Kindergarten

2018-2019 Curriculum Guide

September 10- November 7, 2018

Math in Focus

Unit 1: *Numbers to 10*

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

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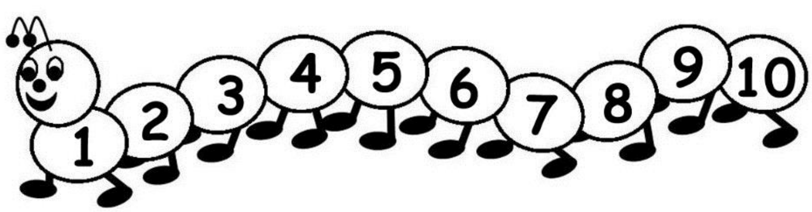
Unit 1 Overview: Chapters 1 & 2

- Students learn to read and write numerals 1 to 10.
- Students begin to address sameness and differences with attributes such as size, number, and color in which they sort items that are connected to numerals and quantities.
- Students will be able to match groups of objects without counting. (Subitizing)
- Students will be touching and counting objects in groups to be provided with a concrete introduction to the counting process. (one-to-one correspondence)
- Students will participate in various activities in which they can explore numerical values with manipulatives, pictures, tools, hands-on activities, and writing numerals with different mediums.
- Students will use the written numerals of 1 to 10 to represent the amount of objects in a set. Students should also create a set based on a numeral presented.
- Students keep track of objects when counting so that each item is counted only once.
- Use of part-part-whole mats, number bonds, ten frames, five frames, number lines¸ calendar, and hundred chart to count.
- Use of exploratory activities that allow students to "play" with the different measurable concepts, with objects that have those measurable attributes, such as a balance scale



Unit 1: Numbers to 10

Pacing:

September 10th- November 7th

Math in Focus: Chapter 1: Numbers to 5

Unit Pacing: September 10- October 5 Tasks Lessons 1.1-1.6	**Focus Standards:** K.CC.3, K.CC.4a, K.CC.4b, K.CC.4c, K.CC.5 **Additional Standards:** K.MD.1, K.MD.2, K.MD.3
Tasks: ***MIF Performance Tasks:*** Chapter 1 Student Pages Chapter 1 Teacher Pages ***Additional Tasks:*** Counting Overview Counting numbers from 0 - 5 or 5-10 Objects can be Sorted and Counted Connecting Numbers to Numerals Rote Counting to 10 The last Number Said Using a Counting Strip or Number Train	

Additional Skills, Strategies, and Concepts:

- *In order to understand that each successive number name refers to a quantity that is one larger, students should have experience counting objects, placing one more object in the group at a time. For example, using cubes, the student should count the existing group, and then place another cube in the set. Some students may need to re-count from one, but the goal is that they would count on from the existing number of cubes. S/he should continue placing one more cube at a time and identify the total number in order to see that the counting sequence results in a quantity that is one larger each time one more cube is placed in the group

- *Draw their own examples of sets and determine the size of each set.
- Incorporate a 5 frame and number line as students are working on counting and making sets up to 5.

	No- Mess Finger Painting: Fill sealable bags with just enough paint or hair gel to form an even layer when laid flat. Children use the bag like a piece of paper, drawing with their fingers or a q-tip to make strokes or numbers by displacing the paint or hair gel. Place the bag on a contrasting sheet of paper to achieve the most visible results. Then "erase" and start over.
	Shaving Cream Fun! Children use their fingers to form strokes or numbers in a small amount of shaving cream in a tray or even just on the table or dark piece of construction paper.

Counting Bead Strings

Math in Focus: Chapter 2: Numbers to 10

Unit Pacing: October 9- November 7 Tasks Lessons 2.1- 2.6	**Focus Standards:** K.CC.2, K.CC.3, K.CC.4a, K.CC.4b, K.CC.4c, K.CC.5, K.CC.6 **Additional Standards:** K.MD.1, K.MD.2

Tasks:

MIF Performance Tasks:

Chapter 2 Student Pages   Chapter 2 Teacher Pages

Additional Tasks:

Counting numbers from 0 - 5 or 5-10

Organizing a Collection

Connecting Numbers to Numerals

Racing Numerals

Connecting Counting to Cardinality

Counting Objects

Identifying Numerals

Additional Skills, Strategies, and Concepts:

- Students can draw their own examples of sets and determine the size of each set.
- Develop an understanding of inclusion based on understanding that numbers build on by exactly one each time and are nested inside of each other and that the number grows by one each count. For example, 6 is inside of 7 or 7 is 6 and one more. If you remove an object it goes back to 6.
- Incorporate a 10 frame and number line as students are working on counting and making sets up to 10.

Using a Counting Strip

Counting Mat

NJSLS Standards:

Unit 1: Chapters 1 & 2	
K.CC.2	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
- Students begin a rote forward counting sequence from a number other than 1. **Example:** given the number 4, the student would count, "4, 5, 6, 7 …" This objective does not require recognition of numerals. It is focused on the rote number sequence 0-100. - Students who struggle with developing the standard, particularly with numbers greater than 10, should master counting within a sequence before counting forward from a number in the sequence. - This is a prerequisite skill for counting on as students begin to work with addition.	
K.CC.3	Write numbers from 0-20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects)
- Write the numerals 0-20 - Use the written numerals 0-20 to represent the amount within a set. **Example:** 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. **Example:** 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.	

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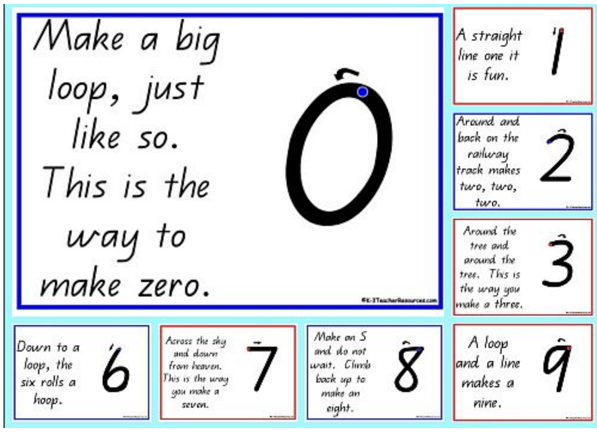
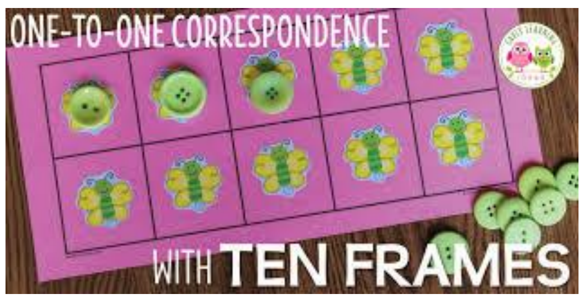
<tr><td colspan="2">
</td></tr>
<tr><td>K.CC.4a

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.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- 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.

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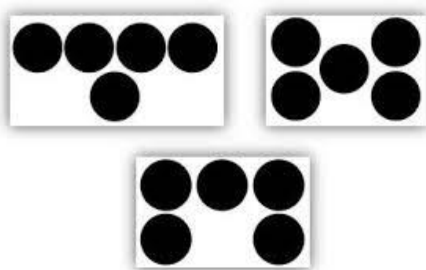
- Answer the question “How many are there?” by counting objects in a set and understanding that the last number stated when counting a set (…8, 9, 10) represents the total amount of objects:
  Example: “There are 10 bears in this pile.” (Cardinality)
- Understanding that numbers build by exactly one 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 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.CC.6	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g, by using matching and counting strategies.

- Develop comparison vocabulary first. (e.g, less than, more than, same as)
- It is helpful to begin with the comparison of two different items, so there is no confusion when students begin to compare.
- Include groups with up to 10 objects.
- There is a hierarchy of strategies involved in comparing (levels of development), but develop strategies that make sense to learners.

Given a set of 3 triangles and 2 circles

Matching: Line up the sets in each set using one-to-one correspondence. *Asking questions like “how do you know” starts to develop reasoning and mathematical arguments as indicated in the Mathematical Practices.*

Observation: I see that there are more triangles than circles. *When students use this strategy, it is important for them to explain how they “see” more triangles than circles.*

Take away or fair share: Each time I take a circle, you take a triangle. When all the circles are gone, there will still be triangles. *Follow up with questions such as, “Are there more triangles than circles? How do you know? What shape has more? “*

Compare counts: Students count the number in each group and compare the counts. *“There are 2 circles and 3 triangles, so there are fewer circles than triangles because 2 is less than 3.*

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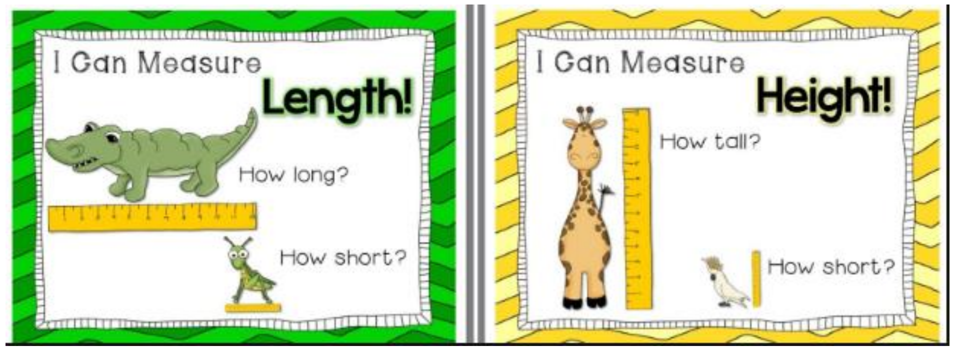
<tr><td>K.MD.1</td><td>Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

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- Students describe measurable attributes of objects, such as length, weight, size, and color.
Example: Student may describe a shoe with one attribute, “Look! My shoe is blue, too!”, or more than one attribute, “This shoe is heavy! It’s also really long.”
- Students often initially hold undifferentiated views of measurable attributes, saying that one object is “bigger” than another whether it is longer, or greater in area, or greater in volume, and so forth.
Example: Two students might both claim their block building is “the biggest.” Conversations about how they are comparing- one building may be taller (greater in length) and another may have a larger base (greater in area)- help students learn to discriminate and name these measureable attributes. As they discuss these situations and compare objects using different attributes, they learn to distinguish, label, and describe several measureable attributes of a single object.

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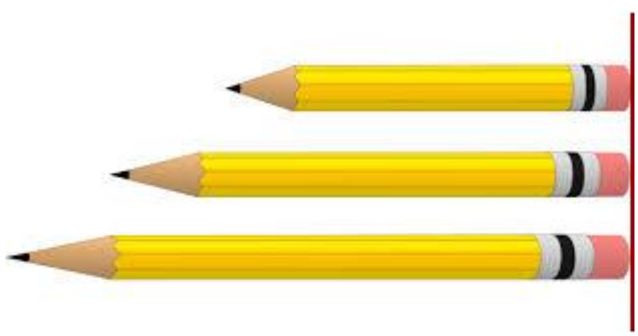
<tr><td>K.MD.2</td><td>Directly compare two objects with a measurable attribute in common, to see which object has ‘more of’/‘less of’ the attribute, and describe the difference.
</td></tr>
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- Direct comparisons are made when objects are put next to each other, such as two children, two books, two pencils. For example, a student may line up two blocks and say, “The black block is a lot longer than the white one.” Students are not comparing objects that cannot be moved and lined up next to each other.

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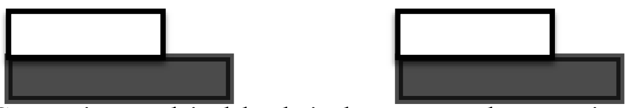
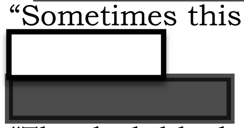
- Similar to the development of the understanding that keeping track is important to obtain an accurate count, kindergarten students need ample experiences with comparing objects in order to discover the importance of lining up the ends of objects in order to have an accurate measurement.

- As this concept develops, children move from the idea that “Sometimes this block is longer than this one and sometimes it’s shorter (depending on how I lay them side by side) and that’s okay.” to the understanding that “This block is always longer than this block (with each end lined up appropriately).” Since this understanding requires conservation of length, a developmental milestone for young children, kindergarteners need multiple experiences measuring a variety of items and discussing findings with one another.



“Sometimes this block is longer and sometimes it is shorter”



“The dark block is always longer than this block”

- Model vocabulary phrases or a summary utilizing the terms longer than and shorter than.

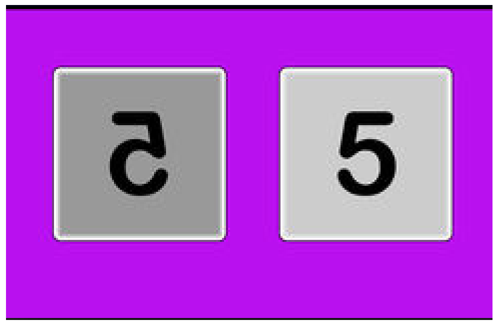
M : Major Content | S: Supporting Content | A : Additional Content

Math Background

- Children begin by touching, examining, and comparing objects to develop awareness of attributes, such as length, size, and weight.
- Using tools o measure length and weight connects the geometry of physical objects to numbers.
- As children learn and practice counting skills, they should be made aware of connections to other math topics.
- Counting can be used to compare and order numbers and quantities.
- Children need to understand that objects can be measured by various attributes.
- Children learn to count in increments, first to 5 or 10, and then 20. As they do, it is important to continue to develop one-to- one correspondence by pointing to each object and saying the number word.

Misconceptions

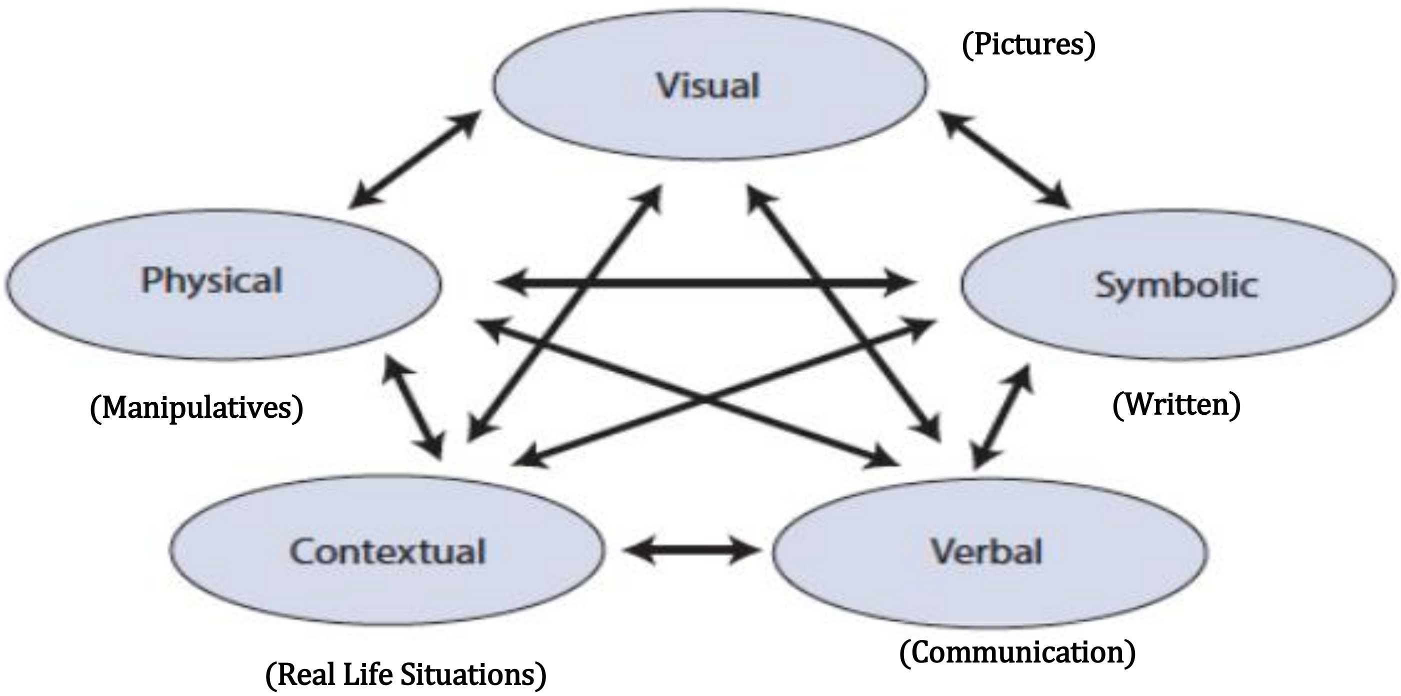
- Due to varied development of fine motor and visual development, reversal of numerals is anticipated. While reversals should be pointed out to students and correct formation modeled in instruction, the emphasis of this standard is on the use of numerals to represent quantities rather than the correct handwriting formation of the actual numeral itself.



- Watch for students who find it confusing to say one number name with one object as they count and those who double count an object. Physically moving the object and saying one number name for each object will help to reinforce this skill. Start by counting objects that are in a straight line and then move to organized representations and finally randomly arranged objects.
- Looking for a specific quantity when given a choice of collections has a lower level of cognitive demand than having to produce a set of objects given a number. This standard will take time and continuous experiences to develop.
- Students who have trouble with the vocabulary of comparisons need more opportunities to compare obvious amounts and practice with different ways to describe the comparisons.
- Students believe changing the arrangements of the counters changes the cardinality of the set.
- Students who have trouble with the vocabulary of comparison need more opportunities to compare obvious amounts and practice the different wasys to describe the comparison.

PARCC Evidence Statements			
CCSS	**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

Use and Connection of Mathematical Representations



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.

<u>Teacher Questioning:</u>

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.

100 questions that promote Mathematical Discourse

Help students **work together** to make sense of mathematics

1. What **strategy** did you use?
2. Do you **agree**?
3. Do you **disagree**?
4. Would you **ask the rest of the class** that question?
5. Could you **share your method** with the class?
6. What part of what he said **do you understand**?
7. Would someone like to **share** ___?
8. Can you **convince the rest of us** that your answer makes sense?
9. **What do others think** about what [student] said?
10. Can someone **retell or restate** [student]'s explanation?
11. Did you **work together**? In what way?
12. Would anyone like to **add to what was said**?
13. Have you **discussed** this with your group? With others?
14. Did anyone get a **different answer**?
15. **Where** would you go for **help**?
16. **Did everybody get a fair chance** to talk, use the manipulatives, or be the recorder?
17. How could you help another student **without telling them the answer**?
18. **How would you explain** ___ to someone who missed class today?

Help students **rely more on themselves** to determine whether something is mathematically correct

19. Is this a **reasonable answer**?
20. Does that make **sense**?
21. **Why** do you think that? Why is that true?
22. Can you **draw a picture or make a model** to show that?
23. **How** did you reach that conclusion?
24. Does anyone want to **revise** his or her answer?
25. **How were you sure** your answer was right?

Ready

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?

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.

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?

Help students focus on the mathematics from **activities**

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**?

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:

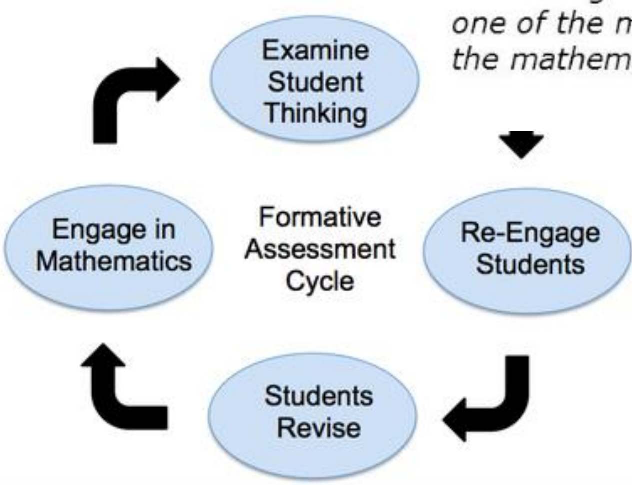
- Conceptual understanding: comprehension of mathematical concepts, operations, and relations;
- Procedural fluency: skill in carrying out procedures flexibly, accurately, efficiently, and appropriately;
- Strategic competence: ability to formulate, represent, and solve mathematical problems;
- Adaptive 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)



Unit 2 Assessment / Authentic Assessment Framework			
Assessment	**CCSS**	**Estimated Time**	**Format**
Chapter 3			
Optional Chapter 3 Test	K.MD.1-3	1 block	Individual
Chapter 4			
Optional Chapter 4 Test	K.CC.1-5 K.OA.1, 3	1 block	Individual
Chapter 5			
Optional Chapter 5 Test	K.CC.1-5 K.OA.1 K.MD.1-3		
Chapter 6			
Optional Chapter 6 Test	K.CC.1-2, 4-7		
Kindergarten Interim Interview Assessment 2	K.CC.1-6 K.MD.1-3 K. OA. 1,3-5 K.NBT.1	1 block	Individual or Small Group with Teacher

	PLD	**Genesis Conversion**
Rubric Scoring	PLD 5	100
	PLD 4	89
	PLD 3	79
	PLD 2	69
	PLD 1	59

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.

The **Standards for Mathematical Practice** describe varieties of expertise that mathematics educators at all levels should seek to	
1	**Make sense of problems and persevere in solving them** In Kindergarten, students learn that doing math involves solving problems and discussing how they solved them. Stud their thinking when the teacher asks them how they got their answer, and if the answer makes sense. When working i
2	**Reason abstractly and quantitatively** Mathematically proficient students in Kindergarten make sense of quantities and the relationships while solving tasks. In Kindergarten, students represent situations by decontextualizing tasks into numbers and symbols. For example, in t the equation: 7-4 = ___, and then solve the task. Students also contextualize situations during the problem solving process. For example, while solving the task above, s soning also occurs when students measure and compare the lengths of objects.
3	**Construct viable arguments and critique the reasoning of others** Mathematically proficient students in Kindergarten accurately use mathematical terms to construct arguments and en take off the shelf?” students will solve the task, and then be able to construct an accurate argument about why they sub ties and differences among them.

4	**Model with mathematics** Mathematically proficient students in Kindergarten model real-life mathematical situations with a number sentence or Kindergarten students rely on concrete manipulatives and pictorial representations while solving tasks, but the expect For example, while solving the task "there are 7 bananas on the counter. If you eat 3 bananas, how many are left?" Kind Likewise, Kindergarten students are expected to create an appropriate problem situation from an equation. For example, students are expected to orally tell a story problem for the equation 4+5 = 9.
5	**Use appropriate tools strategically** Mathematically proficient students in Kindergarten have access to and use tools appropriately. These tools may includ ogies, such as calculators, virtual manipulatives, and mathematical games that support conceptual understanding. During classroom instruction, students should have access to various mathematical tools as well as paper, and determi Kindergarten students are expected to explain why they used specific mathematical tools."
6	**Attend to precision** Mathematically proficient students in Kindergarten are precise in their communication, calculations, and measuremen garding their process of finding solutions. For example, while measuring objects iteratively (repetitively), students check to make sure that there are no gaps or
7	**Look for and make use of structure** Mathematically proficient students in Kindergarten carefully look for patterns and structures in the number system an While decomposing teen numbers, students realize that every number between 11 and 19, can be decomposed into 10

	Further, Kindergarten students make use of structures of mathematical tasks when they begin to work with subtractio
8	**Look for and express regularity in repeated reasoning** Mathematically proficient students in Kindergarten begin to look for regularity in problem structures when solving ma Likewise, students begin composing and decomposing numbers in different ways. For example, in the task “There are 8 crayons in the box. Some are red and some are blue. How many of each could the Kindergarten students are expected to realize that the 8 crayons could include 4 of each color (4+4 = 8), 5 of one colo For each solution, students repeated engage in the process of finding two numbers that can be joined to equal 8.

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.
4. Sequencing	What order will the solutions be shared with the class?
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.

Kindergarten Ideal Math Block

FLUENCY: Partner/Small Group
5 min.

CONCRETE, PICTORIAL, and **ABSTRACT** approaches to support **ARITHMETIC FLUENCY** and **FLUENT USE OF STRATEGIES.**

Getting Ready: Whole Group
Anchor Task: Math In Focus Learn

INVESTIGATE: Whole Group
Children are invited to sing, clap, rhyme, and discuss colorful, playful scenes presented in the **BIG BOOK** while the teacher **SYSTEMATICALLY EMPLOYS** and **ELICITS** related **MATH TALK**.

DISCOVER: Whole Group
Provides HANDS-ON work to allow children to ACT OUT or ENGAGE ACTIVELY with the new MATH IDEA

EXPLORE: Partner / Small Group
Math In Focus Hands-On, Guided Practice, Let's Explore

APPLY: INDEPENDENT PRACTICE
Math In Focus Let's Practice, Workbook, Reteach, Extra Practice, Enrichment

50-60 min.

CENTERS/STATIONS: Pairs / Small Group/ Individual
15-20 min.

DIFFERENTIATED activities designed to **RETEACH, REMEDIATE, ENRICH** student's understanding of concepts.

M:	**A:**	**T:**	**H:**
Meet with the teacher	**Application/ Problem Solving**	**Technology**	**Hands on Activities**

SUMMARY: Whole Group
Lesson Closure: Student Reflection; Real Life Connections to Concept

Note:

- Place emphasis on the flow of the lesson in order to ensure the development of students' conceptual understanding.
- Outline each essential component within lesson plans.
- Math Workstations may be conducted in the beginning of the block in order to utilize additional support staff.
- Recommended: 5-10 technology devices for use within **TECHNOLOGY** and **FLUENCY** workstations.

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?

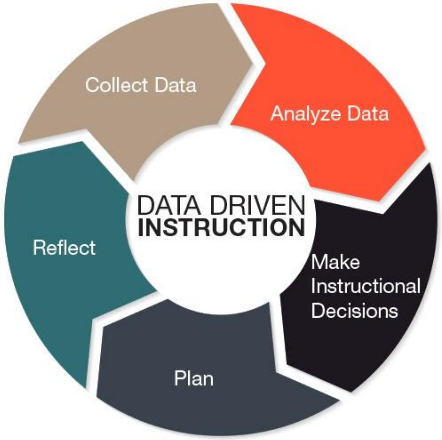
Answering these questions will help inform instructional decisions and will influence lesson planning.

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?



Now it is time to begin the analysis again.

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 CCSS-M. 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:

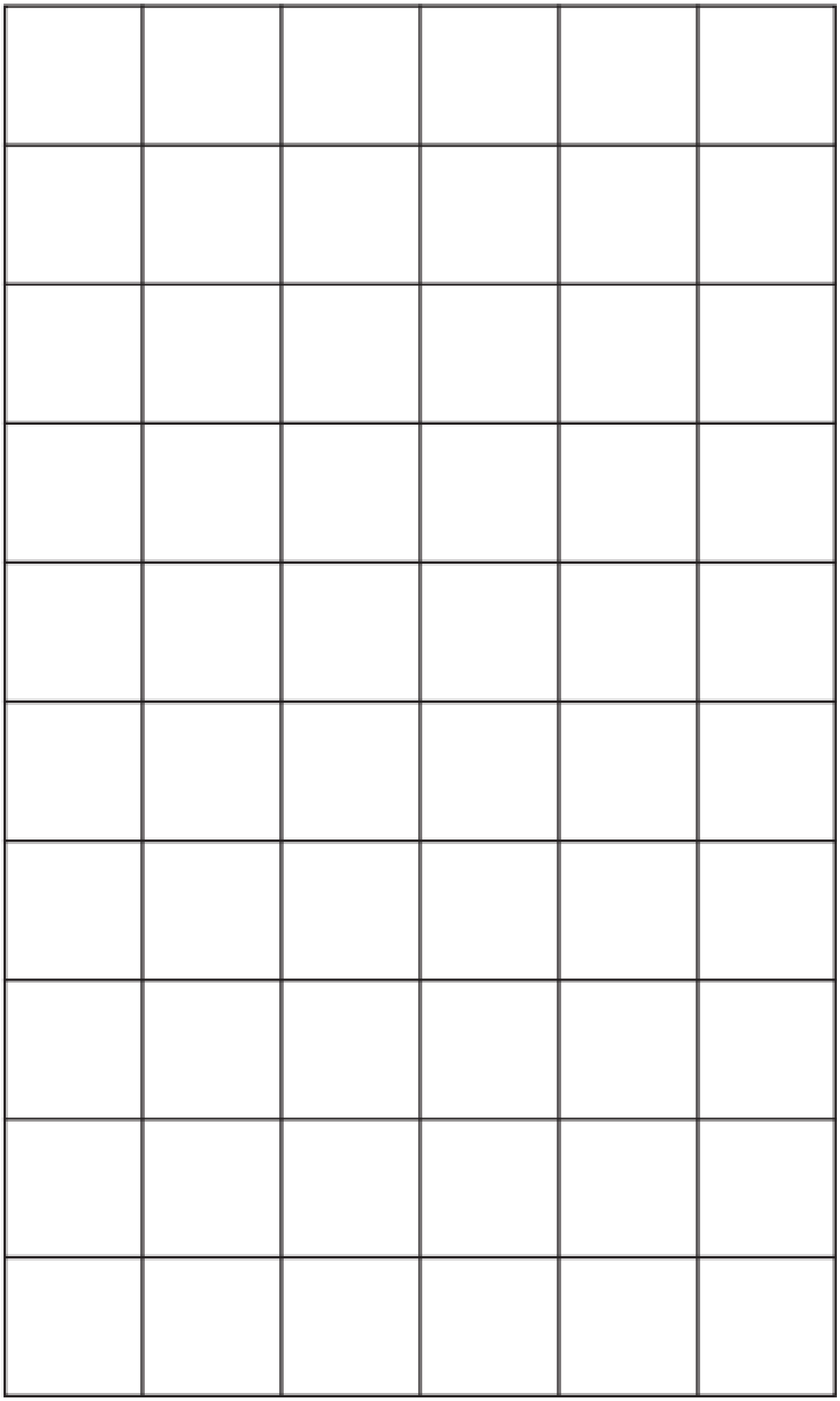
- Tasks contained within the Student Assessment Portfolios are "practice forward" and denoted as "Individual", "Partner/Group", and "Individual w/Opportunity for Student Interviews[1].
- Each Student Assessment Portfolio should contain a "Task Log" that documents all tasks, standards, and rubric scores 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

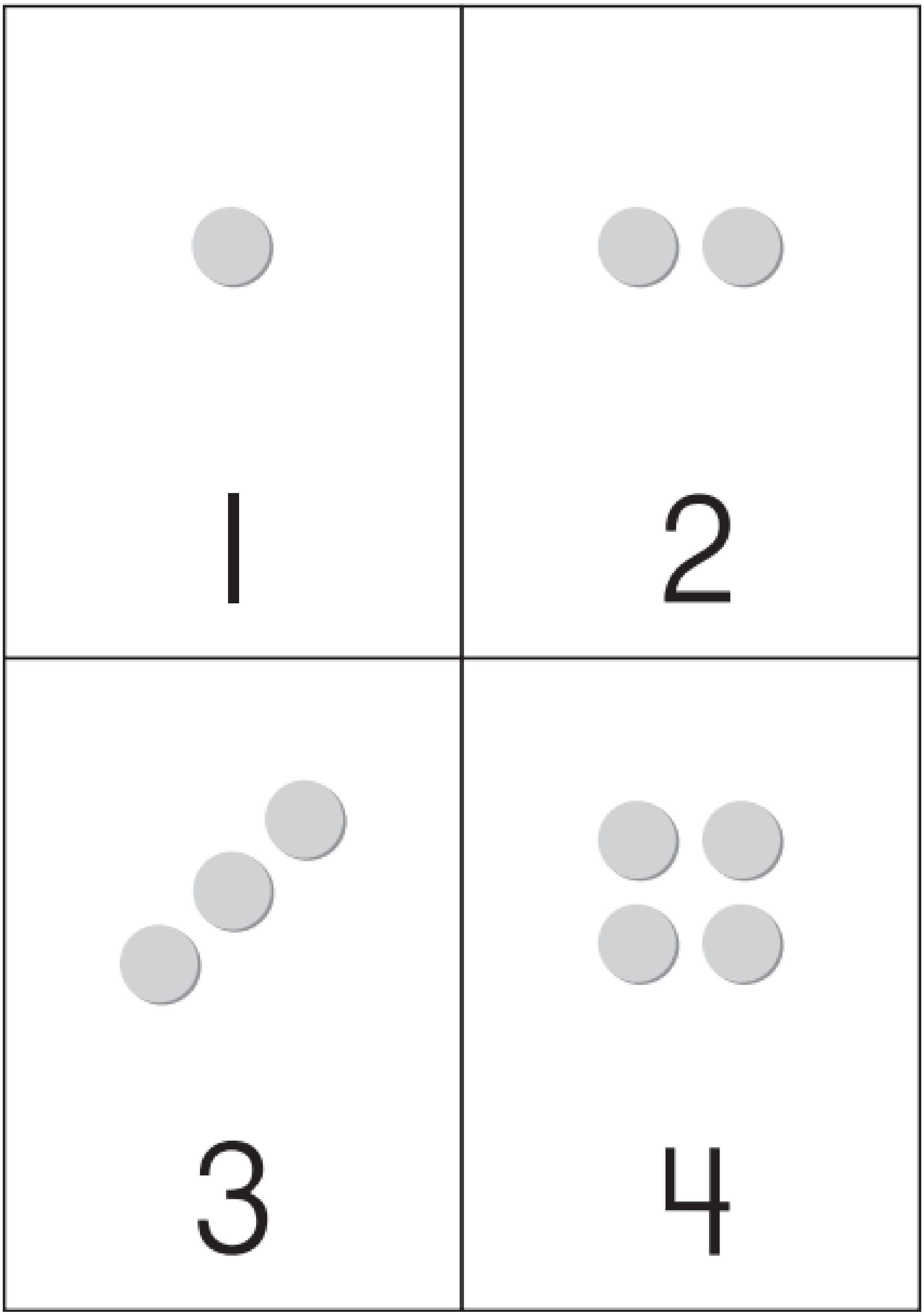
Student Portfolio Review

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 <u>should retain ALL of their current artifacts</u> in their Mathematics Portfolio.

Resources:



 TR1 1-Inch Grid Paper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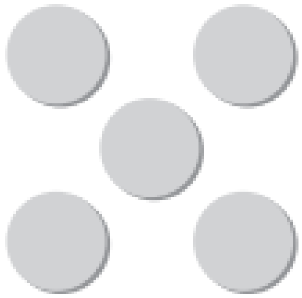

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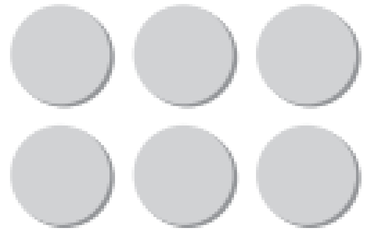

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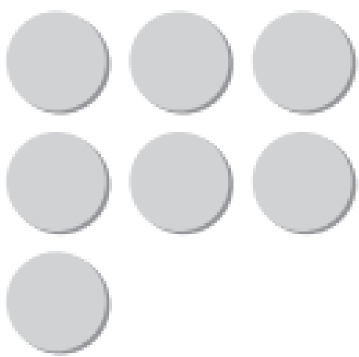

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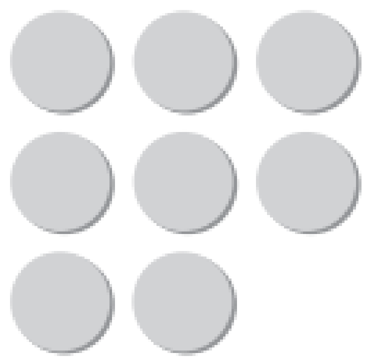

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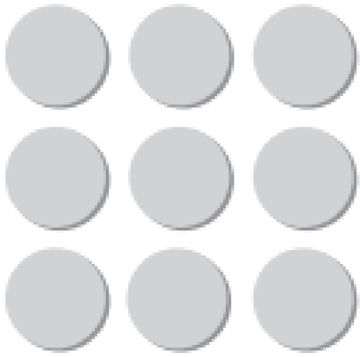

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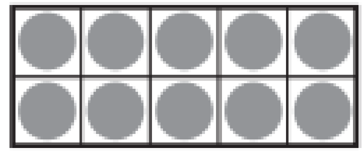

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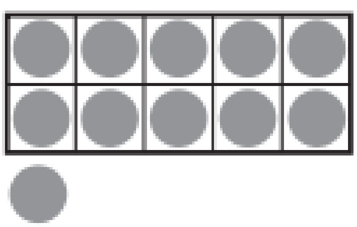

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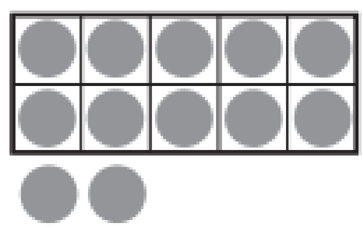

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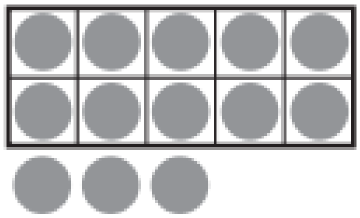

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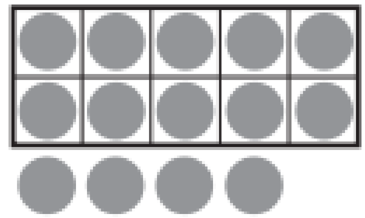

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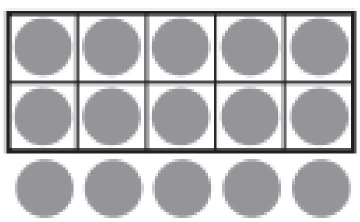

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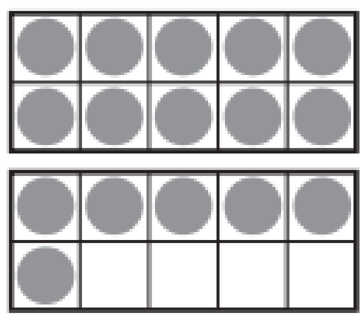

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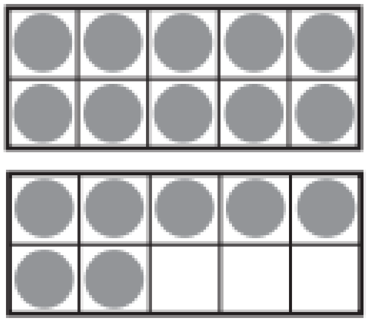

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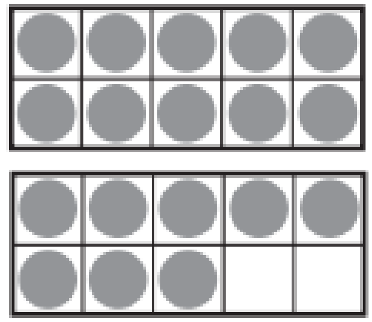

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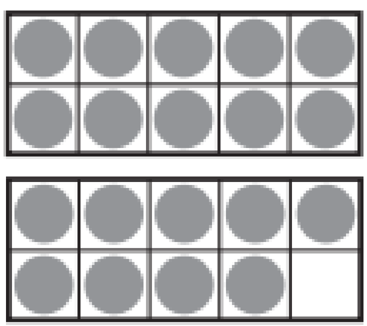

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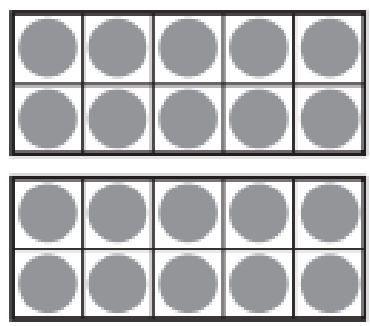

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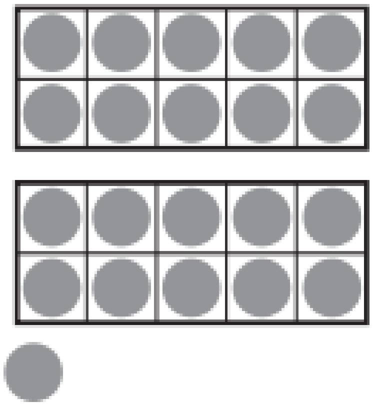

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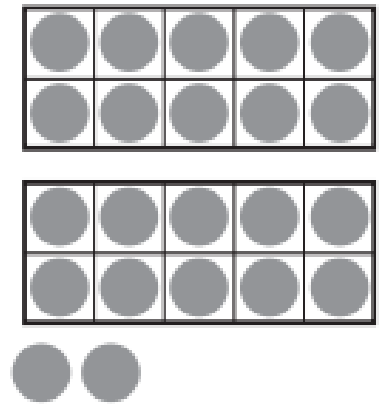

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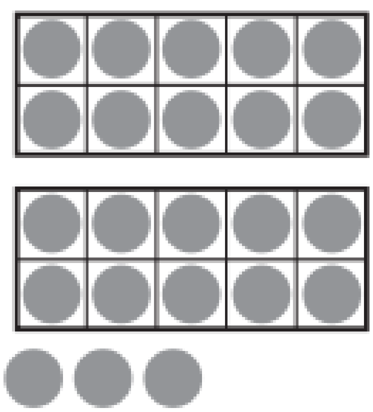

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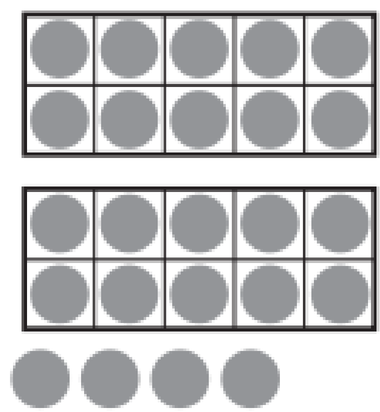

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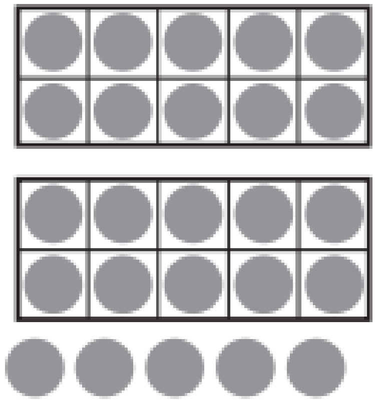

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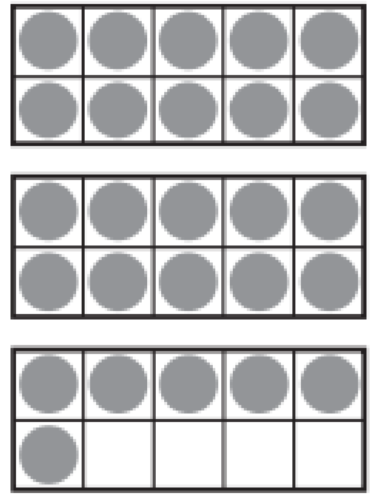

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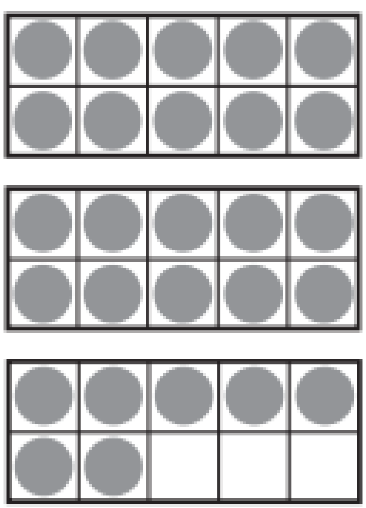

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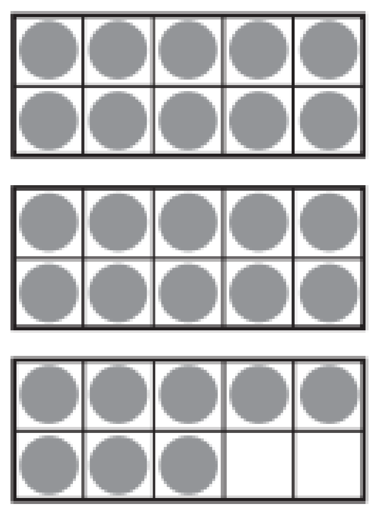

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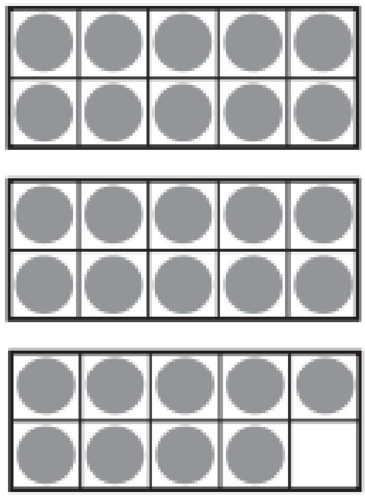

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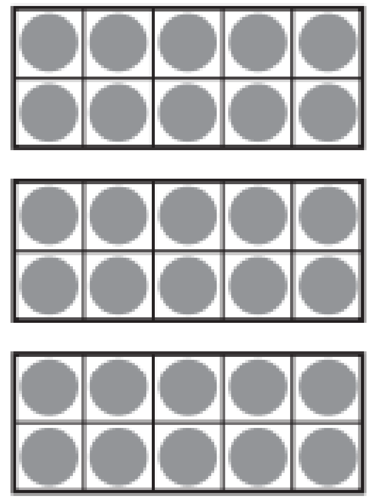

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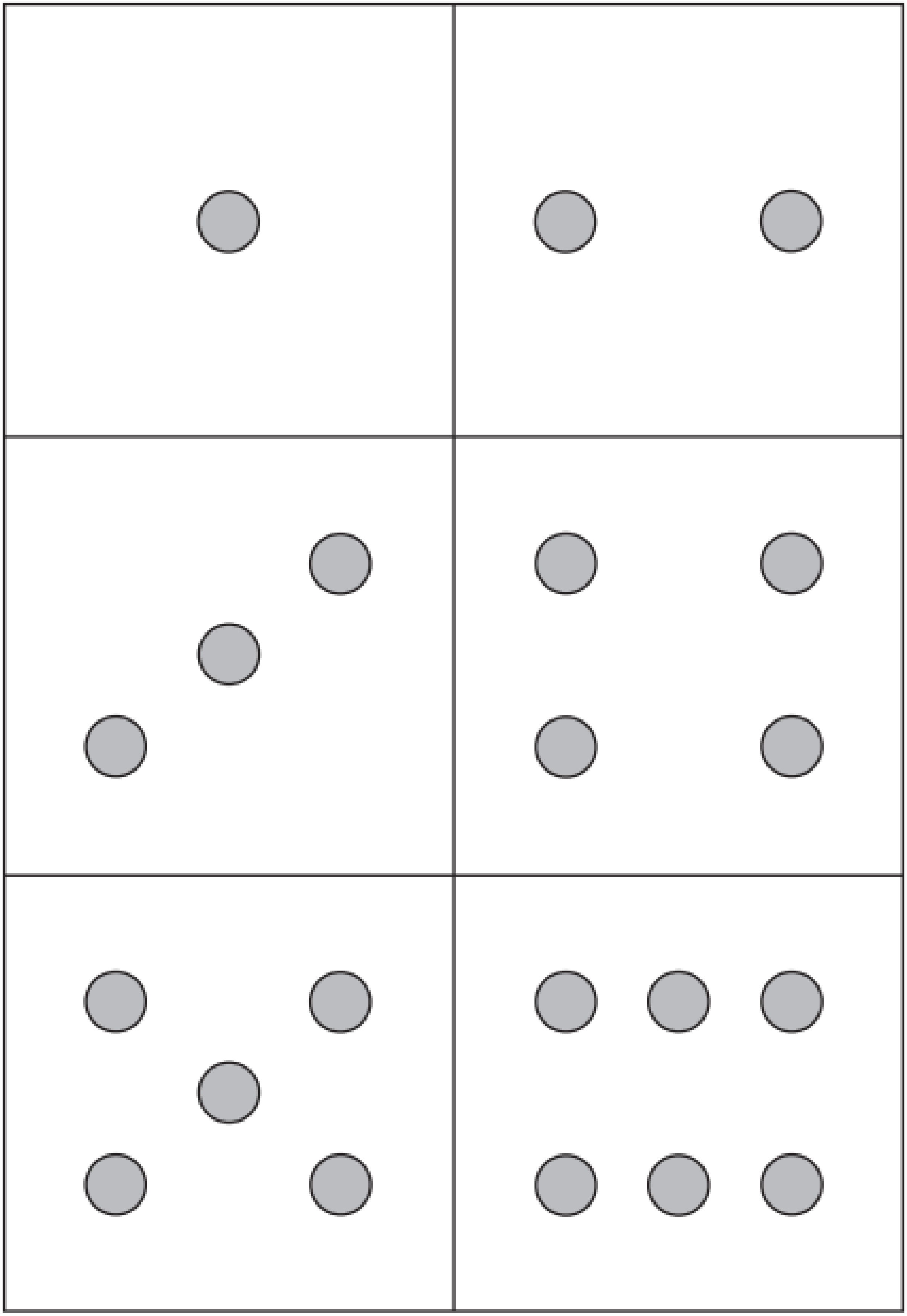
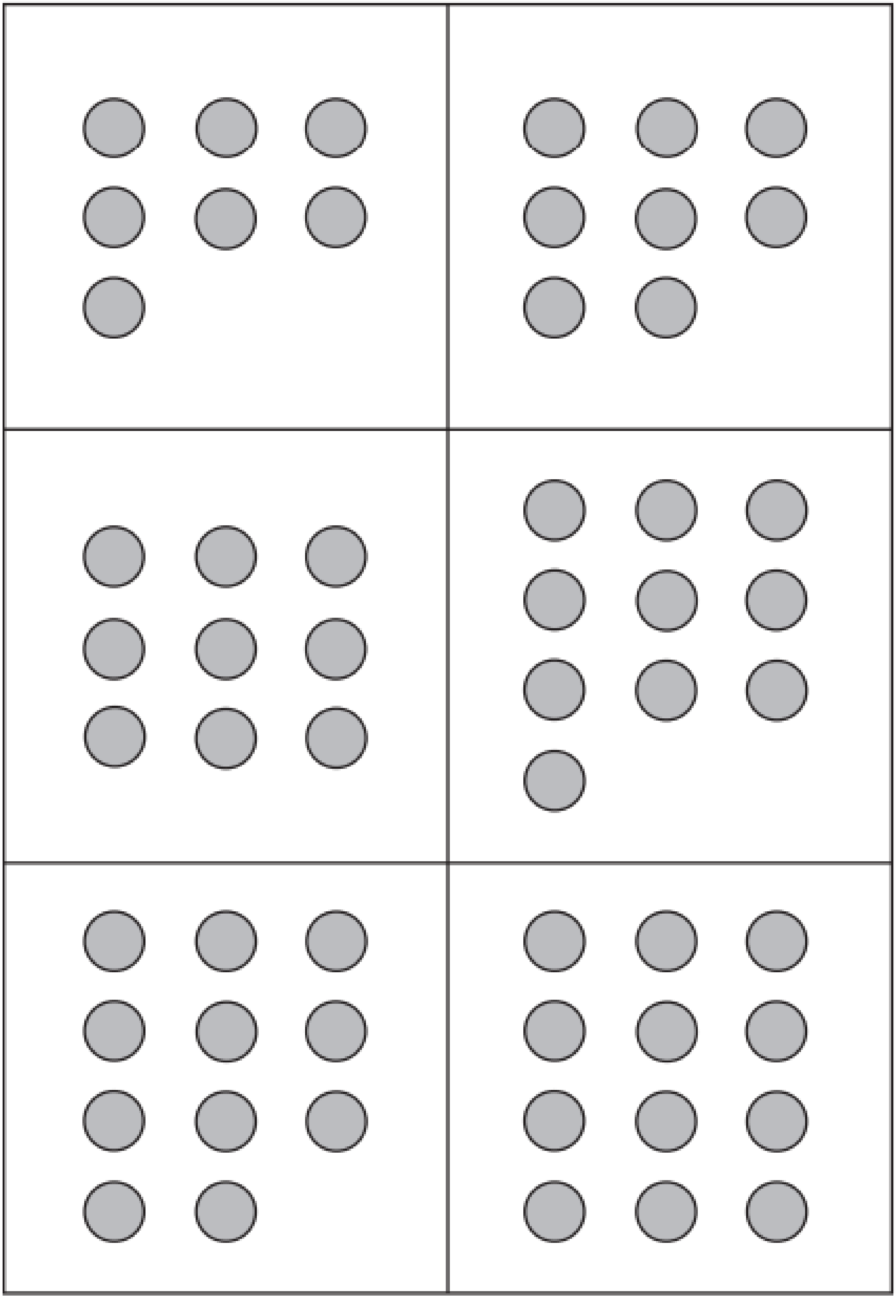




4	0
5	1
6	2
7	3

12	8
13	9
14	10
15	11

20	16
21	17
22	18
23	19

28	24
29	25
30	26
	27

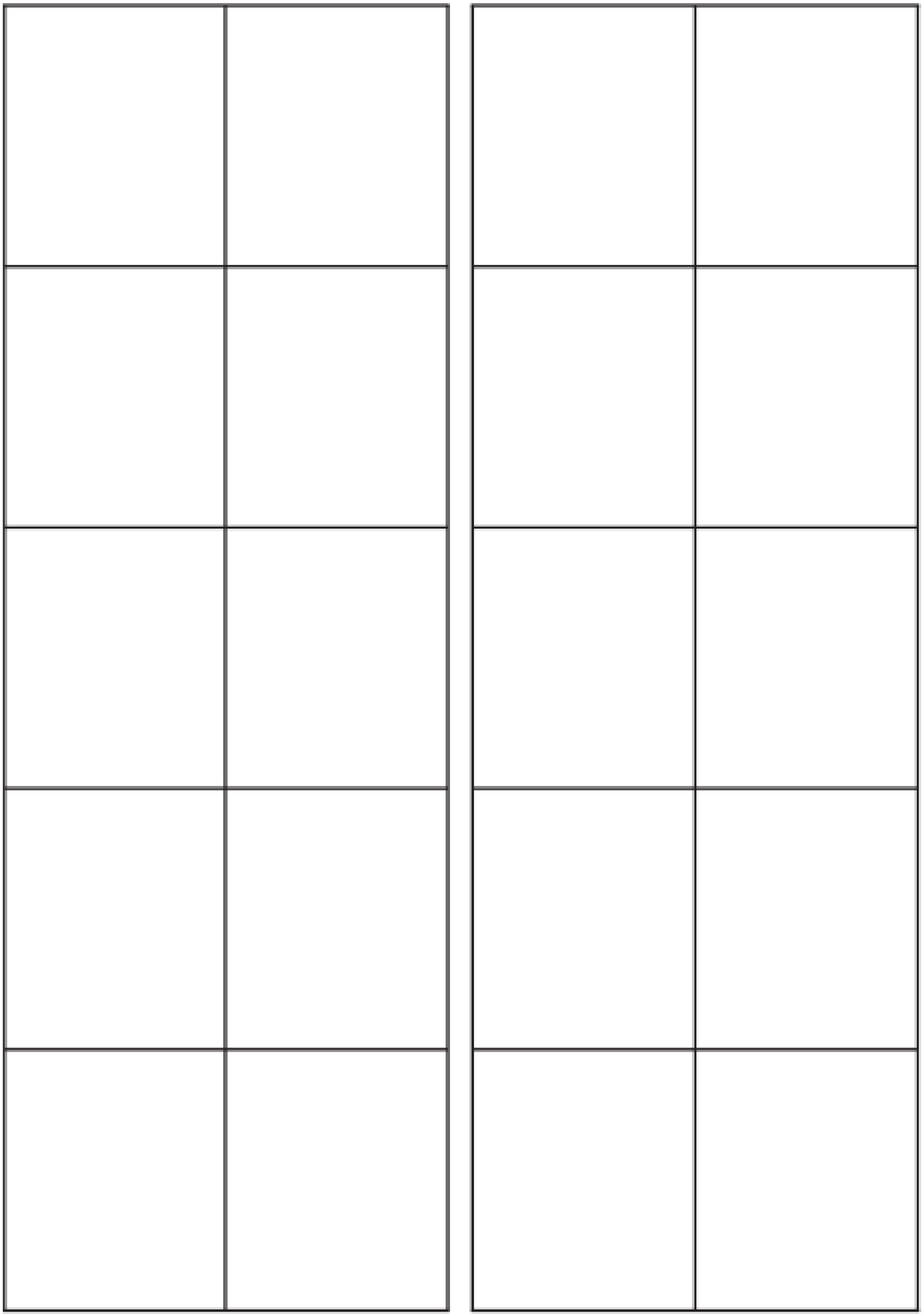
zero	one
two	three
four	five

cero	uno
dos	tres
cuatro	cinco

six	seven
eight	nine
ten	twenty

cero	uno
dos	tres
cuatro	cinco

seis	siete
ocho	nueve
diez	veinte

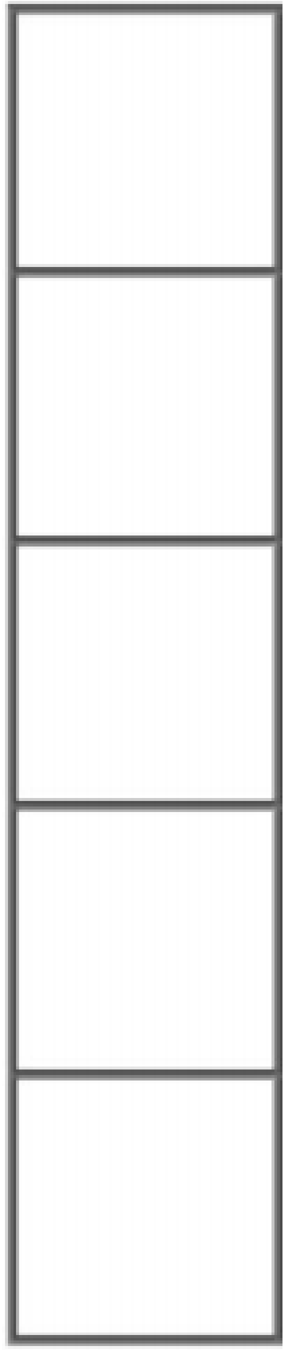


Recording Sheet

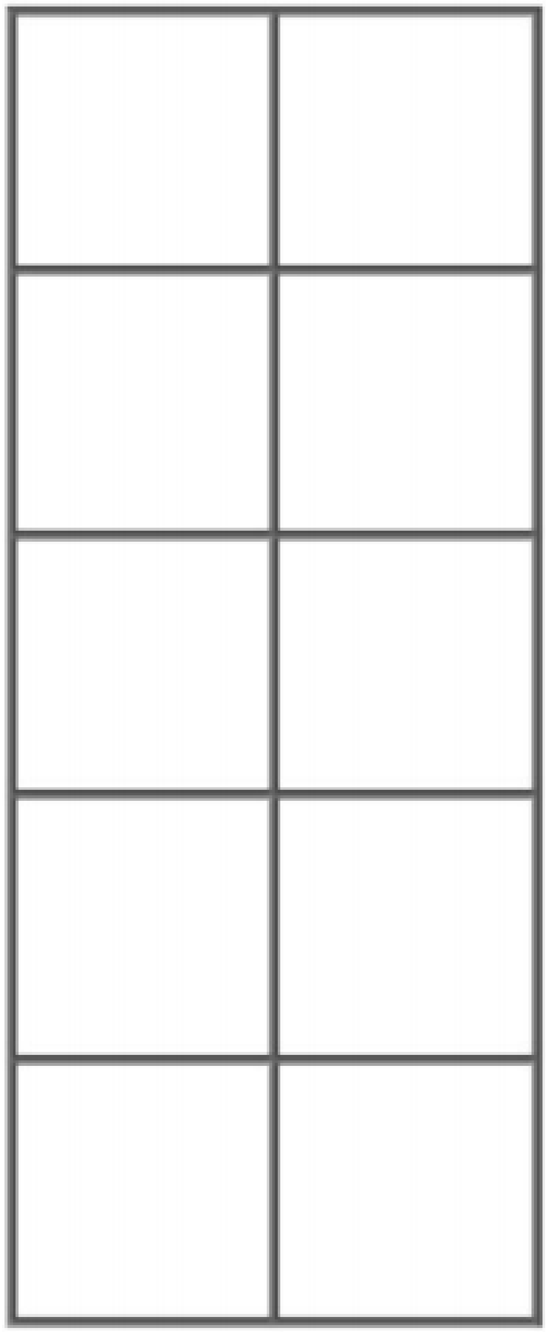
Name ____

Workmat 1

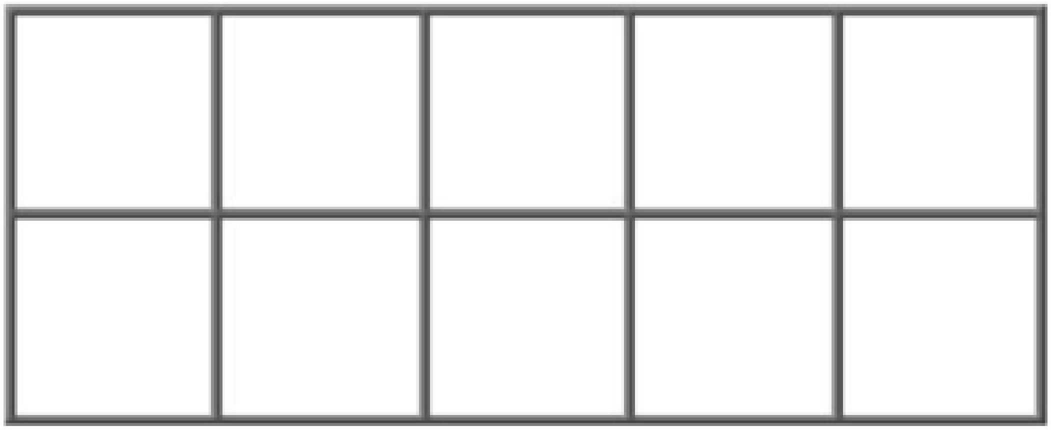
Workmat 2

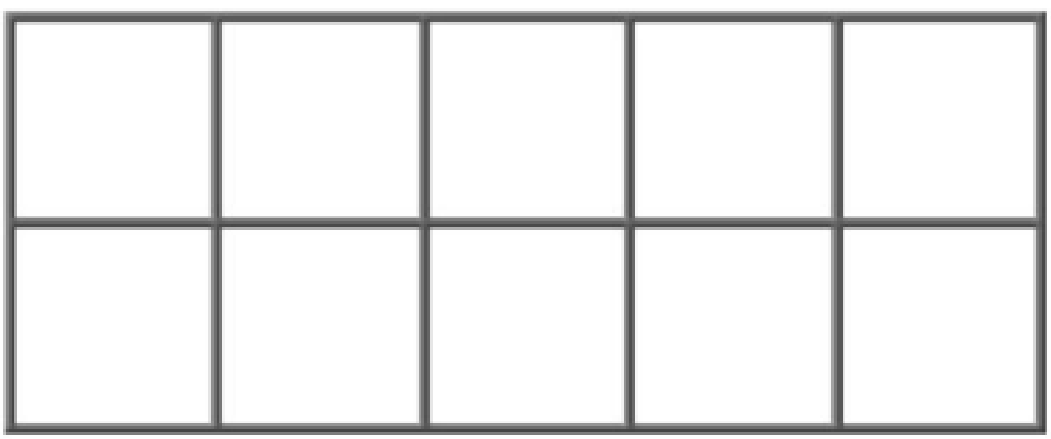


Workmat 3



Workmat 4

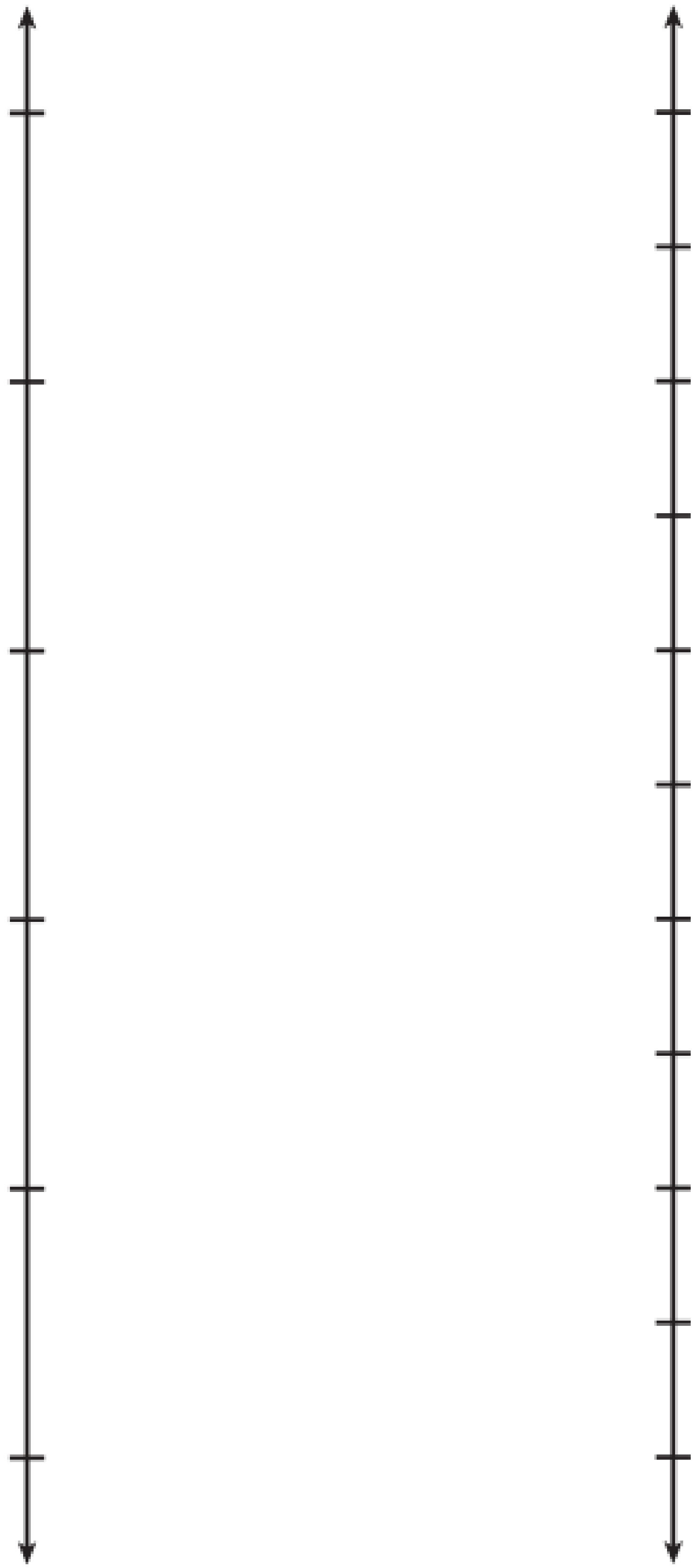




1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

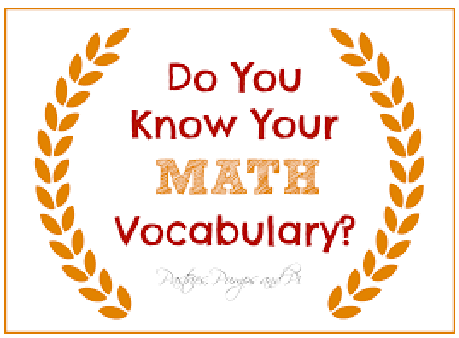
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Vocabulary:

Unit 1	
• Attributes • Color • Compare • Count • Counting back • Counting on • Difference • Digits • Fewer • Greater than • Height	• Length • Less than • Longer Than • Measure • Number • Numeral • Number words: zero, one, two, three, four, five, six, seven, eight, nine, ten • Same as • Shorter than • Total



Teaching Representations/ Manipulatives:	
• Five Frame • Hundreds Chart • Ten Frame • Objects for counting and sorting : beans, linking cubes, counter chips, buttons, small toys, keys, and color tiles. • Number Words • Number Lines • Blocks • Foam/ Magnetic Numbers	• Double Ten Frames • Dot Cards • Numeral Cards • Part-Part- Whole Mat • Number Train • Attribute blocks • Balance Scale • Rice, sand, Play-Doh • Lined Paper • Counting Mats • Flash Cards

*Items that are hyperlinked have a direct link to resources

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

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

21st Century Career Ready Practices

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.

For additional details see **21st Century Career Ready Practices** .