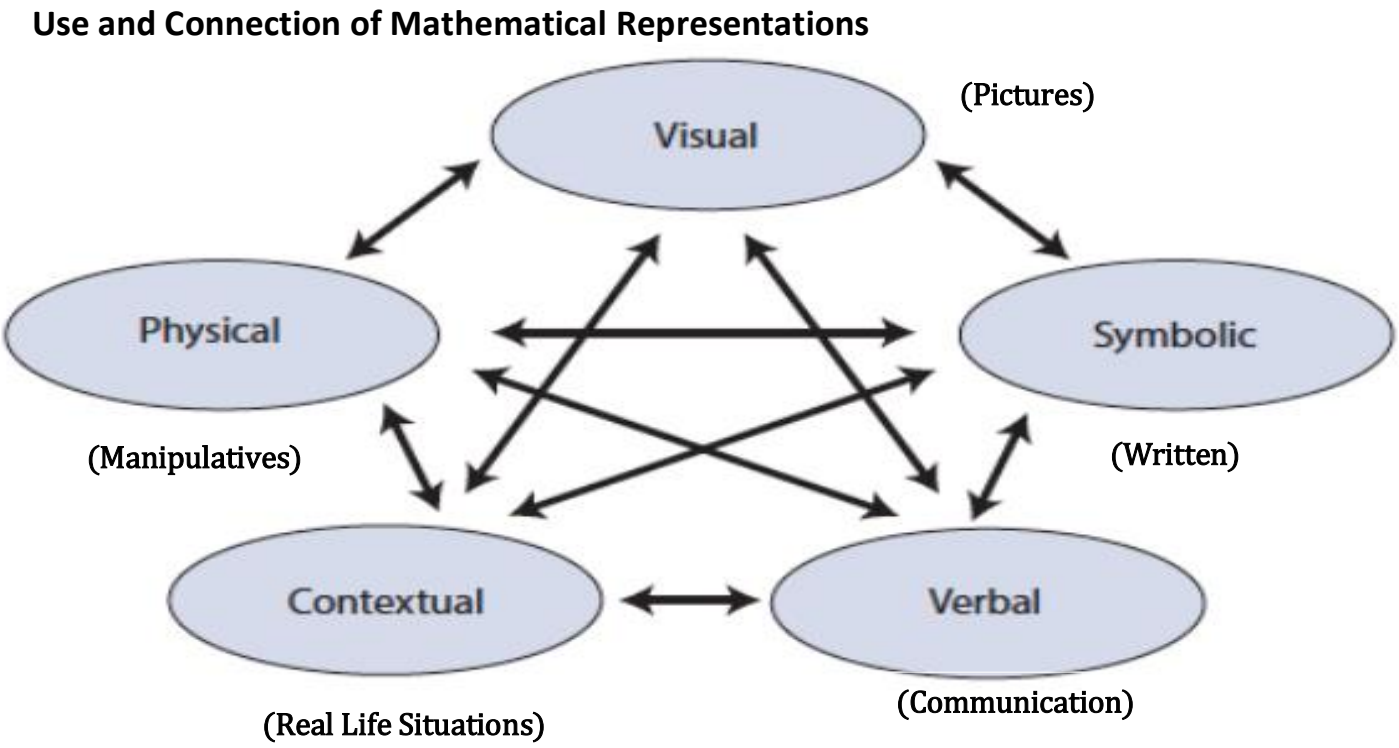
- Start with specific problems in mind
- Be prepared to offer a strategy from a previous student
- It is ok to put a student's strategy on the backburner
- Limit your number talks to about 15 minutes
- Ask a question, don't tell!

The teacher asks questions:

- Who would like to share their thinking?
- Who did it another way?
- How many people solved it the same way as Billy?
- Does anyone have any questions for Billy?
- Billy, can you tell us where you got that 5?
- How did you figure that out?

Student Name: _____ Task: _____ School: _____ Teacher: _____ Date: _____

"I CAN….."	STUDENT FRIENDLY RUBRIC				SCORE
	…a start 1	**…getting there 2**	**…that's it 3**	**WOW! 4**	
Understand	I need help.	I need some help.	I do not need help.	I can help a class-mate.	
Solve	I am unable to use a strategy.	I can start to use a strategy.	I can solve it more than one way.	I can use more than one strategy and talk about how they get to the same answer.	
Say or Write	I am unable to say or write.	I can write or say some of what I did.	I can write and talk about what I did. I can write or talk about why I did it.	I can write and say what I did and why I did it.	
Draw or Show	I am not able to draw or show my thinking.	I can draw, but not show my thinking; or I can show but not draw my thinking;	I can draw and show my thinking	I can draw, show and talk about my think-ing.	



The Lesh Translation Model

Each oval in the model corresponds to one way to represent a mathematical idea.

Visual: When children draw pictures, the teacher can learn more about what they understand about a particular mathematical idea and can use the different pictures that children create to provoke a discussion about mathematical ideas. Constructing their own pictures can be a powerful learning experience for children because they must consider several aspects of mathematical ideas that are often assumed when pictures are pre-drawn for students.

Physical: The manipulatives representation refers to the unifix cubes, base-ten blocks, fraction circles, and the like, that a child might use to solve a problem. Because children can physically manipulate these objects, when used appropriately, they provide opportunities to compare relative sizes of objects, to identify patterns, as well as to put together representations of numbers in multiple ways.

Verbal: Traditionally, teachers often used the spoken language of mathematics but rarely gave students opportunities to grapple with it. Yet, when students do have opportunities to express their mathematical reasoning aloud, they may be able to make explicit some knowledge that was previously implicit for them.

Symbolic: Written symbols refer to both the mathematical symbols and the written words that are associated with them. For students, written symbols tend to be more abstract than the other representations. I tend to introduce symbols after students have had opportunities to make connections among the other representations, so that the students have multiple ways to connect the symbols to mathematical ideas, thus increasing the likelihood that the symbols will be comprehensible to students.

Contextual: A relevant situation can be any context that involves appropriate mathematical ideas and holds interest for children; it is often, but not necessarily, connected to a real-life situation.

The Lesh Translation Model: Importance of Connections

As important as the ovals are in this model, another feature of the model is even more important than the representations themselves: The arrows! The arrows are important because they represent the connections students make between the representations. When students make these connections, they may be better able to access information about a mathematical idea, because they have multiple ways to represent it and, thus, many points of access.

Individuals enhance or modify their knowledge by building on what they already know, so the greater the number of representations with which students have opportunities to engage, the more likely the teacher is to tap into a student's prior knowledge. This "tapping in" can then be used to connect students' experiences to those representations that are more abstract in nature (such as written symbols). Not all students have the same set of prior experiences and knowledge. Teachers can introduce multiple representations in a meaningful way so that students' opportunities to grapple with mathematical ideas are greater than if their teachers used only one or two representations.

Concrete Pictorial Abstract (CPA) Instructional Approach

The CPA approach suggests that there are three steps necessary for pupils to develop understanding of a mathematical concept.

Concrete: "Doing Stage": Physical manipulation of objects to solve math problems.

Pictorial: "Seeing Stage": Use of imaged to represent objects when solving math problems.

Abstract: "Symbolic Stage": Use of only numbers and symbols to solve math problems.

CPA is a gradual systematic approach. Each stage builds on to the previous stage. Reinforcement of concepts are achieved by going back and forth between these representations and making connections between stages. Students will benefit from seeing parallel samples of each stage and how they transition from one to another.

Read, Draw, Write Process

READ the problem. Read it over and over…. And then read it again.
DRAW a picture that represents the information given. During this step students ask themselves: Can I draw something from this information? What can I draw? What is the best model to show the information? What conclusions can I make from the drawing?
WRITE your conclusions based on the drawings. This can be in the form of a number sentence, an equation, or a statement.

Students are able to draw a model of what they are reading to help them understand the problem. Drawing a model helps students see which operation or operations are needed, what patterns might arise, and which models work and do not work. Students must dive deeper into the problem by drawing models and determining which models are appropriate for the situation.

While students are employing the RDW process they are using several Standards for Mathematical Practice and in some cases, all of them.

Mathematical Discourse and Strategic Questioning

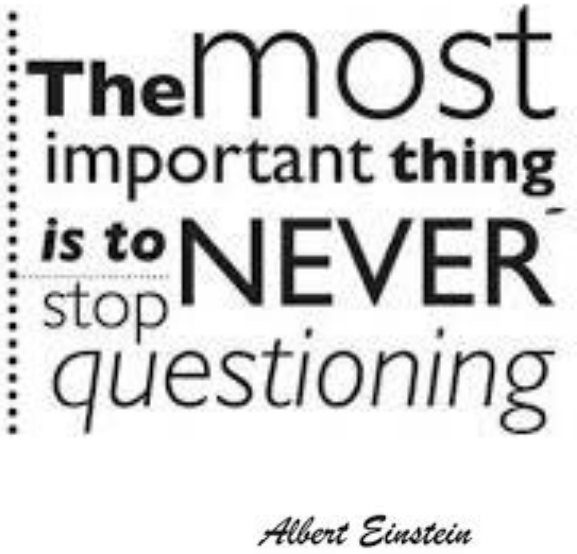
Discourse involves asking strategic questions that elicit from students their understanding of the context and actions taking place in a problem, how a problem is solved and why a particular method was chosen. Students learn to critique their own and others' ideas and seek out efficient mathematical solutions.

While classroom discussions are nothing new, the theory behind classroom discourse stems from constructivist views of learning where knowledge is created internally through interaction with the environment. It also fits in with socio-cultural views on learning where students working together are able to reach new understandings that could not be achieved if they were working alone.

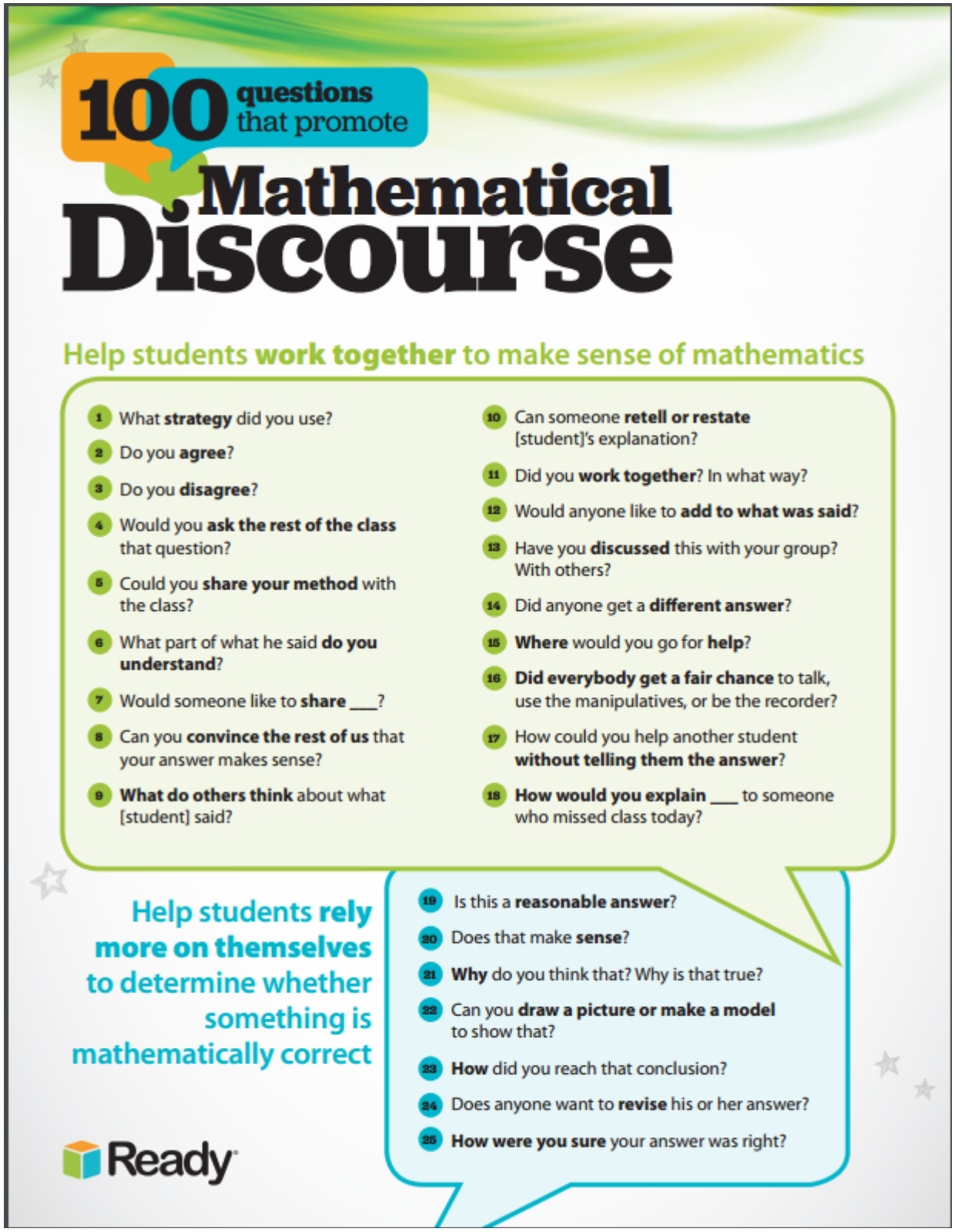
Underlying the use of discourse in the mathematics classroom is the idea that mathematics is primarily about reasoning not memorization. Mathematics is not about remembering and applying a set of procedures but about developing understanding and explaining the processes used to arrive at solutions.

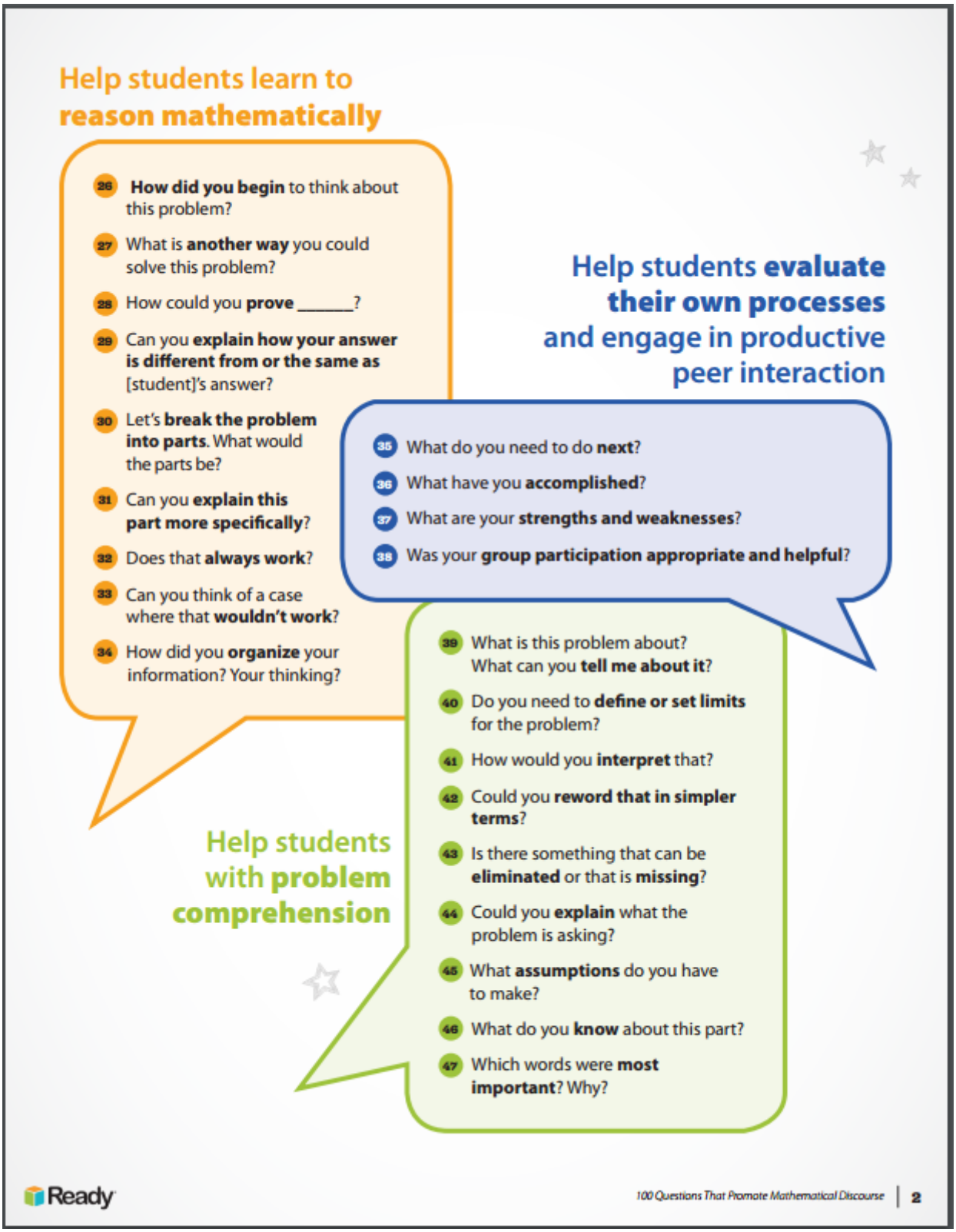
Teacher Questioning:

Asking better questions can open new doors for students, promoting mathematical thinking and classroom discourse. Can the questions you're asking in the mathematics classroom be answered with a simple “yes” or “no,” or do they invite students to deepen their understanding?



To help you encourage deeper discussions, here are 100 questions to incorporate into your instruction by Dr. Gladis Kersaint, mathematics expert and advisor for Ready Mathematics.



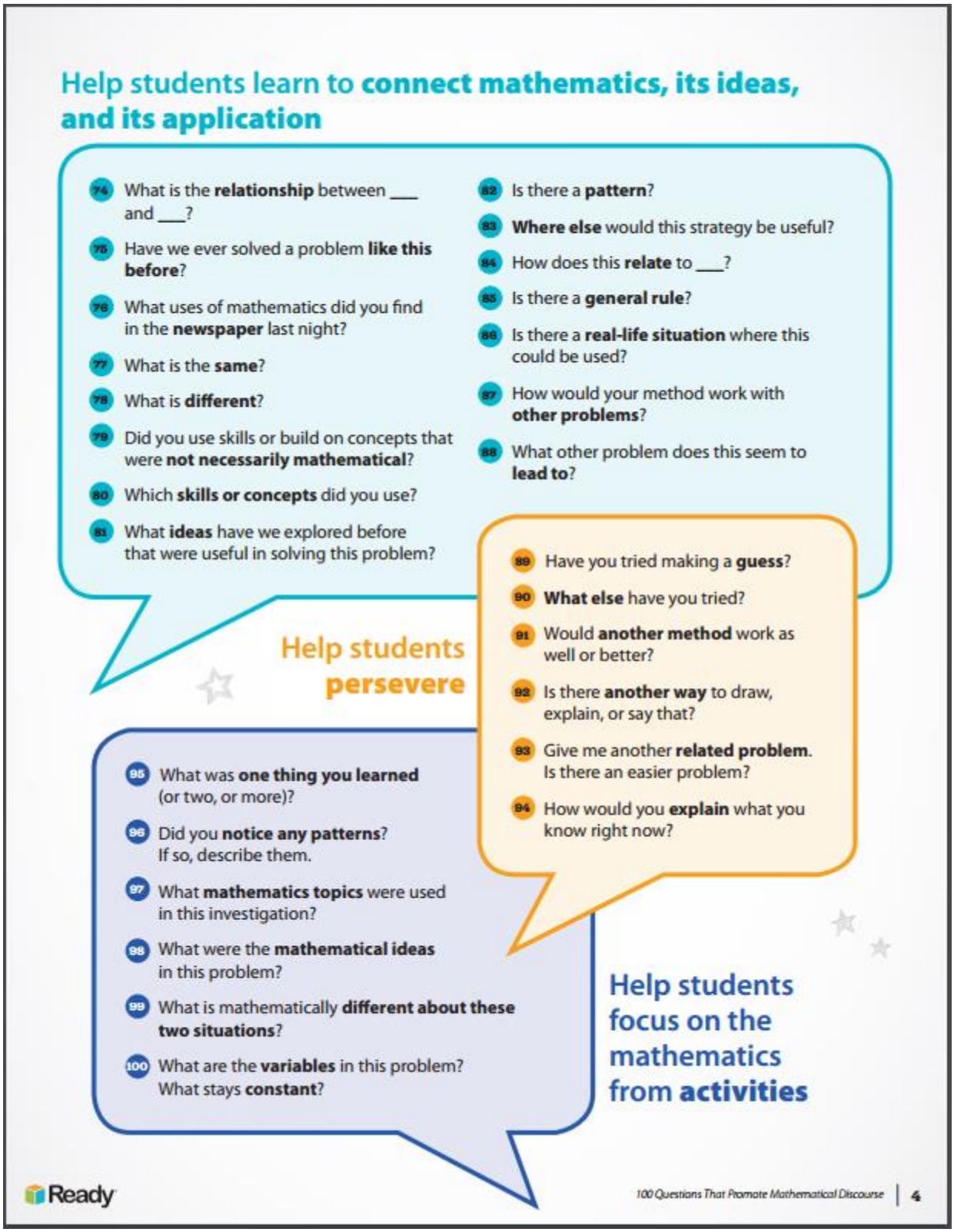

Help students learn to reason mathematically
26 How did you begin to think about this problem?
27 What is another way you could solve this problem?
28 How could you prove _____?
29 Can you explain how your answer is different from or the same as [student]'s answer?
30 Let's break the problem into parts. What would the parts be?
31 Can you explain this part more specifically?
32 Does that always work?
33 Can you think of a case where that wouldn't work?
34 How did you organize your information? Your thinking?
Help students evaluate their own processes and engage in productive peer interaction
35 What do you need to do next?
36 What have you accomplished?
37 What are your strengths and weaknesses?
38 Was your group participation appropriate and helpful?
Help students with problem comprehension
39 What is this problem about? What can you tell me about it?
40 Do you need to define or set limits for the problem?
41 How would you interpret that?
42 Could you reword that in simpler terms?
43 Is there something that can be eliminated or that is missing?
44 Could you explain what the problem is asking?
45 What assumptions do you have to make?
46 What do you know about this part?
47 Which words were most important? Why?
Ready
100 Questions That Promote Mathematical Discourse | 2

Help students learn to **conjecture, invent, and solve** problems

48. **What would happen if ___?**
49. Do you see a **pattern**?
50. What are some **possibilities** here?
51. Where could you find the **information** you need?
52. How would you **check your steps** or your answer?
53. What **did not work**?
54. How is your solution method the **same as or different from** [student]'s method?
55. Other than retracing your steps, **how can you determine** if your answers are appropriate?
56. How did you **organize** the information? Do you have a **record**?
57. How could you solve this using **tables, lists, pictures, diagrams**, etc.?
58. What have you tried? What **steps** did you take?
59. How would it look if you used this **model** or these **materials**?
60. How would you draw a **diagram or make a sketch** to solve the problem?
61. Is there **another possible answer**? If so, explain.
62. Is there **another way to solve** the problem?
63. Is there **another model** you could use to solve the problem?
64. Is there anything you've **overlooked**?
65. **How did you think** about the problem?
66. What was your **estimate or prediction**?
67. How **confident** are you in your answer?
68. **What else** would you like to know?
69. What do you think comes **next**?
70. Is the solution **reasonable**, considering the context?
71. Did you have a **system**? Explain it.
72. Did you have a **strategy**? Explain it.
73. Did you have a **design**? Explain it.

Ready

100 Questions That Promote Mathematical Discourse | 3


Help students learn to connect mathematics, its ideas, and its application
74 What is the relationship between ___ and ___?
75 Have we ever solved a problem like this before?
76 What uses of mathematics did you find in the newspaper last night?
77 What is the same?
78 What is different?
79 Did you use skills or build on concepts that were not necessarily mathematical?
80 Which skills or concepts did you use?
81 What ideas have we explored before that were useful in solving this problem?
82 Is there a pattern?
83 Where else would this strategy be useful?
84 How does this relate to ___?
85 Is there a general rule?
86 Is there a real-life situation where this could be used?
87 How would your method work with other problems?
88 What other problem does this seem to lead to?
Help students persevere
89 Have you tried making a guess?
90 What else have you tried?
91 Would another method work as well or better?
92 Is there another way to draw, explain, or say that?
93 Give me another related problem. Is there an easier problem?
94 How would you explain what you know right now?
95 What was one thing you learned (or two, or more)?
96 Did you notice any patterns? If so, describe them.
97 What mathematics topics were used in this investigation?
98 What were the mathematical ideas in this problem?
99 What is mathematically different about these two situations?
100 What are the variables in this problem? What stays constant?
Help students focus on the mathematics from activities
Ready
100 Questions That Promote Mathematical Discourse | 4

Conceptual Understanding

Students demonstrate conceptual understanding in mathematics when they provide evidence that they can:

- recognize, label, and generate examples of concepts;
- use and interrelate models, diagrams, manipulatives, and varied representations of concepts;
- identify and apply principles; know and apply facts and definitions;
- compare, contrast, and integrate related concepts and principles; and
- recognize, interpret, and apply the signs, symbols, and terms used to represent concepts.

Conceptual understanding reflects a student's ability to reason in settings involving the careful application of concept definitions, relations, or representations of either.

Procedural Fluency

Procedural fluency is the ability to:

- apply procedures accurately, efficiently, and flexibly;
- to transfer procedures to different problems and contexts;
- to build or modify procedures from other procedures; and
- to recognize when one strategy or procedure is more appropriate to apply than another.

Procedural fluency is more than memorizing facts or procedures, and it is more than understanding and being able to use one procedure for a given situation. Procedural fluency builds on a foundation of conceptual understanding, strategic reasoning, and problem solving (NGA Center & CCSSO, 2010; NCTM, 2000, 2014). Research suggests that once students have memorized and practiced procedures that they do not understand, they have less motivation to understand their meaning or the reasoning behind them (Hiebert, 1999). Therefore, the development of students' conceptual understanding of procedures should precede and coincide with instruction on procedures.

Math Fact Fluency: Automaticity

Students who possess math fact fluency can recall math facts with automaticity. Automaticity is the ability to do things without occupying the mind with the low-level details required, allowing it to become an automatic response pattern or habit. It is usually the result of learning, repetition, and practice.

K-2 Math Fact Fluency Expectation

K.OA.5 Add and Subtract within 5.
1.OA.6 Add and Subtract within 10.
2.OA.2 Add and Subtract within 20**.**

Math Fact Fluency: Fluent Use of Mathematical Strategies

First and second grade students are expected to solve addition and subtraction facts using a variety of strategies fluently.

1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as:

- counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14);
- decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9);
- using the relationship between addition and subtraction; and
- creating equivalent but easier or known sums.

2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on:

- place value,
- properties of operations, and/or
- the relationship between addition and subtraction;

Evidence of Student Thinking

Effective classroom instruction and more importantly, improving student performance, can be accomplished when educators know how to elicit evidence of students' understanding on a daily basis. Informal and formal methods of collecting evidence of student understanding enable educators to make positive instructional changes. An educators' ability to understand the processes that students use helps them to adapt instruction allowing for student exposure to a multitude of instructional approaches, resulting in higher achievement. By highlighting student thinking and misconceptions, and eliciting information from more students, all teachers can collect more representative evidence and can therefore better plan instruction based on the current understanding of the entire class.

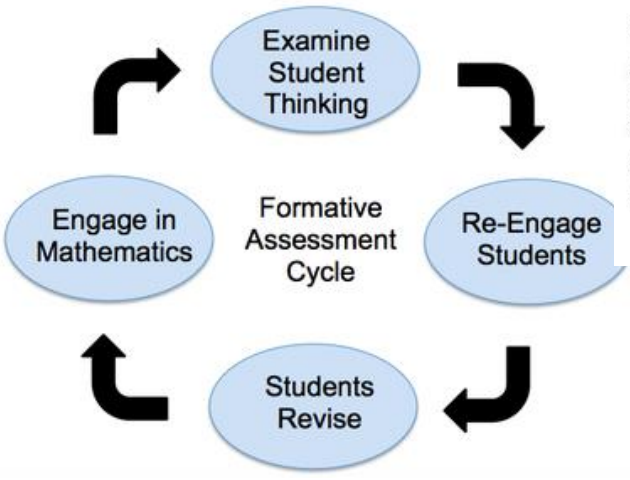
Mathematical Proficiency

To be mathematically proficient, a student must have:

- Conceptual understanding: comprehension of mathematical concepts, operations, and relations;
- Procedural fluency: skill in carrying out procedures flexibly, accurately, efficiently, and appropriately;
- Strategic competence: ability to formulate, represent, and solve mathematical problems;
- Adaptive reasoning: capacity for logical thought, reflection, explanation, and justification;
- Productive disposition: habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy.

Evidence should:

- Provide a window in student thinking;
- Help teachers to determine the extent to which students are reaching the math learning goals; and
- Be used to make instructional decisions during the lesson and to prepare for subsequent lessons.



Formative assessment is an essentially interactive process, in which the teacher can find out whether what has been taught has been learned, and if not, to do something about it. Day-to-day formative assessment is one of the most powerful ways of improving learning in the mathematics classroom.

(Wiliam 2007, pp. 1054; 1091)

Connections to the Mathematical Practices

Student Friendly Connections to the Mathematical Practices

1. I can solve problems without giving up.
2. I can think about numbers in many ways.
3. I can explain my thinking and try to understand others.
4. I can show my work in many ways.
5. I can use math tools and tell why I choose them.
6. I can work carefully and check my work.
7. I can use what I know to solve new problems.
8. I can discover and use short cuts.

ndards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their s

solved them. Students will begin to explain the meaning of a problem, and look for ways to solve it. Kindergarteners will learn how to use
king in small groups or with a partner they will listen to the strategies of the group and will try different approaches.

while solving tasks. This involves two processes- decontextualizing and contextualizing. In Kindergarten, students represent situations by d
ed up?" Kindergarten students are expected to translate that situation into the equation: 7-4 = ___, and then solve the task. Students also
r of children on the playground is the total number of students except for the 4 that are still playing. Abstract reasoning also occurs when

arguments and engage in discussions about problem solving strategies. For example, while solving the task, "There are 8 books on the sh
they subtracted 3 form 8 rather than adding 8 and 3. Further, Kindergarten students are expected to examine a variety of problem solving

umber sentence or an equation, and check to make sure that their equation accurately matches the problem context. Kindergarten stude

sk “there are 7 bananas on the counter. If you eat 3 bananas, how many are left?” Kindergarten students are expected to write the equati
= 9.

se tools may include counters, place value (base ten) blocks, hundreds number boards, number lines, and concrete geometric shapes (e.g
During classroom instruction, students should have access to various mathematical tools as well as paper, and determine which tools are
used specific mathematical tools.”

, and measurements. In all mathematical tasks, students in Kindergarten describe their actions and strategies clearly, using grade-level ap
eck to make sure that there are no gaps or overlaps. During tasks involving number sense, students check their work to ensure the accura

number system and other areas of mathematics. While solving addition problems, students begin to recognize the commutative property
. Further, Kindergarten students make use of structures of mathematical tasks when they begin to work with subtraction as missing adde

s when solving mathematical tasks. Likewise, students begin composing and decomposing numbers in different ways. For example, in the
4+4 = 8), 5 of one color and 3 of another (5+3 = 8), etc. For each solution, students repeated engage in the process of finding two number

Effective Mathematics Teaching Practices
Establish mathematics goals to focus learning. Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.
Implement tasks that promote reasoning and problem solving. Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.
Use and connect mathematical representations. Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.
Facilitate meaningful mathematical discourse. Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.
Pose purposeful questions. Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.
Build procedural fluency from conceptual understanding. Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.
Support productive struggle in learning mathematics. Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.
Elicit and use evidence of student thinking. Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

5 Practices for Orchestrating Productive Mathematics Discussions	
Practice	Description/ Questions
1. Anticipating	What strategies are students likely to use to approach or solve a challenging high-level mathematical task? How do you respond to the work that students are likely to produce? Which strategies from student work will be most useful in addressing the mathematical goals?
2. Monitoring	Paying attention to what and how students are thinking during the lesson. Students working in pairs or groups Listening to and making note of what students are discussing and the strategies they are using Asking students questions that will help them stay on track or help them think more deeply about the task. (Promote productive struggle)
3. Selecting	This is the process of deciding the *what* and the *who* to focus on during the discussion. Selection of children is guided by the mathematical goal for the lesson
4. Sequencing	What order will the solutions be shared with the class? Sequence depends largely on the teacher's goals for a lesson Maximizing the chances that math goals will be achieved
5. Connecting	Asking the questions that will make the mathematics explicit and understandable. Focus must be on mathematical meaning and relationships; making links between mathematical ideas and representations.

MATH CENTERS/ WORKSTATIONS

Math workstations allow students to engage in authentic and meaningful hands-on learning. They often last for several weeks, giving students time to reinforce or extend their prior instruction. Before students have an opportunity to use the materials in a station, introduce them to the whole class, several times. Once they have an understanding of the concept, the materials are then added to the work stations.

Station Organization and Management Sample

Teacher A has 12 containers labeled 1 to 12. The numbers correspond to the numbers on the rotation chart. She pairs students who can work well together, who have similar skills, and who need more practice on the same concepts or skills. Each day during math work stations, students use the center chart to see which box they will be using and who their partner will be. Everything they need for their station will be in their box. **Each station is differentiated**. If students need more practice and experience working on numbers 0 to 10, those will be the only numbers in their box. If they are ready to move on into the teens, then she will place higher number activities into the box for them to work with.

In the beginning there is a lot of prepping involved in gathering, creating, and organizing the work stations. However, once all of the initial work is complete, the stations are easy to manage. Many of her stations stay in rotation for three or four weeks to give students ample opportunity to master the skills and concepts.

Read *Math Work Stations* by Debbie Diller.
In her book, she leads you step-by-step through the process of implementing work stations.

MATH WORKSTATION INFORMATION CARD

Math Workstation: _____ **Time:** _____

NJSLS.:

_____

_____

_____

_____

Objective(s): By the end of this task, I will be able to:

- _____
- _____
- _____

Task(s):

- _____
- _____
- _____
- _____

Exit Ticket:

- _____
- _____
- _____

MATH WORKSTATION SCHEDULE

Week of: _____

DAY	Technology Lab	Problem Solving Lab	Fluency Lab	Math Journal	Small Group Instruction
Mon.	Group ____	Group ____	Group ____	Group ____	BASED ON CURRENT OBSERVATIONAL DATA
Tues.	Group ____	Group ____	Group ____	Group ____	
Wed.	Group ____	Group ____	Group ____	Group ____	
Thurs.	Group ____	Group ____	Group ____	Group ____	
Fri.	Group ____	Group ____	Group ____	Group ____	

INSTRUCTIONAL GROUPING

	GROUP A		GROUP B
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
	GROUP C		GROUP D
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	

Kindergarten PLD Rubric

Got It Evidence shows that the student essentially has the target concept or big math idea.		**Not There Yet** Student shows evidence of a major misunderstanding, incorrect concepts or procedure, or a failure to engage in the task.		
PLD Level 5: 100% **Distinguished command**	**PLD Level 4: 89%** **Strong Command**	**PLD Level 3: 79%** **Moderate Command**	**PLD Level 2: 69%** **Partial Command**	**PLD Level 1: 59%** **Little Command**

Student work shows **distinguished levels of understanding** of the mathematics.
 	
Student **constructs** and **communicates** a **complete response** based on explanations/reasoning using the:
• Tools:
  ○ Manipulatives
  ○ Five Frame
  ○ Ten Frame
  ○ Number Line
  ○ Part-Part-Whole Model
• Strategies:
  ○ Drawings
  ○ Counting All
  ○ Count On/Back
  ○ Skip Counting
  ○ Making Ten
  ○ Decomposing Number
• Precise use of math vocabulary
Response includes an **efficient and logical progression** of mathematical reasoning and understanding.
	Student work shows **strong levels of understanding** of the mathematics.
	
	Student **constructs** and **communicates** a **complete response** based on explanations/reasoning using the:
	• Tools:
	  ○ Manipulatives
	  ○ Five Frame
	  ○ Ten Frame
	  ○ Number Line
	  ○ Part-Part-Whole Model
	• Strategies:
	  ○ Drawings
	  ○ Counting All
	  ○ Count On/Back
	  ○ Skip Counting
	  ○ Making Ten
	  ○ Decomposing Number
	• Precise use of math vocabulary
	
	Response includes a **logical progression** of mathematical reasoning and understanding.
		Student work shows **moderate levels of understanding** of the mathematics.
		
		Student **constructs** and **communicates** a **complete response** based on explanations/reasoning using the:
		• Tools:
		  ○ Manipulatives
		  ○ Five Frame
		  ○ Ten Frame
		  ○ Number Line
		  ○ Part-Part-Whole Model
		• Strategies:
		  ○ Drawings
		  ○ Counting All
		  ○ Count On/Back
		  ○ Skip Counting
		  ○ Making Ten
		  ○ Decomposing Number
		• Precise use of math vocabulary
		
		Response includes a **logical but incomplete progression** of mathematical reasoning and understanding.
		Contains **minor errors**.
			Student work shows **partial understanding** of the mathematics.
			
			Student **constructs** and **communicates** an **incomplete response** based on student's attempts of explanations/ reasoning using the:
			• Tools:
			  ○ Manipulatives
			  ○ Five Frame
			  ○ Ten Frame
			  ○ Number Line
			  ○ Part-Part-Whole Model
			• Strategies:
			  ○ Drawings
			  ○ Counting All
			  ○ Count On/Back
			  ○ Skip Counting
			  ○ Making Ten
			  ○ Decomposing Number
			• Precise use of math vocabulary
			
			Response includes an **incomplete or illogical progression** of mathematical reasoning and understanding.
				Student work shows **little understanding** of the mathematics.
				
				Student **attempts** to **constructs** and **communicates** a response using the:
				• Tools:
				  ○ Manipulatives
				  ○ Five Frame
				  ○ Ten Frame
				  ○ Number Line
				  ○ Part-Part-Whole Model
				• Strategies:
				  ○ Drawings
				  ○ Counting All
				  ○ Count On/Back
				  ○ Skip Counting
				  ○ Making Ten
				  ○ Decomposing Number
				• Precise use of math vocabulary
				
				Response includes **limited evidence of the progression** of mathematical reasoning and understanding.

5 points	**4 points**	**3 points**	**2 points**	**1 point**

DATA DRIVEN INSTRUCTION

Formative assessments inform instructional decisions. Taking inventories and assessments, observing reading and writing behaviors, studying work samples and listening to student talk are essential components of gathering data. When we take notes, ask questions in a student conference, lean in while a student is working or utilize a more formal assessment we are gathering data. Learning how to take the data and record it in a meaningful way is the beginning of the cycle.

Analysis of the data is an important step in the process. What is this data telling us? We must look for patterns, as well as compare the notes we have taken with work samples and other assessments. We need to decide what are the strengths and needs of individuals, small groups of students and the entire class. Sometimes it helps to work with others at your grade level to analyze the data.

Once we have analyzed our data and created our findings, it is time to make informed instructional decisions. These decisions are guided by the following questions:

- What mathematical practice(s) and strategies will I utilize to teach to these needs?
- What sort of grouping will allow for the best opportunity for the students to learn what it is I see as a need?
- Will I teach these strategies to the whole class, in a small guided group or in an individual conference?
- Which method and grouping will be the most effective and efficient? What specific objective(s) will I be teaching?

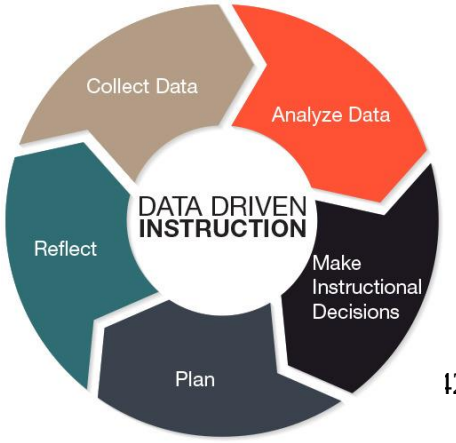
Answering these questions will help inform instructional decisions and will influence lesson planning.

Then we create our instructional plan for the unit/month/week/day and specific lessons.

It's important now to reflect on what you have taught.

Did you observe evidence of student learning through your checks for understanding, and through direct application in student work?

What did you hear and see students doing in their reading and writing?



Data Analysis Form **School**: _____ **Teacher**: _____ **Date**: _____
Assessment: _____ **NJSLS**: _____

GROUPS (STUDENT INITIALS)	SUPPORT PLAN	PROGRESS
MASTERED (86% - 100%) (PLD 4/5):		
DEVELOPING (67% - 85%) (PLD 3):		
INSECURE (51%-65%) (PLD 2):		
BEGINNING (0%-50%) (PLD 1):		

MATH PORTFOLIO EXPECTATIONS

The Student Assessment Portfolios for Mathematics are used as a means of documenting and evaluating students' academic growth and development over time and in relation to the NJSLS. The September task entry(-ies) should reflect the prior year content and *can serve* as an additional baseline measure.

All tasks contained within the **Student Assessment Portfolios** should be aligned to NJSLS and be "practice forward" (closely aligned to the Standards for Mathematical Practice).

Four (4) or more additional tasks will be included in the **Student Assessment Portfolios** for Student Reflection and will be labeled as such.

K-2 GENERAL PORTFOLIO EXPECTATIONS:

- Tasks contained within the Student Assessment Portfolios are "practice forward" and denoted as "Individual", "Partner/Group", and "Individual w/Opportunity for Student Interviews[1].
- Each Student Assessment Portfolio should contain a "Task Log" that documents all tasks, standards, and rubric scores aligned to the performance level descriptors (PLDs).
- Student work should be attached to a completed rubric; with appropriate teacher feedback on student work.
- Students will have multiple opportunities to revisit certain standards. Teachers will capture each additional opportunity "as a new and separate score" in the task log.
- A 2-pocket folder for each Student Assessment Portfolio is *recommended.*
- All Student Assessment Portfolio entries should be scored and recorded as an Authentic Assessment grade (25%)[2].
- All Student Assessment Portfolios must be clearly labeled, maintained for all students, inclusive of constructive teacher and student feedback and accessible for review.

GRADES K-2

Student Portfolio Review

Provide students the opportunity to review and evaluate their portfolio at various points throughout the year; celebrating their progress and possibly setting goals for future growth. During this process, students should retain ALL of their current artifacts in their Mathematics Portfolio.

Kindergarten Authentic Assessment #1 – Finding Equal Groups

Task

Material

- Assorted objects to create the groups
- Clear ziplock bags or small cups
- Index cards and stickers
- An egg timer or a kitchen timer

Action

The teacher will assemble a variety of groups of objects in a few different forms. For example the teacher might put together:

- an index card with 5 stickers
- a clear ziplock bag with 7 beans
- a cup filled with 4 pennies
- an index card with a 4 smiley faces drawn onto it
- a clear ziplock bag with 4 unifix cubes inside
- 5 crayons held together by a rubber band
- a picture of 7 fingers
- 5 small toy animals in a clear ziplock bag
- 7 erasers in a small cup
- a group of 4 pencils held together by a rubber band

The teacher will give students a timer, and the students will race against the clock to sort the groups of objects into three separate groups (grouped by quantity) by the time the timer is finished. This can be played individually or in pairs.

*Quantities of items in bags can be altered to include any quantities up to 10.

Commentary

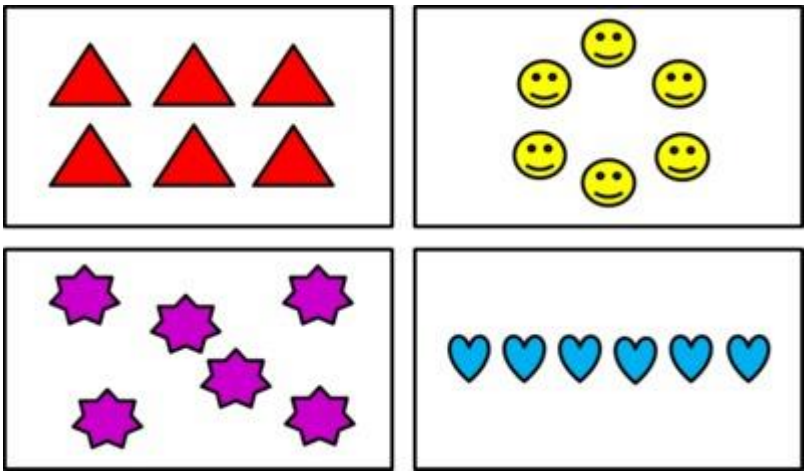
The purpose of this task is for students to build fluency in counting. Fluency is about being able to quickly and efficiently use the knowledge that is stored in one's brain. The timer is used so that students will use their most efficient counting strategies.

Prior to starting the activity, the teacher should tell students that since they will be timed, they should use their most efficient counting strategies. Before the task, a whole group discussion about how to go about counting several items may help to get the students in this mode as not all students will intuitively use the most efficient counting strategies unless prompted to do so. There should also be some time after the task where students share their counting strategies. The assumption is that those who used the most efficient counting strategies will be able to beat the clock. This can be further motivation for other students to use more efficient counting strategies. The teacher could also lead a discussion about why counting efficiently is helpful in students' lives. Students could brainstorm real life examples of when they might (or have) used efficient counting strategies.

This activity can be done without direct teacher supervision. It would be well suited to be implemented during math station time where an adult (teacher, parent, classroom aid) is in close proximity to provide corrective feedback but does not need to be led by the teacher. Additionally once the teacher has set this station up s/he can simply change the quantities in the groups and students can repeat the activity. The teacher can also increase the quantities as students' counting skills deepen.

Students should be instructed not to take the objects out of their bags, rubber bands or cups. They can count them bounded or bagged. If each group of objects is taken apart, it will make it very time consuming for the teacher to refresh the station for the next group of students!

Initially, the groups should primarily be physical objects, such a bag with 5 small animals. As students get more proficient with counting, they should count increasingly more abstract representations of groups of objects. For example, they might sort a set of index cards with stickers arranged in different configurations:



The teacher may need to experiment with how long to set the the egg timer and the quantities the students are working with. The list above should be given a two or three minute time limit but larger quantities will probably need more time.

K.CC.5: Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Student is able to only count and the match the quantity to other sets for all numbers given.	Student is able to only count and the match the quantity to other sets for 2 of the numbers given.	Student is able to only count and the match the quantity to other sets for one number.	Student is able to count but cannot match he quantity to another set with the same quantity.	Student is not able to correctly count items in the sets.

Core Instructional and Supplemental Materials (K-5)

EUREKA MATH V. 2019
(GREAT MINDS)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
K (v. 2019.)	• **Teacher Edition: Module 1-6** • Eureka Math Teacher Resource Pack • Eureka K-5 PD Toolkit	• Learn Workbook Set: Module 1-6 • Succeed Workbook Set: Module 1-6 • Practice Workbook, Fluency: Module 1-6
1	• **Teacher Edition: Module 1-6** • Eureka Math Teacher Resource Pack • Eureka K-5 PD Toolkit	• Learn Workbook Set: Module 1-6 • Succeed Workbook Set: Module 1-6 • Practice Workbook, Fluency: Module 1-6
2	• **Teacher Edition: Module 1-8** • Eureka Math Teacher Resource Pack • Eureka K-5 PD Toolkit	• Learn Workbook Set: Module 1-8 • Succeed Workbook Set: Module 1-8 • Practice Workbook, Fluency: Module 1-8
3		
4	• **Teacher Edition: Module 1-7** • Eureka Math Teacher Resource Pack • Eureka K-5 PD Toolkit	• Learn Workbook Set: Module 1-7 • Succeed Workbook Set: Module 1-7 • Practice Workbook, Fluency: Module 1-7
5	• **Teacher Edition: Module 1-7** • Eureka Math Teacher Resource Pack • Eureka K-5 PD Toolkit	• Learn Workbook Set: Module 1-7 • Succeed Workbook Set: Module 1-7 • Practice Workbook, Fluency: Module 1-7
	• **Teacher Edition: Module 1-6** • Eureka Math Teacher Resource Pack • Eureka K-5 PD Toolkit	• Learn Workbook Set: Module 1-6 • Succeed Workbook Set: Module 1-6 • Practice Workbook, Fluency: Module 1-6

MATH IN FOCUS v. 2015
(HOUGHTON MIFFLIN HARCOURT)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
K	• **Teacher Edition (A & B)** • Implementation Guide • Assessment Package • Enrichment Bundle • Extra Practice Set • Teacher and Student Activity Cards • Home -to- School Connection Book • Online Teacher Technology Kit • Big Book Set • Online Interactive Whiteboard Lessons	• Student Edition A – Pt. 1 • Student Edition A – Pt. 2 • Student Edition B – Pt. 1 • Student Edition B – Pt. 2 • Online Student Technology Kit
1	• **Teacher Edition (A & B)** • Implementation Guide • Assessment Package • Enrichment Bundle • Extra Practice Guide • Reteaching Guide • Home -to- School Connection Book • Online Teacher Technology Kit • Fact Fluency • Online Interactive Whiteboard Lessons	• Student Texts (A & B) • Student Workbooks • Online Student Technology Kit • Student Interactivities
2-5	• **Teacher Edition (A & B)** • Implementation Guide • Assessment Package • Enrichment Bundle • Extra Practice Guide • Transition Guides • Reteaching Guide • Home -to- School Connection Book • Online Teacher Technology Kit • Fact Fluency • Online Interactive Whiteboard Lessons	• Student Texts (A & B) • Student Workbooks • Online Student Technology Kit • Student Interactivities

Supplemental Resources

Number Book Assessment Link: http://investigations.terc.edu/

Model Curriculum- http://www.nj.gov/education/modelcurriculum/

Georgia Department of Education: Games to be played at centers with a partner or small group.
http://ccgpsmathematicsk-5.wikispaces.com/Kindergarten

Engage NY: *For additional resources to be used during centers or homework.
https://www.engageny.org/sites/default/files/resource/attachments/math-gk-m1-full-module.pdf

Add/ Subtract Situation Types: Darker Shading indicates Kindergarten expectations
https://achievethecore.org/content/upload/Add%20Subtract%20Situation%20Types.pdf

Math in Focus PD Videos: https://www-k6.thinkcentral.com/content/hsp/math/hspmath/common/mif_pd_vid/9780547760346_te/index.html

Number Talks activities: psassets.weebly.com/uploads/9/9/3/2/.../number_talks_kindergarten_resource.pdf

Suggested Literature

Fish Eyes by, Lois Ehlert

Ten Little Puppies by, Elena Vazquez

Zin! Zin! Zin! A Violin! by, Lloyd Moss

My Granny Went to the Market by, Stella Blackstone and Christopher Corr

Anno's Couting Book by, Mitsumasa Anno

Chicka, Chicka, 1,2,3 by, Bill Martin Jr.; Michael Sampson; Lois Ehlert

How Dinosaurs Count to 10 by Jane Yolen and Mark Teague

10 Little Rubber Ducks by Eric Carle

Ten Black Dots by Donald Crews

Mouse Count by Ellen Stoll Walsh

Count! by Denise Fleming